FOR CONTRACT NO.: 04-0A7104

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INITIAL SITE ASSESSMENT UPDATE REPORT

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I-880 29TH AVE OVERCROSSING REPLACEMENT, OAKLAND, CA FOUNDATION REPORT DATED JUNE 22, 2012

I-880 29TH AVE OFF RAMP, OAKLAND, CA FOUNDATION REPORT DATED JUNE 22, 2012

NON-STANDARD RETAINING WALLS AND SOUNDWALL, I-880 OPERATIONAL AND SAFETY IMPROVEMENTS, ALAMEDA COUNTY, CALIFORNIA FINAL FOUNDATION REPORT DATED JUNE 25, 2012

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LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ROUTE: 04-Ala-880, 28.4/29.2

FINAL MATERIALS REPORT

I-880 Operational and Safety Improvements Project
Alameda County, California
04-ALA-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)

EMI Project No. 10-133
Date: APRIL 17, 2012

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

April 17, 2012

EMI Project No. 10-133

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Attention: Mr. Garrett Gritz, P.E.

Subject: Final Materials Report
I-880 Operational and Safety Improvements Project
Alameda County, California
04-ALA-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)

Dear Mr. Gritz:

Attached is our final Materials Report for the I-880 Operational and Safety Improvements project. This report contains our findings, conclusions, and recommendations for the design and construction of the proposed interchange improvements. Specifically, this report addresses geotechnical and materials issues as described in Topic 114 of the California Department of Transportation (Caltrans) Highway Design Manual and Caltrans Test Method 130.

The first version of this report dated September 6, 2011 was submitted to Caltrans for review. Caltrans produced a memorandum dated September 27, 2011 containing their review comments of the Materials Report and Pavement Strategy Checklist. A copy of the Caltrans review comments and our responses are included in Appendix C. The responses of Appendix C have been incorporated into a revised Materials Report dated January 10, 2012. We did not receive any review comments from Caltrans on the revised report.

On February 16, 2012, Caltrans produced a memorandum after their review of the 95% Draft PS&E. In that memorandum, there were comments on the Typical Cross Section Sheets which require revisions in our pavement sections. Specifically, the unconfined compressive strength of lime stabilized soil is 300 psi with a Gravel Factor of 1.2, and a Working Table is now required due to poor quality subgrade. This final Materials Report contains the revised pavement sections based on the February 16, 2012 Caltrans review memorandum.

Sincerely,
EARTH MECHANICS, INC.

4-17-2012

Lino Cheang, GE 2345
Project Manager

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FINAL MATERIALS REPORT
I-880 OPERATIONAL AND SAFETY IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880, PM 28.4/29.2
CALTRANS PROJECT NO. 04000001601 (EA 04-0A7100)

Prepared for:

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EMI Project Number: 10-133

April 17, 2012

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1.0 GENERAL

1.1 PURPOSE AND SCOPE OF WORK

This Materials Report presents findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for the Interstate (I) 880 Operational and Safety Improvements Project located in County of Alameda, California. The purpose of the geotechnical investigation was to obtain subsurface information to develop design and construction recommendations to aid RBF Consulting (RBF) in preparing the Project Plans, Specifications, and Estimates.

This report follows the requirements for a Materials Report in accordance with Topic 114 of the California Department of Transportation (Caltrans) Highway Design Manual (HDM, 2008a) and is organized in general accordance with California Test (CT) 130. This report provides geotechnical information and recommendations for pavement structural sections, earthwork, and addresses soil corrosion issues at the site as required by the HDM.

The following geotechnical services were completed for this project:

- Geotechnical field exploration consisting of drilling and logging thirty-six exploratory borings.
- Laboratory testing of selected soil samples.
- Pavement structural section design.
- Soil corrosivity evaluation.
- Preparation of this report presenting our findings, conclusions, and recommendations.

1.2 PROJECT DESCRIPTION

I-880 is a major north-south freeway crossing Alameda, Santa Clara, San Francisco, Contra Costa and San Mateo Counties. The project location is shown on Figure 1. The proposed project is located in the City of Oakland and County of Alameda on I-880. The project limits are from just south of the existing 29th Avenue northbound off ramp to just north of the existing 23rd Avenue northbound on ramp. The 29th Avenue Overcrossing (OC) (Bridge No. 33-0141) and 23rd Avenue OC (Northern Bridge No. 33-0139 and Southern Bridge No. 33-0149) are located within the project limits.

To improve operations and safety, the proposed project will replace the 29th Avenue OC and the two 23rd Avenue OCs, and reconstruct the existing northbound 29th Avenue and 23rd Avenue off- and on-ramps. Replacement of these OCs will also provide room to widen the existing I-880 mainline lanes outside shoulders to the Caltrans standard width and lengthen existing northbound auxiliary lane between the 29th Avenue on-ramp and 23rd Avenue off-ramp. The intersection of East 9th Street / 29th Avenue / northbound 29th Avenue on-ramp will be configured as a roundabout.

1.3 CLIMATIC CONDITIONS

Weather in the greater San Francisco Bay Region is typified by a temperate Mediterranean climate with mild, wet winters and dry, warm summers. Oakland, being located slightly inland and across from the Golden Gate, occasionally experiences morning maritime fog. It is far enough inland, though, that the fog often burns off by midday, allowing it to have more sunny days than its neighbor San Francisco. The Oakland hills tend to have more fog than the lower elevation flatlands immediately adjacent to the Bay.

Temperatures in Oakland range from an average annual high of 62°F to an average annual low of 48°F. During the summer, the average highs are in the low 70s and the average lows are in the upper 50s. The warmest month is September. During the winter, the average highs are in the mid- to upper 50s and the average lows are in the mid- to upper 40s. December and January are the coldest months of the year. Extreme high temperatures can reach over 100°F during the summer and extreme low temperatures can dip into the mid-20s overnight during the winter.

Annual precipitation averages about 23 inches, and most rain falls between the months of October and May. The wettest month is January, with an average of 4.85 inches of rain. Rainfall is rare during the summertime, with an average of only 0.07 inches of rain during July. While rare dustings of snowfall can occur on the hills above Oakland during the winter months, measurable snowfall near sea level around San Francisco Bay is extremely unlikely and has not happened since February of 1976.

The prevailing annual wind direction is from the west. In this area, marine air intrusion through the Golden Gate, across San Francisco, and through the San Bruno Gap is a dominant weather factor throughout the year. The Oakland-Berkeley Hills causes a bifurcation of westerly flow in the vicinity of Oakland, with more southerly winds observed over the San Francisco Bay to the north of the Golden Gate and northwesterly winds observed over the bay to the south of the Golden Gate. During the winter months of December and January, the prevailing wind direction shift to the southeast. Wind speeds average about 6-8 miles per hour (mph) during the winter and increase to about 8-10 mph during the summer.

1.4 TERRAIN, LAND USE, AND SURFACE DRAINAGE

The interstate is located on the generally level Oakland alluvial plain, with a gentle slope down to the west at an average gradient of about 50 feet per mile. The plain is bounded by the Oakland Estuary and San Francisco Bay which is located about 0.25 miles to the southwest, and the Oakland hills, which are located about 2.5 miles to the northeast. The Oakland alluvial plain extends for approximately 25 miles from north to south and, along its length in east-west direction, varies from 2 to 7 miles in width. The alluvial plain includes all or portions of the cities of Richmond, San Pablo, El Cerrito, Albany, Berkeley, Emeryville, Piedmont, Alameda, Oakland, San Leandro, San Lorenzo and Hayward.

Areas immediately adjacent to the interchange are occupied primarily by commercial and residential developments.

Based on the project Drainage Plans and Project Report, the existing drainage facilities include storm drain systems and cross culverts. There are no major rivers, creeks, or streams within the project limits. The project area lies within the San Antonio Creek watershed. The watershed is

drained by Glen Echo Creek (Cemetery Creek), Pleasant Valley Creek, Bushy Dell Creek, Wildwood Creek, Indian Gulch Creek (Trestle Glen Creek), Park Boulevard Creek and 14th Avenue Creek. These creeks originate as natural streams in the Oakland Hills, flow from the northeast to the southwest through more urbanized areas, and follow improved channels with some sections buried in underground culverts. Eventually, they discharge into San Francisco Bay via the Oakland Estuary.

1.5 REGIONAL GEOLOGY

The project area is located in the Coast Ranges geomorphic province of California. The Coast Ranges are bounded by the Pacific Ocean on the west and the Great Valley on the east. The ranges extend from the Oregon border south to the Santa Ynez River near Santa Barbara; San Francisco Bay further subdivides the province into the northern and southern sections. The Coast Ranges are characterized by discontinuous, northwest-trending mountain ranges, ridges, and valleys. East of the San Andreas Fault, most of the province bedrock is composed of a heterogeneous mix of marine and volcanic rocks of the Franciscan Assemblage, including chert, greywacke sandstone, altered mafic volcanic rock, shale, serpentinite, and metamorphic rock. Granitic rocks of the Salinian block comprise much of the basement rock of the ranges located west of the San Andreas Fault.

The project area is underlain predominantly by medium stiff to very stiff layers of clay with silt and sandy clay and few interbedded layers of medium dense to very dense sand and gravel. The geologic formations of importance to this project are flat-lying sediments with no notable geologic structures such as faults, folds, or unconformities. The site area is flat, with no natural hills or slopes.

The subsurface soil conditions at the project location consist primarily of unconsolidated Holocene alluvial fan deposits. These materials are typical of late Quaternary-age sediments deposited in a distal alluvial fan environment. The project site is mapped as undifferentiated Holocene alluvial gravel, sand, and clay by Dibblee (2005) and as Holocene alluvial fan sand and sandy gravel upwardly fining to sandy or silty clay by Graymer (2000) and Helley and Graymer (1997). According to Knudsen et al. (2000) and California Geological Survey (CGS, 2003), the site is underlain by Holocene alluvial fan deposits. Regional mapping indicates that elevation of Franciscan bedrock in the vicinity of site is about 800 to 850 feet below MSL.

1.6 PERTINENT REPORTS AND INVESTIGATIONS

No previous geotechnical studies were performed specifically for final design of the improvements addressed in this report.

1.7 RELATED REPORTS PREPARED FOR THE PROPOSED IMPROVEMENTS

A separate Geotechnical Design Report (GDR) (EMI, 2012a) has been prepared for the current geotechnical study to address geotechnical issues not included in this report. The Geotechnical Design Report may be referred to for additional geotechnical information.

Separate Foundation Reports (EMI, 2012b and 2012c) have been prepared for the wall foundations and the two overhead sign structures.

1.8 LIMITATIONS

This report is intended for the use of Alameda County Transportation Commission, RBF Consulting and Caltrans for the I-880 Operational and Safety Improvements Project. This report is based on the project as described herein and information obtained from exploratory borings drilled for this project at the approximate locations indicated on the attached plans. Findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. Soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site; however, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented herein are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained herein are applicable to the specific design elements and locations that are the subject of this report. Data, opinions, and recommendations herein are not applicable to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any worker to carry out the construction in accordance with the Final Construction Drawings and Specifications.

Services performed by EMI were conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 EXISTING FACILITIES

The project study area is located in the City of Oakland, on I-880. The limits are from just south of the existing 29th Avenue northbound off ramp to just north of the existing 23rd Avenue northbound on ramp. The existing interchanges at 29th Avenue and 23rd Avenue are very closely spaced, and the mainline freeway alignment transitions between relatively small radius reversing horizontal curves. The existing overcrossings have multiple columns supporting each bridge with nonstandard minimum vertical clearances over I-880. The columns are oriented in such a way as to prevent widening of the mainline freeway to accommodate future lane widening, standard shoulders and incorporation of auxiliary lane extensions. The inside and outside mainline shoulders do not meet current design standards and the width of the number one lane in the northbound direction is less than the 12-foot design standard.

The existing 23rd Avenue Overcrossing was constructed around 1947, and consists of two, two-lane bridges. The northern bridge (Caltrans Bridge No. 33-0139) carries southbound traffic on 23rd Avenue over the on-ramp to southbound I-880, the on-ramp to northbound I-880 from northbound 23rd Avenue, and over I-880 at Post Mile 28.98. The southern bridge (Caltrans Bridge No. 33-0149) carries northbound traffic on 23rd Avenue over the on-ramp to southbound I-880, and over I-880 at Post Mile 28.93. The north bridge (southbound) is about 940 feet long, and the south bridge (northbound) is about 503 feet long.

The existing 29th Avenue Overcrossing (Bridge No. 33-0141) was constructed around 1947 as a two-lane overcrossing. The total length of the bridge is about 610 feet.

Based on information provided by RBF, the as-built pavement sections are as follows:

- Mainline I-880 is 0.75' Portland Cement Concrete (PCC) over 0.33' Cement Treated Base (CTB, Drained Base) over 1.0' Aggregate Subbase (AS).
- NB off ramp to 29th Avenue, NB off ramp to 23rd Avenue, and NB on ramp from WB 23rd Avenue are 0.25' PMS (AC) over 0.5' Crushed Run Base and 1.0' Import Borrow; NB on ramp from EB 23rd Avenue is 0.67' PCC over 0.33' Crushed Run Base and 1.0' Import Borrow.
- Existing city streets are 0.33' AC over 1.5' Aggregate Base (AB).

2.2 PROPOSED IMPROVEMENTS

The proposed project will replace the 29th Avenue and 23rd Avenue overcrossings. The existing northbound 29th Avenue off ramp and on ramp will be reconstructed to improve operations and safety. The intersection of East 9th Street / 29th Avenue / northbound 29th Avenue on ramp will be configured as a roundabout. The existing northbound 23rd Avenue off ramp and on ramps will be reconstructed to improve operations and safety. In addition, a soundwall will be constructed along East 8th Street, between 29th and 23rd Avenues to reduce noise impacts associated with the I-880 freeway within the Jingletown residential community. Retaining structures will be used to retain embankment fills at the bridge approaches.

3.0 ROADWAY AND CULVERT FOUNDATIONS

3.1 GEOTECHNICAL INVESTIGATION

A geotechnical field investigation was conducted between March 28 and April 20, 2011. Thirty six exploratory borings were accomplished under the supervision of EMI. Approximate locations of borings are shown on Figure 2 through Figure 6. Soil exploration information is summarized in Table 1, and boring logs and Log of Test Boring (LOTB) sheets are presented in Appendix A.

Table 1. Soil Exploration Information

Boring	Station [1]	Offset [1] (feet)	Station Line [2]	Top of Boring Elevation (feet)	Bottom of Boring Elevation (feet)	Groundwater Elevation [3] (feet)	Drilling Method [4]
CPT-11-001	224+00	51 Rt	05	+27.0	-23.0	NM	CPT
R-11-002	225+11	72 Rt	05	+26.6	-44.9	+13.6	RW
CPT-11-003	227+44	128 Rt	05	+25.3	-44.7	NM	CPT
HA-11-004	231+30	80 Rt	05	+22.5	+17.5	NE	HA
A-11-005	26+90	30 Rt	A	+24.8	+13.3	NE	HSA
R-11-006	30+15	50 Rt	A	+27.8	-43.7	NM	RW
A-11-007	31+57	4 Lt	A	+30.0	+18.5	NM	HSA
R-11-008	28+70	27 Lt	A	+27.5	-43.8	+14.0	RW
R-11-010	234+20	95 Rt	05	+21.8	-29.7	+14.3	RW
CPT-11-011	236+95	85 Rt	05	+21.7	-28.3	NM	CPT
CPT-11-013	239+55	84 Rt	05	+19.8	-30.2	NM	CPT
R-11-014	242+02	85 Rt	05	+19.5	-52.0	+10.0	RW
A-11-016	43+53	4 Rt	B1	+16.2	+4.7	NE	HSA
CPT-11-017	245+95	113 Rt	05	+17.0	-53.0	NM	CPT
A-11-018	46+64	7 Rt	B1	+19.2	+7.7	NE	HSA
A-11-020	27+93	11 Lt	B	+20.2	+8.7	NE	HSA
R-11-021	28+56	50 Rt	B	+24.2	-27.3	+10.7	RW
A-11-022	250+78	61 Rt	05	+17.8	+6.3	+6.8	HSA
A-11-023	52+98	38 Rt	B2	+19.5	+8.0	NE	HSA
A-11-024	31+32	18 Rt	B	+22.5	+11.0	NE	HSA
A-11-025	55+08	82 Rt	B2	+21.5	+10.0	NE	HSA
A-11-026	33+82	67 Rt	B	+22.4	+10.9	NE	HSA
A-11-027	57+08	72 Rt	B2	+19.5	+8.0	NE	HSA
A-11-028	32+93	1 Rt	B	+22.6	+11.1	NE	HSA
A-11-029	60+46	7 Rt	B2	+20.0	+8.5	NE	HSA

Boring	Station [1]	Offset [1] (feet)	Station Line [2]	Top of Boring Elevation (feet)	Bottom of Boring Elevation (feet)	Groundwater Elevation [3] (feet)	Drilling Method [4]
R-11-030	20+44	28 Lt	B	+15.4	-56.1	+7.9	RW
R-11-031	21+80	45 Rt	B	+19.0	-52.5	+7.2	RW
A-11-032	16+91	53 Lt	B	+15.4	+3.9	+4.9	HSA
CPT-11-033	21+39	28 Rt	A	+18.2	-51.8	NM	CPT
R-11-034	20+33	45 Lt	A	+16.9	-54.1	+9.4	RW
R-11-035	19+21	33 Rt	A	+17.3	-54.2	+9.3	RW
A-11-036	251+37	105 Rt	05	+18.7	-12.8	+7.7	HSA
W-11-037 [5]	251+34	92 Rt	05	+18.7	+11.7	NE	HSA
W-11-038 [5]	251+87	90 Rt	05	+18.7	+11.7	NE	HSA
W-11-039 [5]	251+82	90 Rt	05	+18.7	+11.7	NE	HSA
CPT-11-040	247+00	220 Rt	05	+19.0	-51.0	NM	CPT

Notes:
(1) Stations and offsets are measured relative to the identified Station Lines and are approximate.
(2) 05 = I-880 Mainline; A = 29th Avenue; B = 23rd Avenue; B1 = NB Off-Ramp to 23rd Avenue; B2 = NB On-Ramp from 23rd Avenue.
(3) NE = Not Encountered; NM = Not Measured.
(4) HSA = Hollow-Stem Auger Boring; HA = Hand Auger Boring; CPT = Cone Penetrometer Test; RW = Rotary Wash Boring.
(5) W = Infiltration Wells.

Soil borings designated with a prefix "W" are infiltration wells. They were used for soil infiltration testing only, and boring logs are not prepared for these wells.

The rotary-wash borings were drilled by Pitcher Drilling Co., under a subcontract with EMI, using a truck-mounted drill rig equipped with 5-inch diameter drill bits with a mud-rotary circulation drill system. The samplers were driven into the ground using a 140-lb automatic hammer free falling from a height of 30 inches.

The hollow-stem auger borings were drilled by West Coast Explorations, under a subcontract with EMI, using a truck mounted drill rig equipped with 8-inch diameter hollow-stem augers. The samplers were driven into the ground using a manually operated 140-lb safety hammer free falling from a height of 30 inches.

Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval is generally 5 feet. Relatively undisturbed soil samples were obtained using a 3.25-inch outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1-inch long with a 2.5-inch outside diameter. The SPT sampler (1.4-inch inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18 inches into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30 inches. The numbers of blows to advance the sampler each 6 inches of penetration were recorded. The number of blows for the final 12

inches or shorter of driving was recorded on the boring logs and LOTB sheets. Charts published by Winterkorn and Fang (1975) can be used to determine a reduction factor used to convert blowcounts recorded using the Modified California Drive sampler into SPT blowcounts. Using those charts, we obtained a reduction factor of 0.5 which was used for this project.

Hand-auger borings were drilled using a 3-inch diameter stainless steel hand-auger. Only bulk samples were collected from the hand-auger borings.

The CPT soundings were performed by Middle Earth Geo Testing, Inc. (Middle Earth), under a subcontract with EMI, using an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and ASTM D3441). The CPT equipment consisted of a cone penetrometer assembly mounted at the end of a series of hollow sounding rods. The cone penetrometer assembly consisted of a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in^2 (10 cm^2) and a cylindrical friction sleeve with a surface area of 23.25 in^2 (150 cm^2). The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurements of cone tip and friction sleeve resistance during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79 inch per second (20 mm per second) while the cone tip resistance and sleeve friction resistance are recorded every 1.967 inches (50 mm) and stored in digital form. A specially designed all-wheel drive 25-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

3.2 LABORATORY SOIL TESTING

Soil samples were tested to obtain or derive relevant physical and engineering properties. To perform analyses related to the Materials Report, the following laboratory soil tests were conducted to supplement the observations recorded during the field investigation:

- In-situ Moisture Content & Unit Weight
- Atterberg Limits
- Maximum Density & Optimum Moisture Content
- Unconfined Compressive Strength of Lime-Treated Soils
- No. 200 Wash
- R-Value
- Soil Corrosivity

The laboratory tests were conducted in general accordance with California Test (CT) methods or American Society for Testing and Materials (ASTM) standards. Laboratory test results are presented in Appendix B including the unconfined compressive strength of lime-treated soils. Other laboratory tests such as Direct Shear, Unconsolidated-Undrained Triaxial, Pocket Penetrometer and Consolidation are noted on the boring logs and LOTB sheets in Appendix A. These strength tests were conducted for structures foundation and embankment design; these test results were not used in preparation of the recommendations included in this report and therefore, they were omitted from Appendix B.

3.3 GROUNDWATER

Groundwater was encountered between the elevations +4.9 feet and +14.3 feet during the recent field investigation for the I-880 Operational and Safety Improvements Project. During the past field investigation conducted in 1993, groundwater was encountered in two explorations at elevations -1.5 feet and -1.7 feet. Based on California Geological Survey (2003), the recorded highest historical groundwater depth varies from about 5 to 10 feet along the project corridor.

Groundwater encountered during construction may be higher or lower than those encountered above due to seasonal rainfall fluctuation and runoff amount, local irrigation practices, extraction and recharge of local and regional aquifers, and other manmade conditions.

3.4 FOUNDATION TREATMENT FOR GENERAL FILL AREAS

Vegetation on existing ground should be removed from the site prior to fill placement. Loose, soft, dry, wet, or otherwise unsuitable materials should be removed from areas to receive fill. After clearing and grubbing, a minimum overexcavation and recompaction of 18 inches should be accomplished within all areas to receive compacted fill. The overexcavation should extend horizontally a minimum distance of 18 inches from edges of new fills. The overexcavation bottoms should be scarified to a minimum depth of 6 inches, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. All overexcavation bottoms should be observed to be firm and unyielding prior to fill placement. Foundation treatment for pavement subgrade is discussed in Section 7.6.

3.5 DRAINAGE SYSTEMS

According to the Utility Plan and Drainage Plan, 6-inch to 24-inch diameter water lines operated by East Bay Municipal Utility District, and 6-inch to 18-inch diameter sewer lines operated by the City of Oakland are crisscrossing the project site. New drainage lines consisting of 12-inch to 36-inch diameter Alternate Pipe Culverts (APC) will also be constructed as part of this project.

Based on current plans, fills are proposed throughout the project area; impact of fills at least 5 feet in height should be evaluated for utilities and drainage structures that fall within a 45-degree projection below the footprint of fills. In addition, the existing culverts, if any, that will remain in-place should be inspected, then rehabilitated or replaced (if necessary).

RBF has identified four lines in close proximity to new embankment fills:

- An existing 12-inch diameter sewer line located East of southern approach to 29th Avenue OC (Replace);
- An existing 15-inch diameter sewer located at northern approach to 29th Avenue OC (Replace)
- A proposed 18-inch diameter storm drain located at southern approach to 29th Avenue OC (Replace); and
- A proposed 18-inch diameter storm drain located south of western approach to 29th Avenue NB Off-Ramp Bridge.

We performed calculations to determine the settlement profile along each of these four lines. Maximum settlement was about 2.5 inches. Structural integrity assessment of these four lines should be based on the detailed results included in the GDR (EMI, 2012a).

4.0 CUTS AND EXCAVATIONS

Based on the Profile Sheets and cross-sections provided by RBF, most of the excavations are relatively minor (less than about 5 feet). However, up to 20 feet of cut is expected for construction of the 23rd Avenue Northbound (NB) Off-Ramp between "B1" Line Stations 47+00 and 49+00. But the finished grade will be near the existing surrounding grade elevation and will be relatively flat. Therefore, we don't anticipate any slope stability issues due to this proposed cut. The remaining cut slopes are also globally stable with side slopes at a 2H:1V gradient or flatter and a maximum height of 5 feet.

Per Caltrans HDM Topic 304 (Caltrans, 2008a), side slopes should be constructed no steeper than 4H:1V where possible. Design exception will be required for side slopes with gradients steeper than 4H:1V.

5.0 EMBANKMENTS

Based on the Profile Sheets and cross-sections provided by RBF, embankment fill will need to be placed to construct the approaches to 23rd Avenue OC bridge replacement, 29th Avenue OC bridge replacement, and 29th Avenue NB Off-Ramp bridge. The following major embankment fills will be placed to construct the approaches and on-ramp:

- Up to 27.5 feet of embankment fill at southern approach to 23rd Avenue OC (Replace).
- Up to 15.0 feet of embankment fill at northern approach to 23rd Avenue OC (Replace).
- Up to 20.0 feet of embankment fill at southern approach to 29th Avenue OC (Replace).
- Up to 15.0 feet of embankment fill at northern approach to 29th Avenue OC (Replace).
- Up to 17.5 feet of embankment fill at approach to 29th Avenue NB Off-Ramp (New).

Retaining walls will be constructed at each approach to retain the above embankment fill. These retaining walls are mostly Mechanically Stabilized Embankment (MSE) walls. The relatively tall portion of the embankment at the southern approach to 23rd Avenue OC Replacement will also be constructed with Light Weight Fill (LWF) consisting of Expanded Polystyrene (EPS) blocks. EPS blocks are required to minimize the impact of the new embankment fill on existing facilities including supports of the existing 23rd Avenue OC. Design of the EPS blocks and the curtain walls are performed by RBF and URS Corporation, respectively. Pavement structural sections on-top of the EPS blocks are presented in Section 7.5.

In addition to the aforementioned embankment fills, 4 to 10 feet of embankment fill will be required to construct the 29th Avenue NB Off-Ramp. The width of the embankment fill varies between 10 and 24 feet. A Caltrans Standard Type 1 Wall 224 will be constructed along the north side of the off-ramp to retain this embankment fill.

Stability and settlement of the bridge approach fill embankments and retaining structures are addressed in the foundation report for walls (EMI, 2012b). Settlement calculations were performed for the embankment fills along the 29th Avenue NB Off-Ramp, and the results are presented in the GDR (EMI, 2012a).

Per Caltrans HDM Topic 304 (Caltrans, 2008a), side slopes should be constructed no steeper than 4H:1V where possible. Design exception will be required for side slopes with gradients steeper than 4H:1V.

6.0 CORROSION INVESTIGATIONS

Nine soil samples were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are presented in Table 2.

Minimum resistivities ranged from 1,200 to 5,900 ohm-cm. The pH ranged from 6.5 to 7.6. The soluble sulfate contents ranged from 55 to 252 parts per million (ppm), and the soluble chloride contents ranged from 158 to 231 ppm.

Based on the Caltrans Corrosion Guidelines (2003), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 2,000 ppm or greater. Based on the test results and the Caltrans criteria, the on-site soils are considered to be non-corrosive to bare metals and concrete.

Table 2. Summary of Soil Corrosion Test Results

Boring	Station (Offset) / Station Line	Sample Depth (feet)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
R-11-002	225+11 (72 Rt) / "05" Line	5	CL	1,300	7.3	65	219
R-11-006	30+15 (50 Rt) / "A" Line	5	CL	1,600	7.6	65	164
R-11-010	234+20 (95 Rt) / "05" Line	10	SC	5,900	6.7	55	185
R-11-014	242+02 (85 Rt) / "05" Line	5	CH	1,300	6.6	70	158
R-11-021	28+56 (50 Rt) / "B" Line	5	CL	1,500	6.5	65	197
R-11-030	20+44 (28 Lt) / "B" Line	10	CL	1,200	6.6	80	231
R-11-031	21+80 (45 Rt) / "B" Line	5	CH	1,300	6.9	170	221
R-11-034	20+33 (45 Lt) / "A" Line	15	CL	2,500	7.1	252	160
R-11-035	19+21 (33 Rt) / "A" Line	5	CH	1,400	7.3	90	158

Notes: 05 = I-880 Mainline; A = 29th Avenue; B = 23rd Avenue

7.0 STRUCTURAL PAVEMENT DESIGN

7.1 EXISTING PAVEMENT SECTIONS

Based on information provided by RBF, the as-built pavement sections are as follows:

- Mainline I-880 is 0.75' PCC over 0.33' CTB (Drained Base) over 1.0' AS.
- NB off ramp to 29th Avenue, NB off ramp to 23rd Avenue, and NB on ramp from WB 23rd Avenue are 0.25' PMS (AC) over 0.5' Crushed Run Base and 1.0' Import Borrow; NB on ramp from EB 23rd Avenue is 0.67' PCC over 0.33' Crushed Run Base and 1.0' Import Borrow.
- Existing city streets are 0.33' AC over 1.5' AB.

Based on the above information, the ramps and local streets will be designed as "undrained" sections. Based on discussions with RBF, the Mainline will also be designed as "undrained" sections because Caltrans prefers any new pavements to be undrained sections. The existing edge drains will be moved to the sawcut line between the Mainline ETW and the proposed Auxiliary Lane. The relocation of the existing edge drains is also temporary because the District has a pavement rehabilitation project that is scheduled to follow immediately after this project, and the edge drains will be abandoned then.

7.2 SUBGRADE R-VALUES

Nineteen (19) samples of on-site, near-surface soils were tested to determine their R-values. The R-value test results together with Plasticity Index (PI) are presented in Table 3.

Table 3. Summary of R-Value Results

Boring	Station (Offset) / Station Line	Sample Depth (ft)	Soil Type	R-Value	PI (%)
R-11-002	225+11 (72 Rt) / 05	2 to 5	CL	<5	-
HA-11-004	231+30 (80 Rt) / 05	0 to 5	CL	<5	22.9
A-11-005	26+90 (30 Rt) / A	0 to 2.5	CL	<5	23.9
A-11-007	31+57 (4 Lt) / A	2.5 to 5	CL	<5	-
R-11-008	28+70 (27 Lt) / A	0 to 5	CL	<5	-
R-11-010	234+20 (95 Rt) / 05	2.5 to 5	CL	4	21.8
R-11-014	242+02 (85 Rt) / 05	0 to 2.5	CL	<5	29.2
A-11-016	43+53 (4 Rt) / B1	0 to 5	CL	9	-
A-11-020	27+93 (11 Lt) / B	0 to 5	CL	<5	24.7
R-11-021	28+56 (50 Rt) / B	2.5 to 5	SC	15	-
A-11-022	250+78 (61 Rt) / 05	0 to 5	CL to SC	9	17.7
A-11-023	52+98 (38 Rt) / B2	0 to 5	CL	12	-
A-11-027	57+08 (72 Rt) / B2	0 to 5	CL	<5	32.0

Boring	Station (Offset) / Station Line	Sample Depth (ft)	Soil Type	R-Value	PI (%)
A-11-028	32+93 (1 Rt) / B	0 to 5	SC	14	-
A-11-029	60+46 (7 Rt) / B2	0 to 2.5	CL	4	23.1
R-11-030	20+44 (28 Lt) / B	2.5 to 5	CL	8	-
A-11-032	16+91 (53 Lt) / B	0 to 2.5	CL	<5	-
R-11-034	20+33 (45 Lt) / A	1 to 2.5	SC	32	-
R-11-035	19+21 (33 Rt) / A	0 to 2.5	CL	<5	32.6

Notes: 05 = I-880 Mainline; A = 29th Avenue; B = 23rd Avenue; B1 = NB Off-Ramp to 23rd Avenue; B2 = NB On-Ramp from 23rd Avenue.

We have the following observations based on an examination of the data in Table 3:

- R-value ranges from less than 5 to 32, and 12 out of the 19 samples have a R-value less than 5,
- 15 out of 19 samples tested are classified as "CL", and
- All PI results are greater than 12%; as a result, onsite subgrade is classified as "Expansive Soils" per Caltrans HDM Topic 614.4 (2008a).

Based on the R-value test results, an R-value of 5 can be used for the onsite subgrade.

7.3 REHABILITATION OF EXISTING PAVEMENTS

Based on recent discussions with Caltrans, this project will be followed by a pavement rehabilitation project; the rehabilitation project will place an overlay on the existing and new pavements, thus lengthening the design life of the new pavement sections.

7.4 EXPANSIVE SUBGRADE

Based on the results of the Plasticity Index test, the onsite subgrade is classified as "Expansive Soils" per Caltrans Highway Design Manual (HDM) Topic 614.4 (2008a). Expansive soils are not suitable as pavement subgrade and several mitigation alternatives are described in the following paragraphs.

7.4.1 Replace Expansive Subgrade with Non-Expansive Subgrade

The expansive subgrade can be replaced with non-expansive Select import materials.

7.4.2 Lime Treatment

Lime can be added to fine-grained subgrades to reduce the expansion potential. Soil treated with lime is considered to be Lime Stabilized Soil (LSS). Caltrans HDM Topic 614.4 describes a procedure used to determine the depth of lime treatment. In this procedure, the Gravel Factor (G_f) of the subbase can be increased beyond unity using results of unconfined compression test of batched subgrades treated with lime. The treatment depth is then determined by dividing the Gravel Equivalent (GE) by the G_f. In this method, the minimum G_f is 1.2 and the maximum G_f is

1.7. Topic 614.4 also indicates that the minimum treated depth is 0.65 foot and the maximum treated depth is 2 feet.

Caltrans recommends using a minimum G_f of 1.2 for this project which corresponds to an unconfined compressive strength of 300 psi for the LSS. To demonstrate that the onsite subgrade can attain the minimum required 300 psi after lime treatment, unconfined compressive strength tests were performed on two specimens treated with 6% lime. Results are included in Appendix B. As shown in Appendix B, the 7-day unconfined compressive strengths vary from 305 to 401 psi which are larger than the required 300 psi. It should be pointed out that the test results in Appendix B are merely used to demonstrate the effectiveness of lime treatment of onsite subgrade. Contractors should not use the results in Appendix B for bidding and construction. Lime treatment protocols and requirements shall conform to Caltrans Standard Specifications and Special Provisions.

7.4.3 Subgrade Enhancement Geotextile (SEG)

Caltrans HDM Topic 614.5 discusses the use of Subgrade Enhancement Geotextiles (SEG) for poor subgrade (R-value < 20). In addition, per Caltrans HDM Topic 614.5, the use of SEG will also raise the effective R-value of the subgrade to 20.

7.4.4 Preferred Alternative

The Design Team has reviewed the above three options and recommended using lime treatment as the preferred option. Replacing expansive subgrade with non-expansive subgrade is not a viable option because the onsite subgrade contains sufficient aerially deposited lead (ADL) such that if re-used at the project site, the excavated expansive subgrade will need to be covered by pavements or at least 1 foot of clean ("lead-free") soil and placed a minimum of 5 feet above the maximum water table. It is unlikely that there are sufficient areas at the project site to bury the ADL-expansive subgrade. So, the excavated material will need to be disposed offsite at a Class-I landfill which could add a significant cost. As shown in Appendix C, Caltrans rejected the use of SEG to mitigate expansive subgrade.

7.5 RECOMMENDED PAVEMENT STRUCTURAL SECTIONS

For Mainline auxiliary lane and shoulders, Hot-Mixed Asphalt, HMA (flexible), pavement is recommended over Jointed Plain Concrete Pavement, JPCP (rigid), section because the upcoming Mainline rehabilitation project will crack, seat, and overlay with about 10 inches of HMA. Rigid pavement is not cost effective for local streets, thus flexible pavement is recommended. Both rigid and flexible pavements are feasible for the ramps and the final selected pavement type should be based on cost and/or construction schedule.

Rigid and flexible pavement sections were designed in accordance with Sections 620 and 630 of the Caltrans HDM (2008a), respectively. All new pavements are undrained sections.

7.5.1 Traffic Indices and Design Life

Traffic Indices were provided by Caltrans for the Auxiliary (Right) Lane and shoulders. Traffic indices for the ramps and local streets were provided by RBF. These traffic indices are summarized below:

- Mainline Auxiliary Lane: 15.0
- Ramps: 12.0
- Mainline Shoulder: 10.5
- Local Streets: 10.0

The above traffic indices correspond to a design life of 20-year. Forty-year design life was not considered because as mentioned earlier this project will be followed by a pavement rehabilitation project; the rehabilitation project will place an overlay on the existing and new pavements, thus lengthening the design life of the 20-year pavement sections. In addition, the Life Cycle Cost Analysis included in the Project Report identified 20-year Hot Mixed Asphalt pavement as the most cost effective for the local streets.

7.5.2 Mainline, Ramps and Local Street Pavements with Lime Treatment

The recommended pavement sections with lime treatment are presented in Table 4.

Table 4. Recommended Pavement Sections with Lime Treatment

Location	Traffic Index	Design Life (years)	R-Value	Section (in feet)
Mainline Aux Lane	15.0	20	5	0.70 HMA / 0.90 LCB / 1.50 LSS
Ramps	12.0			0.60 HMA / 0.45 LCB / 1.50 LSS or 0.85 JPCP / 0.40 LCB / 0.60 AS / 1.50 LSS
Mainline Shoulders	10.5			0.50 HMA / 0.35 LCB / 1.50 LSS or 0.70 HMA / 0.95 LCB / WT
Local Streets	10.0			0.50 HMA / 0.35 AB / 1.50 LSS

Notes: HMA=Hot Mix Asphalt, Type A; LCB=Lean Concrete Base; LSS=Lime Stabilized Soil; AB=Aggregate Base (Class 2); JPCP=Jointed Plain Concrete Pavement; AS=Aggregate Subbase (Class 4); WT= Working Table consisting of 0.50' Class-4 Aggregate Subbase (AS).

There are areas where a limited traffic window will be available for pavement construction. In those areas, the pavement sections presented in Table 5 are recommended.

Table 5. Recommended Pavement Sections for Limited Traffic Window

Location	Traffic Index	Design Life (years)	R-Value	Section (in feet)
Mainline Aux Lane	15.0	20	5	1.35 HMA / 1.00 LCBRS / WT
Ramps	12.0			0.90 HMA / 1.00 LCBRS / WT
Mainline Shoulders	10.5			0.70 HMA / 0.95 LCBRS / WT
Local Streets	10.0			0.60 HMA / 1.00 LCBRS / WT

Notes: HMA=Hot Mix Asphalt, Type A; LCBRS=Lean Concrete Base Rapid Set; WT=Working Table consisting of 0.50' Class-4 Aggregate Subbase (AS).

7.5.3 Mainline, Ramps and Local Street Pavements with Select Subgrade

In areas where import material is used as pavement subgrade, lime treatment can be omitted provided sufficient thickness of import soil is used. The import soil for use as pavement subgrade shall possess a minimum R-value of 40, a Plasticity Index (PI) less than 12 and an Expansion Index (EI) less than 50. Based on laboratory swell tests, the pavement surface (without lime treatment) must be underlain by a minimum of 6.5 feet of non-expansive subgrade. Therefore if lime treatment is omitted, the minimum thickness of the above specified Select subgrade (measured below the grading plane) can be determined by either subtracting the thickness of the pavement structural section from 6.5 feet or 4 feet per Caltrans HDM Section 614.6 (2), whichever is greater. For this condition, the pavement structural sections presented in Table 6 are recommended above the Select Subgrade.

As mentioned earlier, we do not recommend using Select subgrade to replace existing subgrade because existing subgrade contains aerially deposited lead. Also, excavation below the freeway level could encounter a wet condition, particularly if construction is performed during the rainy season. Therefore, using Select subgrade is only appropriate in fill areas and in local streets and part of the 29th Avenue Off-Ramp where finished surface is well-above the freeway level.

Table 6. Recommended Pavement Sections with Select Subgrade

Location	Traffic Index	Design Life (years)	R-Value	Section (in feet)
Mainline Aux Lane	15.0	20	40	0.70 HMA / 0.95 LCB
Ramps	12.0			0.60 HMA / 0.70 LCB or 0.85 JPCP / 0.40 LCB / 0.60 AS
Mainline Shoulders	10.5			0.50 HMA / 0.60 LCB
Local Streets	10.0			0.50 HMA / 0.95 AB

Notes: HMA=Hot Mix Asphalt, Type A; LCB=Lean Concrete Base; AB=Aggregate Base (Class 2); JPCP=Jointed Plain Concrete Pavement; AS=Aggregate Subbase (Class 2); Use PG 64-28 PM Asphalt Binder for HMA pavements.

7.5.4 Pavement On-Top of Expanded Polystyrene (EPS) Blocks

Flexible pavement is proposed on-top of the EPS blocks at 23rd Avenue between Stations 20+22.36 and 20+90.00. This stretch has a design TI of 10 (local street). Design of EPS blocks including flexible pavement is documented in the National Cooperative Highway Research Program (NCHRP) Report 529 (Stark et al, 2004). Based on calculations performed by RBF, a 9-inch thick reinforced concrete Load Distribution Slab (LDS) will be used as a separation layer between the top of the EPS block and the overlying pavement consisting of HMA over AB. AASHTO Material Designation EPS100 or equivalent has been selected for the EPS block, and the pertinent engineering properties are given below:

- Minimum Allowable Full-Block Density = 2.0 lb/ft^3

- California Bearing Ratio = 4%
- Initial Tangent Young's Modulus = 1,450 lb/in^2
- Resilient Modulus = 1,450 lb/in^2

Three design procedures were used to cross-check the calculated thickness of the HMA and AB layers:

(1) The NCHRP report shows minimum thicknesses of 0.35' and 0.50' for the HMA and AB, respectively, for an Equivalent Single Axle Load (ESAL) of 2.5 million; the 2.5-million ESAL passes corresponds to a Traffic Index of 10. These thicknesses appear to be relatively low, but they are considered to be "minimum" values.

(2) Structural Numbers (SN) are also given in the NCHRP report for low-volume roads (up to 1 million ESAL passes). A conservative "SN" of 7.5 was obtained for an ESAL of 2.5 million by extrapolating the data in the NCHRP report. In the AASHTO pavement design method, $SN = a_1D_1+a_2D_2+a_3D_3$, where "a" is the Layer Coefficient and "D" is the thickness of each individual pavement section in inches. AASHTO (1993) recommends Layer Coefficients of 0.42, 0.13 and 0.5 for the HMA, AB and LDS, respectively. Using these a-coefficients and a LDS thickness of 9 inches, the resulting HMA and AB thickness is the same at 0.50'.

(3) There are published correlations between California Bearing Ratio (CBR) and R-Value (Hveem, 1948 and Warnes, 1971). Using a CBR of 4% for the EPS100, the estimated lower-bound R-value is 15. Using the Caltrans pavement design method and conservatively modeling the 9-inch thickness LDS as Class-2 Aggregate Subbase, the calculated thickness of the HMA and AB is 0.75' and 0.40', respectively.

Based on the above results, we recommend using 0.75' HMA over 0.50' Class-2 AB over 0.75' LDS. The recommended thickness of the HMA and AB is equal to or thicker than the above values because NCHRP also recommends using a minimum pavement system thickness of 2 feet over the EPS blocks to minimize the potential for differential icing and solar heating.

7.5.5 Temporary Pavement

Full-depth HMA temporary pavement sections are presented in Table 7.

Table 7. Temporary Pavement Sections

Traffic Index	Temporary Pavement Sections (in feet)
10.5	1.35 HMA / WT
9.0	1.15 HMA / WT
7.5	0.95 HMA / WT
6.5	0.80 HMA / WT

Notes: HMA=Hot Mix Asphalt, Type A; WT=Working Table consisting of 0.50' Class-4 Aggregate Subbase (AS).

7.6 COMPACTION AND REMEDIAL GRADING

Compaction of the subgrade should conform to requirements described in Section 19 of the Caltrans Standard Specifications (2006).

Compaction and remedial grading recommendations for unpaved areas are included in the Geotechnical Design Report (EMI, 2012a). Those recommendations are: a minimum overexcavation and recompaction of 18 inches is recommended within all areas to receive compacted fill, and the overexcavation depth is measured from the existing grade. The overexcavation should extend horizontally a minimum distance of 18 inches from edges of new fills. In cut areas, the minimum overexcavation and recompaction depth is 12 inches if the difference between the finished and existing grade is 2 feet or less, and overexcavation is not required if the difference between the finished and existing grade is greater than 2 feet. In cut areas, the overexcavation depth is measured from the finished grade. Unless specified on the contract plans or specifications, the excavated soils (in both fill and cut areas) may be reused as compacted fill. The overexcavation bottom should be scarified a minimum depth of 6 inches and compacted in-place to the required minimum relative compaction.

All overexcavation bottoms should be firm and unyielding prior to fill placement. If not, additional remedial grading may be required.

8.0 MATERIALS AVAILABLE

Construction materials can be supplied by public or private sources. Private sources of construction materials (including sand, gravel, base, concrete, and asphalt concrete) were not investigated. However, materials are available from several local commercial suppliers. Table 8 provides the name, location, and telephone number for several commercial sources that can supply materials for the project. The suppliers listed in Table 8 are publicly known suppliers located in the vicinity of the project site; there may be other suppliers located closer to the project site.

Prior to submitting bids and scheduling construction, contractors should verify the availability of materials from the suppliers listed in Table 8. A current listing of mining operations eligible to sell materials to the State can be found on the Internet at: http://www.consrv.ca.gov/omr/index.htm.

Table 8. Material Sources

Operator	Location/Telephone Number
Sand and Gravel	
Stevens Creek Quarry, Inc.	Cupertino/408-253-2512
Volikos Enterprises	San Bruno/650-952-3656
Cemex USA	Redwood City/650-369-9189
Gordon Sand Co.	Hayward/510-782-5640
San Francisco Gravel Co.	San Francisco/415-431-1273
Tri City Rock, Inc.	Fremont/510-651-7761
Voss, L.H., Materials	Dublin/925-560-9920
Dutra Materials	Richmond/415-721-1391
Portland Cement Concrete	
PSI Concrete Construction Co., Inc.	San Jose/408-288-7388
M R Construction Services	Richmond/510-812-5636
Lozica Contracting, Inc.	El Cerrito/510-334-6029
2001 Construction Group	San Jose/408-371-2006
Bay Area Structural, Inc.	Oakland/510-547-8250
Al-Con Concrete	Newark/510-793-1352
QLM, Inc.	Los Gatos/408-265-0904
Whiteside Construction Corporation	Richmond/510-234-6681

9.0 RECOMMENDED MATERIALS SPECIFICATIONS

9.1 REVIEW OF GRADING AND CONSTRUCTION PLANS

Recommendations contained herein are based on preliminary plans. Final grading and construction plans should be reviewed by EMI to confirm that geotechnical recommendations were applied to the design and that no additional recommendations are required. Recommendations contained herein may require revision or additional recommendations may be necessary based on the final design.

9.2 GENERAL EARTHWORK REQUIREMENTS

Earthwork should conform to requirements of Section 19 of the Caltrans Standard Specifications (2006). Compaction of soil should be conducted in accordance with Section 19-5 of the Standard Specifications. Fills placed against existing embankments should be properly keyed and benched into the existing side slopes as described in Section 19-6.01 of the Caltrans Standard Specifications.

9.3 ADJACENT STRUCTURES

No excavation should be performed below an imaginary plane inclined at 45 degrees from the edge of any existing foundation without providing adequate support for the foundation. The contractor is responsible for worker safety in the field during construction. The contractor shall conform to all applicable occupational safety and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented herein. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

9.4 PAVEMENT

As indicated in Section 7.5, pavement structural sections are designed based on (1) subgrade with an R-value of 5 but treated with lime to mitigate soil expansion, and (2) Select subgrade with an R-value of at least 40 without lime treatment.

If the R-value of subgrade exposed during construction comes into question, the exposed soils should be sampled and tested during grading to verify the R-value. Soils placed beneath pavement sections should be inspected, sampled, and tested to verify the minimum required relative compaction.

9.5 CULVERT MATERIALS

Culvert material requirements were calculated using the Caltrans Alternative Pipe Culvert Selection Website (AltPipe) (Caltrans, 2008b), and the corrosion test results presented in Table 2. In the AltPipe calculation routine, we input the following data:

Structural and Design Life Requirements. Pipe diameters of 12 to 36 inches at 6-inch increment were used, and a soil cover of 2 feet was assumed. The design life is 50 years.

Corrosion Test Results. The following worst-case scenario corrosion values were used:

- Minimum Resistivity = 1,200 ohm-cm
- pH = 6.5
- Soluble Sulfate = 252 ppm
- Soluble Chloride = 231 ppm

Abrasion Condition. A Level-1 abrasion level as defined by the AltPipe web based application was used.

Based on the above input and using the AltPipe web based application, the following information is provided for pipe diameters of 12, 18, 24, 30 and 36 inches:

- For all the pipe diameters, corrugated steel pipe $2^2/_3$" x $^1/_2$" helical corrugations with a minimum steel thickness of 0.052 inch and steel coating of polymerized asphalt invert or polymeric sheet coating should be used to attain an estimated service life of 50 years under non-abrasive conditions.
- For 36-inch diameter pipe, corrugated steel pipe $2^2/_3$" x $^1/_2$" helical corrugations with a minimum steel thickness of 0.138 inch and steel coating of bituminous coating and paved invert should be used to attain an estimated service life of 50 years.
- For pipe diameters of 18, 24, 30 and 36 inches, corrugated steel pipe $2^2/_3$" x $^1/_2$" annular corrugations with a minimum steel thickness of 0.064 inch and steel coating of polymerized asphalt invert or polymeric sheet coating should be used to attain an estimated service life of 50 years under non-abrasive conditions.
- For pipe diameters of 24, 30 and 36 inches, steel spiral rib pipe $^3/_4$" x 1" ribs at $8^1/_2$" or $11^1/_2$" pitch or steel spiral rib pipe $^3/_4$" x $^3/_4$" ribs at $7^1/_2$" pitch with a minimum steel thickness of 0.064 inch and coating of polymerized asphalt invert or polymeric sheet coating should be used to attain an estimated service life of 50 years under non-abrasive conditions.
- For pipe diameters of 24, 30 and 36 inches, steel spiral rib pipe $^3/_4$" x $^3/_4$" ribs at $7^1/_2$" pitch with a minimum steel thickness of 0.138 inch and coating of bituminous coating and paved invert should be used to attain an estimated service life of 50 years under non-abrasive conditions.
- For pipe diameters of 30 and 36 inches, steel spiral rib pipe $^3/_4$" x $^3/_4$" ribs at $7^1/_2$" pitch with a minimum steel thickness of 0.064 inch and coating of composite steel spiral rib pipe should be used to attain an estimated service life of 50 years under non-abrasive conditions.
- For all pipe diameters, reinforced concrete pipe design should be suitable. The minimum concrete cover is 0.75-inch for 12 and 18-inch diameter pipes and 1-inch for 24, 30, 36-inch diameter pipes. The mix design should also include a cement content of 5 sacks per cubic yard and the quantity of water is 11.1% by volume.
- For all pipe diameters, corrugated PVC pipes or Type S corrugated HDPE pipes may be used. For pipe diameters of 12, 18 and 24 inches, Type C corrugated HDPE pipes also could be used. However, abrasion should be evaluated by the project civil engineer.
- Aluminum pipe or aluminized steel pipes are not allowed.

The above recommendations are only applicable to the assumptions and input parameters listed above. Additional analysis will be required if the actual field conditions differ from those listed above. The termini of any plastic pipes should be protected from potential physical or fire damage such as by constructing concrete headwalls, or by concrete or metal treatment.

9.6 INSPECTION AND TESTING

Qualified geotechnical personnel should perform inspections and testing during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill.
- Removal of existing pavement structural sections, curb and gutter, and concrete sidewalk.
- Preparation of pavement subgrade.
- Placement of base and subbase.
- Excavations for utility trenches and drainage structures.
- Removal or support of buried utilities or structures.
- Shoring installation, if necessary.
- When any unusual conditions are encountered.

10.0 SOIL TESTING AND MATERIAL PROPERTIES SUMMARY

Relevant soil exploration logs and materials testing results prepared as part of this investigation are presented in Appendix A and Appendix B of this report, respectively.

11.0 REFERENCES

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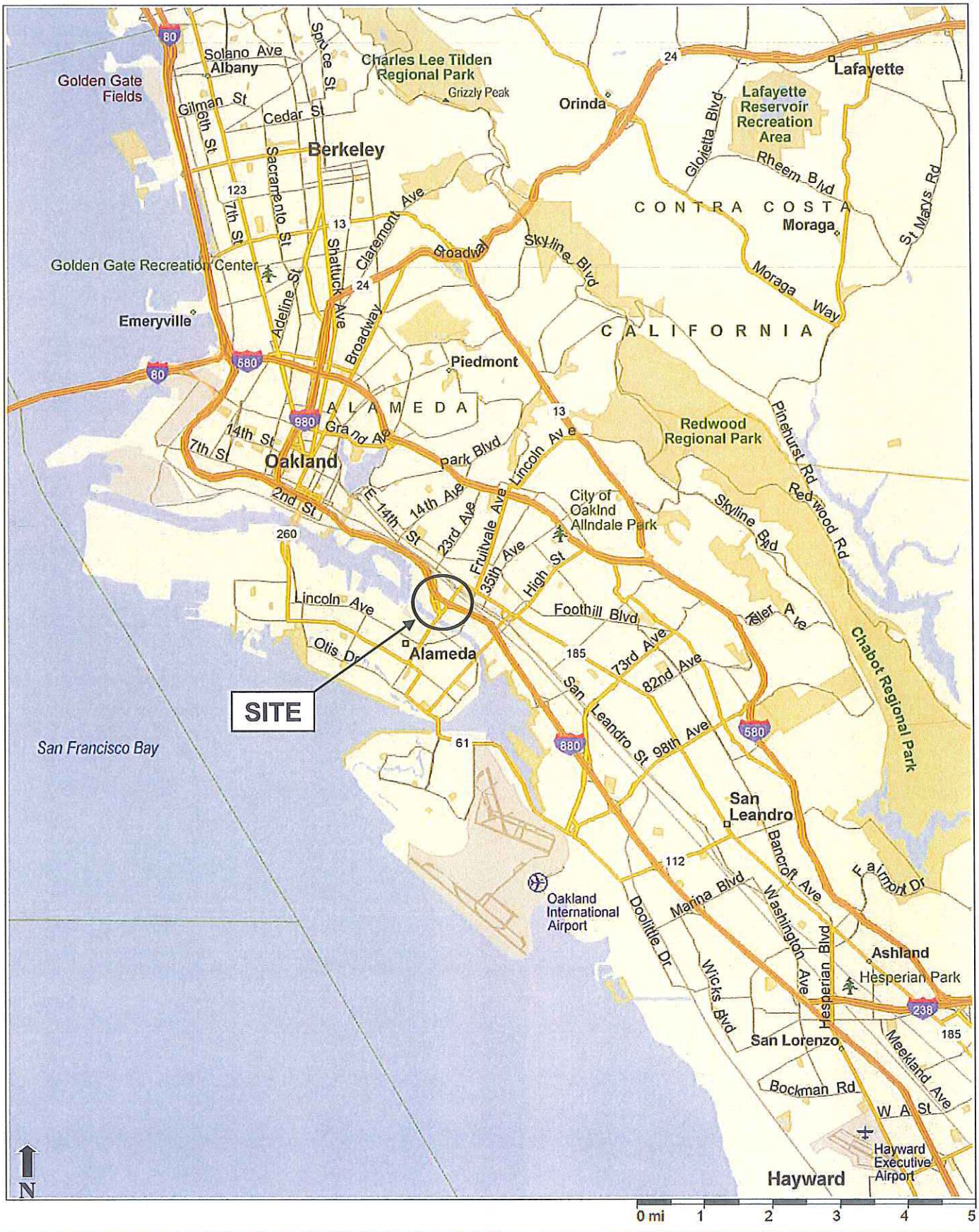
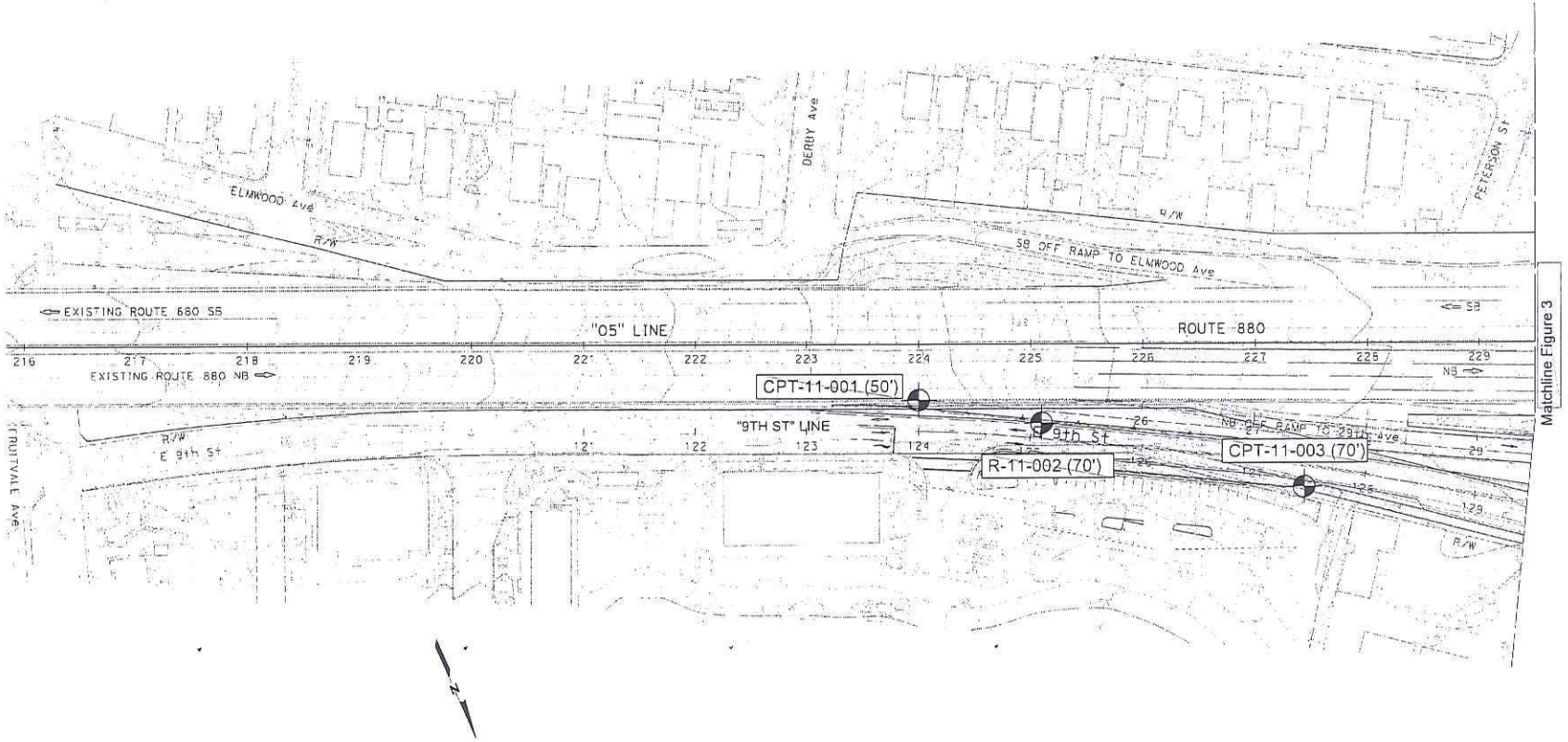
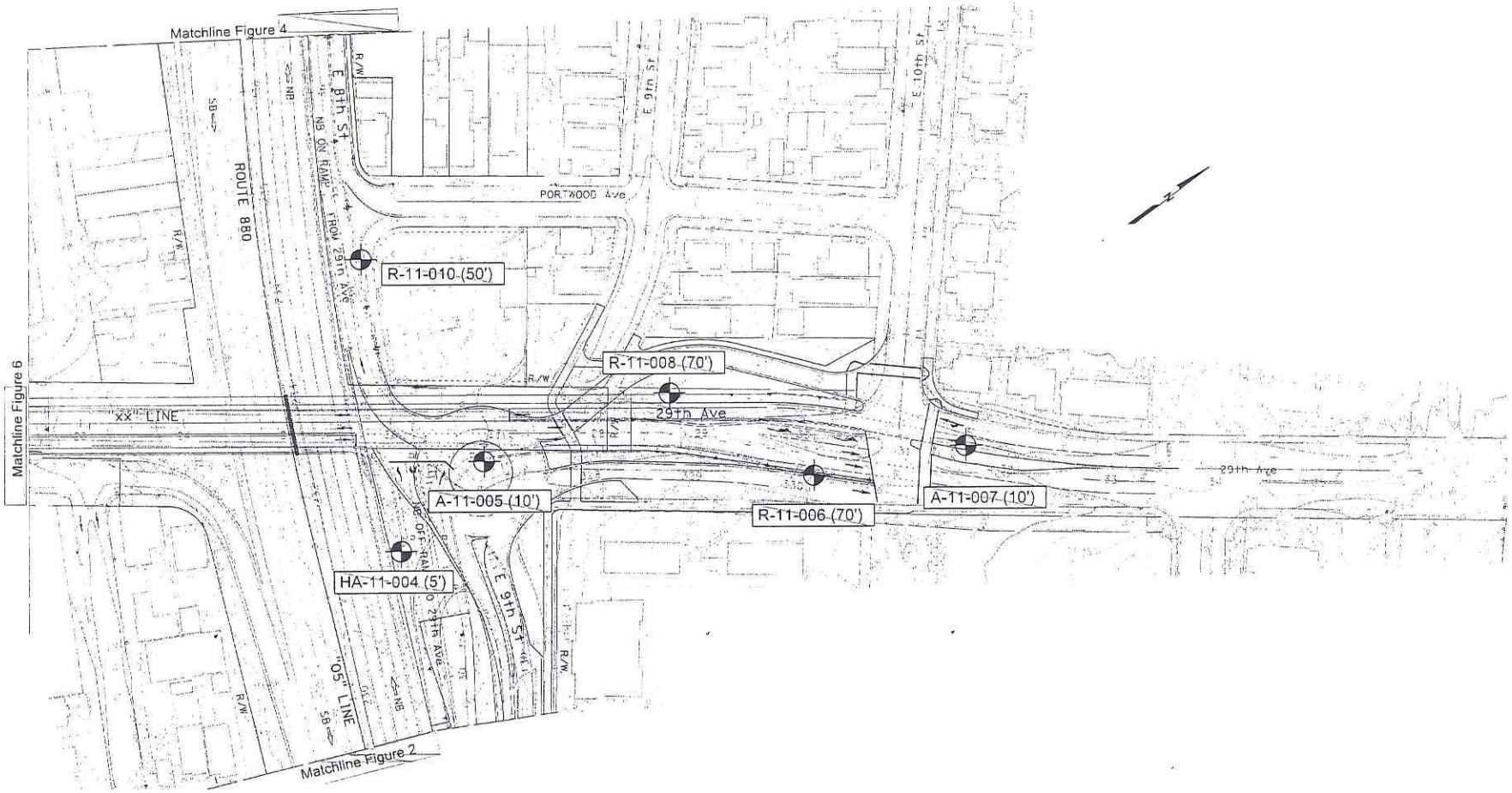


I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	Site Location Map Figure 1
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 10-133 | Date: 08-25-2011



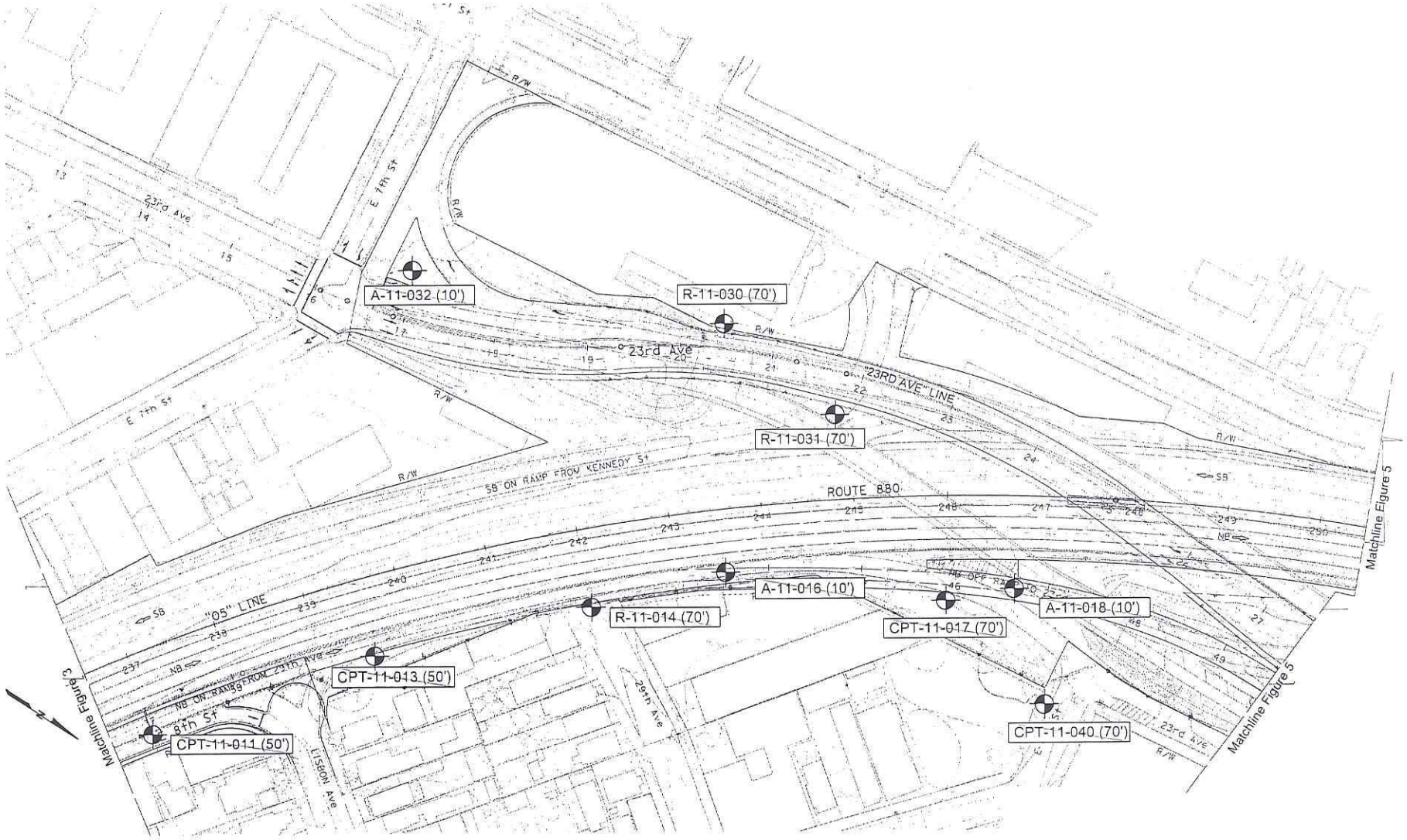
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements		Exploratory Boring Location Plan (1 of 5)
	Project No. 10-133	Date: April 2011	Figure 2

0 50 100 FEET



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements		Exploratory Boring Location Plan (2 of 5)
	Project No. 10-133	Date: April 2011	Figure 3

0 50 100 FEET



Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

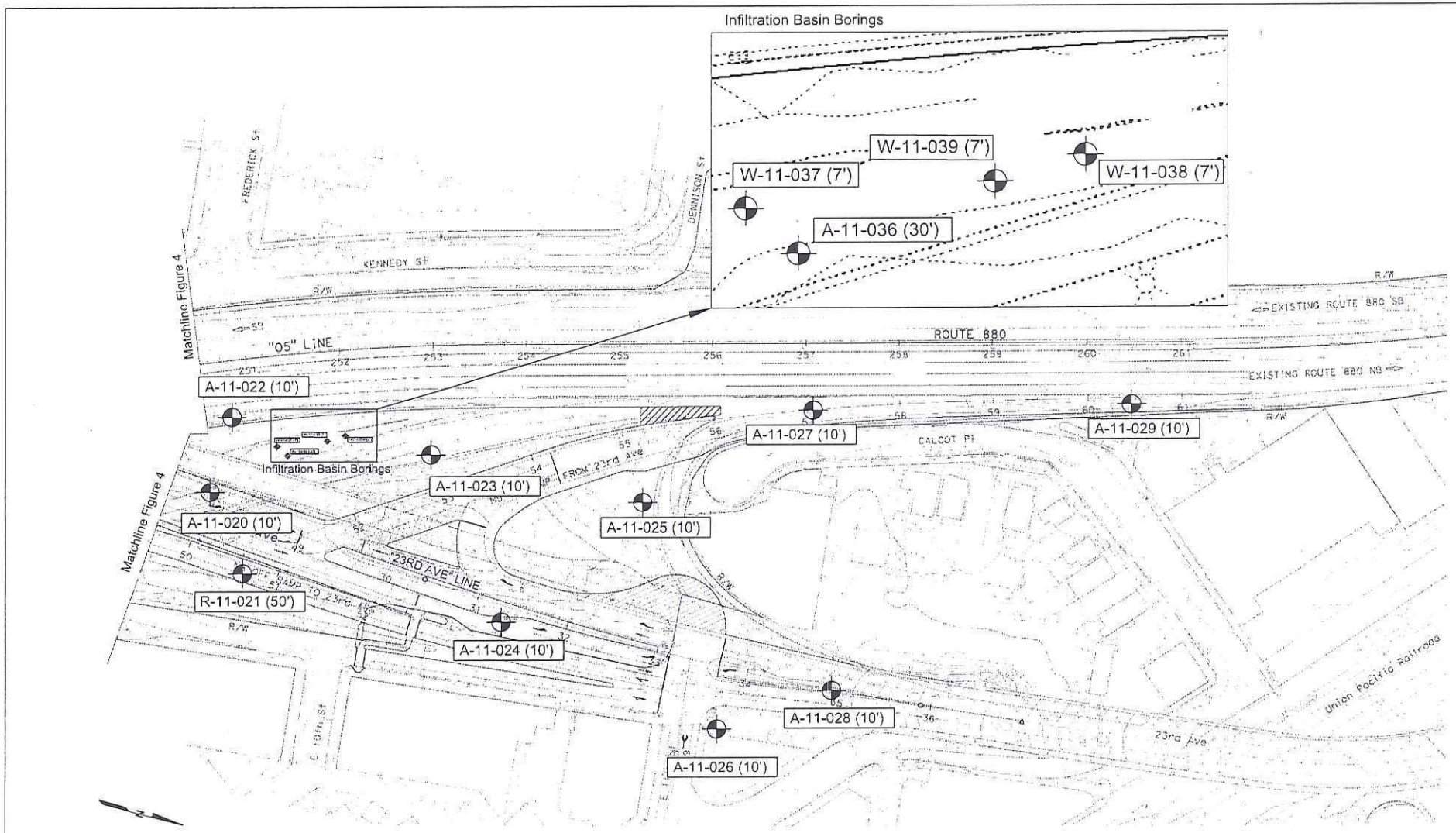
I-880 Operational and Safety Improvements

Project No. 10-133 | Date: April 2011

Exploratory Boring Location Plan (3 of 5)

Figure 4

0 50 100 FEET



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements		Exploratory Boring Location Plan (4 of 5)
	Project No. 10-133	Date: April 2011	Figure 5

0 50 100 FEET

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 Operational and Safety Improvements

Project No. 10-133 | Date: April 2011

Exploratory Boring Location Plan (5 of 5)

Figure 6

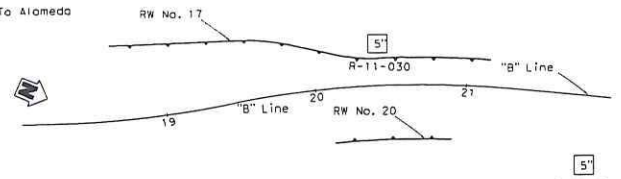
Appendix A. Exploratory Boring Logs

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.
DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.
DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF
HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	ALA	880	28.4/29.2		

REGISTERED ENGINEER DATE

L. CHEANG No. GE 2345 EXP. 9-30-13 GEOTECHNICAL STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER

PLANS APPROVAL DATE

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OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

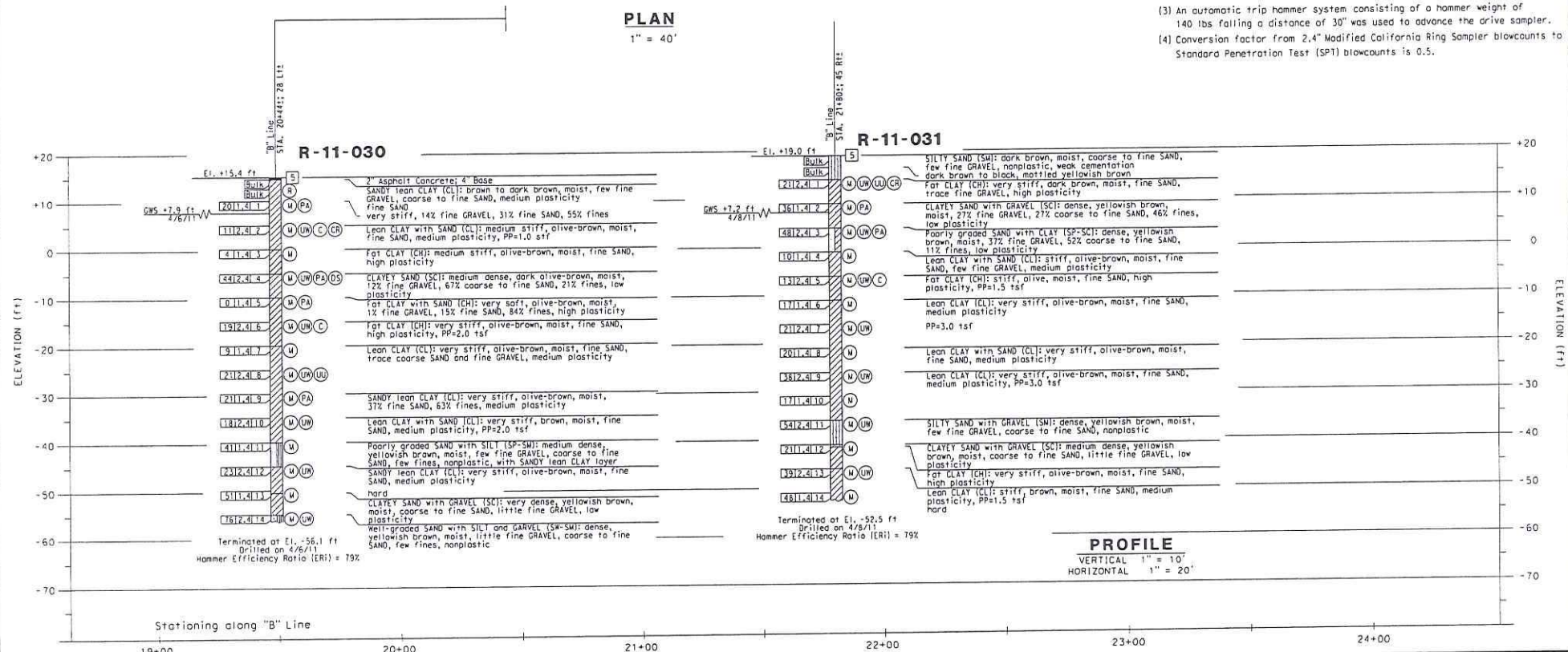
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

PLAN
1" = 40'



R-11-030

	Bulk	5				2" Asphalt Concrete; 4" Base
	Bulk	R				SANDY lean CLAY (CL): brown to dark brown, moist, few fine GRAVEL, coarse to fine SAND, medium plasticity
20	1.4	1	M	PA		very stiff, 14% fine GRAVEL, 31% fine SAND, 55% fines
11	2.4	2	M	UW	C CR	Lean CLAY with SAND (CL): medium stiff, olive-brown, moist, fine SAND, medium plasticity, PP=1.0 tsf
4	1.4	3	M			Fat CLAY (CH): medium stiff, olive-brown, moist, fine SAND, high plasticity
54	2.4	4	M	UW	PA DS	CLAYEY SAND (SC): medium dense, dark olive-brown, moist, 12% fine GRAVEL, 67% coarse to fine SAND, 21% fines, low plasticity
0	1.4	5	M	PA		Fat CLAY with SAND (CH): very soft, olive-brown, moist, 1% fine GRAVEL, 15% fine SAND, 84% fines, high plasticity
19	2.4	6	M	UW	C	Fat CLAY (CH): very stiff, olive-brown, moist, fine SAND, high plasticity, PP=2.0 tsf
9	1.4	7	M			Lean CLAY (CL): very stiff, olive-brown, moist, fine SAND, trace coarse SAND and fine GRAVEL, medium plasticity
21	2.4	8	M	UK	UL	
21	1.4	9	M	PA		SANDY lean CLAY (CL): very stiff, olive-brown, moist, 37% fine SAND, 63% fines, medium plasticity
18	2.4	10	M	UW		Lean CLAY with SAND (CL): very stiff, brown, moist, fine SAND, medium plasticity, PP=2.0 tsf
4	1.4	11	M			Poorly graded SAND with SILT (SP-SM): medium dense, yellowish brown, moist, few fine GRAVEL, coarse to fine SAND, few fines, nonplastic, with SANDY lean CLAY layer
23	2.4	12	M	UW		SANDY lean CLAY (CL): very stiff, olive-brown, moist, fine SAND, medium plasticity
5	1.4	13	M			hard
76	2.4	14	M	UW		CLAYEY SAND with GRAVEL (SC): very dense, yellowish brown, moist, coarse to fine SAND, little fine GRAVEL, low plasticity
						Well-graded SAND with SILT and GRAVEL (SW-SM): dense, yellowish brown, moist, little fine GRAVEL, coarse to fine SAND, few fines, nonplastic

Terminated at El. -56.1 ft
Drilled on 4/6/11
Hammer Efficiency Ratio (ERi) = 79%

R-11-031

	Bulk	5				SILTY SAND (SM): dark brown, moist, coarse to fine SAND, few fine GRAVEL, nonplastic, weak cementation
	Bulk					dark brown to black, mottled yellowish brown
21	2.4	1	M	UW	UL CR	Fat CLAY (CH): very stiff, dark brown, moist, fine SAND, trace fine GRAVEL, high plasticity
36	1.4	2	M	PA		CLAYEY SAND with GRAVEL (SC): dense, yellowish brown, moist, 27% fine GRAVEL, 27% coarse to fine SAND, 46% fines, low plasticity
48	2.4	3	M	UW	PA	Poorly graded SAND with CLAY (SP-SC): dense, yellowish brown, moist, 37% fine GRAVEL, 52% coarse to fine SAND, 11% fines, low plasticity
10	1.4	4	M			Lean CLAY with SAND (CL): stiff, olive-brown, moist, fine SAND, few fine GRAVEL, medium plasticity
13	2.4	5	M	UW	C	Fat CLAY (CH): stiff, olive, moist, fine SAND, high plasticity, PP=1.5 tsf
17	1.4	6	M			Lean CLAY (CL): very stiff, olive-brown, moist, fine SAND, medium plasticity
21	2.4	7	M	UW		PP=3.0 tsf
20	1.4	8	M			Lean CLAY with SAND (CL): very stiff, olive-brown, moist, fine SAND, medium plasticity
38	2.4	9	M	UW		Lean CLAY (CL): very stiff, olive-brown, moist, fine SAND, medium plasticity, PP=3.0 tsf
17	1.4	10	M			
54	2.4	11	M	UW		SILTY SAND with GRAVEL (SM): dense, yellowish brown, moist, few fine GRAVEL, coarse to fine SAND, nonplastic
21	1.4	12	M			CLAYEY SAND with GRAVEL (SC): medium dense, yellowish brown, moist, coarse to fine SAND, little fine GRAVEL, low plasticity
39	2.4	13	M	UW		Fat CLAY (CH): very stiff, olive-brown, moist, fine SAND, high plasticity
46	1.4	14	M			Lean CLAY (CL): stiff, brown, moist, fine SAND, medium plasticity, PP=1.5 tsf
						hard

Terminated at El. -52.5 ft
Drilled on 4/8/11
Hammer Efficiency Ratio (ERi) = 79%

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATES: 3/2011, 4/2011		PROJECT ENGINEER

BRIDGE NO. -
POST MILES Varies

RETAINING WALL No. 17 and 20
LOG OF TEST BORING 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/18/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 0400000160I

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

CONTRACT NO.:04-0A7100 PROJECT ID:

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BENCH MARK:

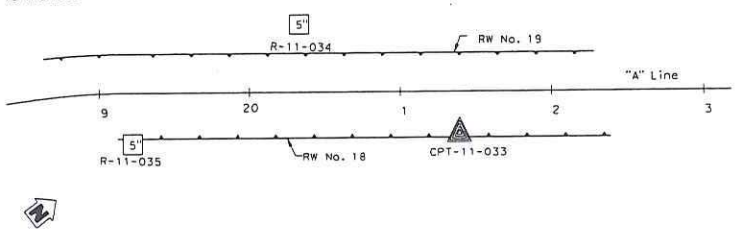
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	28.4/29.2		

REGISTERED ENGINEER DATE

L. CHEANG
No. GE 2345
EXP. 9-30-13
GEOTECHNICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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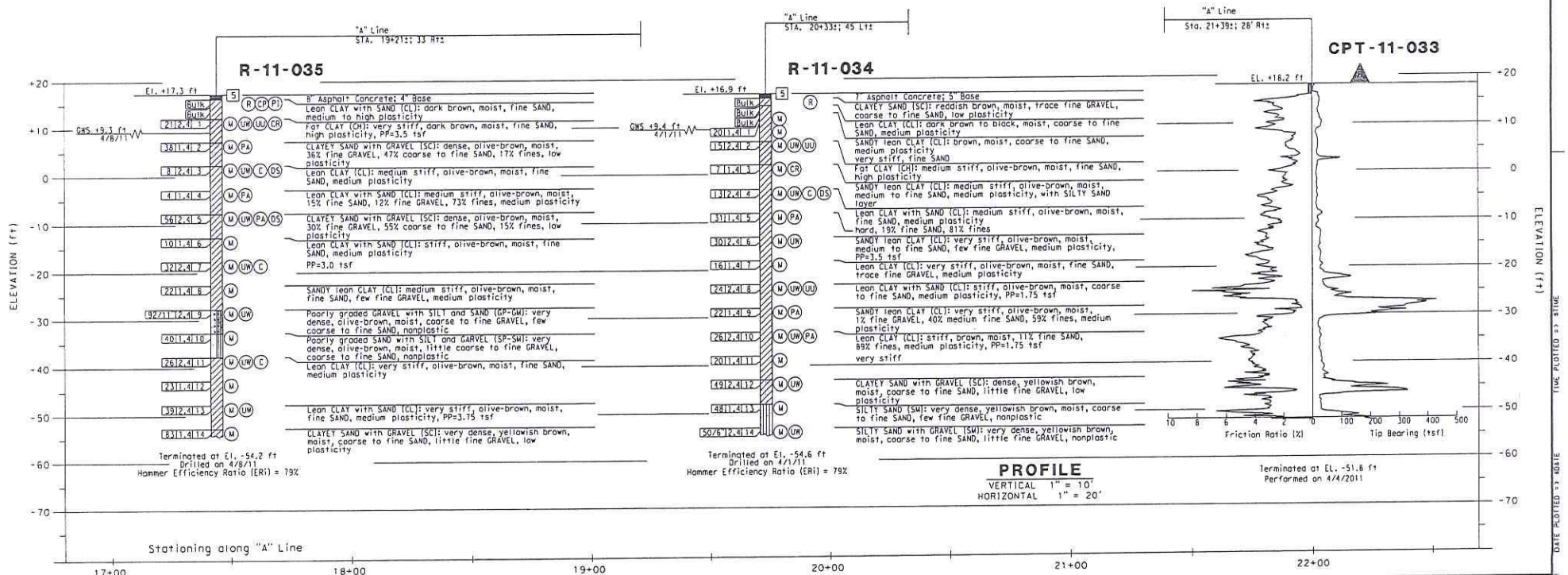

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 18 and 19
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORING 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

CONTRACT NO.:04-0A7100 PROJECT ID:

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56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

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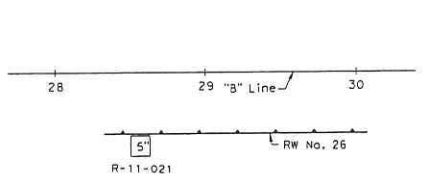

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REGISTERED ENGINEER DATE

L. CHEANG No. GE 2345 (exp. 9-30-13) REGISTERED PROFESSIONAL ENGINEER GEOTECHNICAL STATE OF CALIFORNIA

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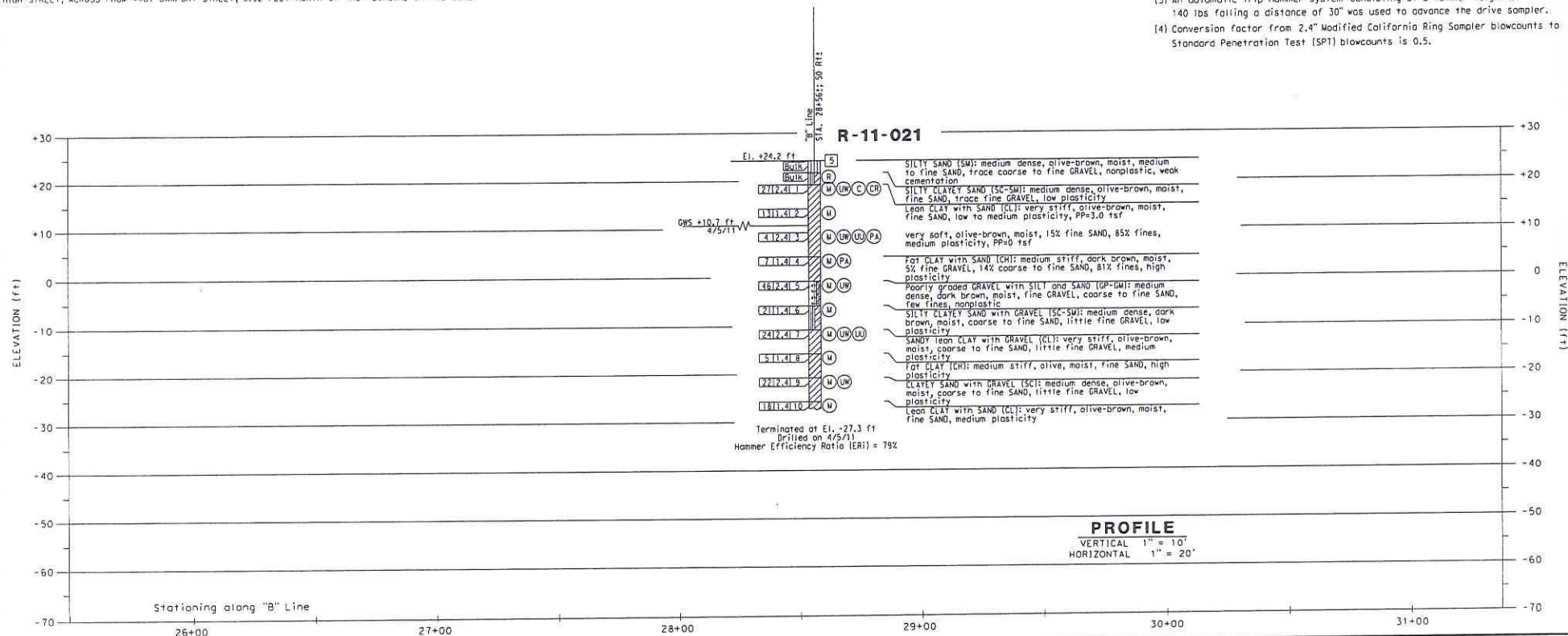

PROFILE
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HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fong	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			POST MILES Varies

RETAINING WALL No. 26
LOG OF TEST BORING 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 0400000160I

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

CONTRACT NO.:04-0A7100 PROJECT ID:

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

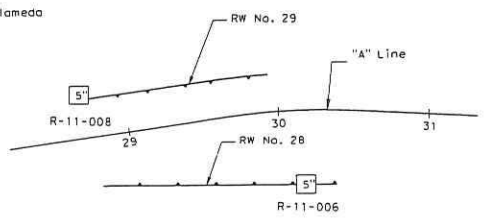
DESIGNATION: ALAB ELEV=14.521
FOUND BRASS DISK STAMPED "ALAB" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE

PLANS APPROVAL DATE

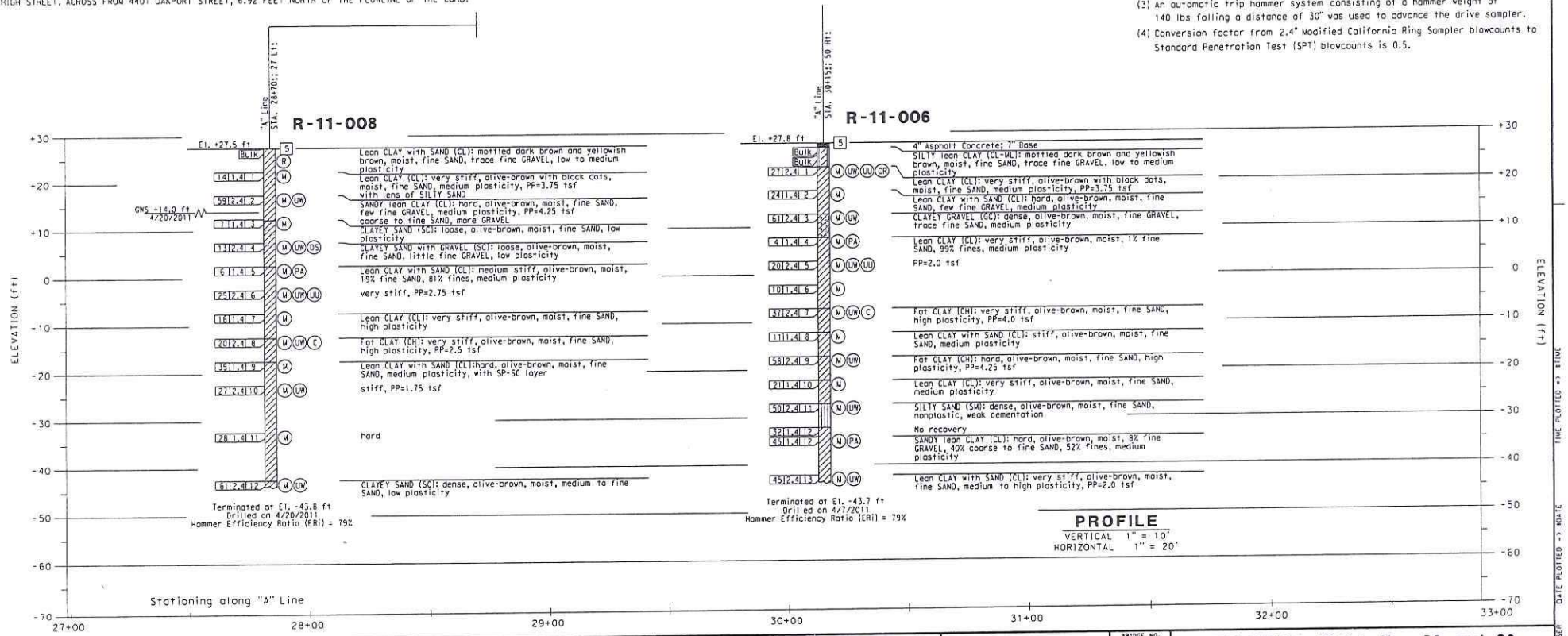
L. CHEANG No. GE 2345 (exp. 6-30-13) REGISTERED PROFESSIONAL ENGINEER GEOTECHNICAL STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).
(2) 2.4" samples were taken using a California Modified Sampler.
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.
(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies

RETAINING WALL No. 28 and 29
LOG OF TEST BORING 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNITS: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

CONTRACT NO.:04-0A7100 PROJECT ID:

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

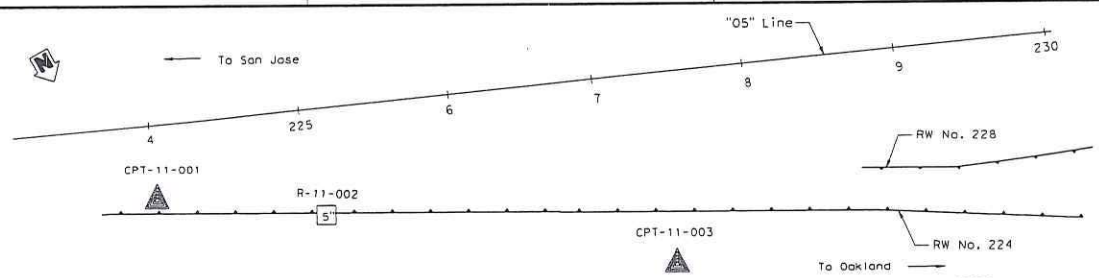
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	ALA	880	28.4/29.2		

REGISTERED ENGINEER _____ DATE _____

PLANS APPROVAL DATE _____

L. CHEANG No. GE 2345 (EXP. 9-30-13) REGISTERED PROFESSIONAL ENGINEER GEOTECHNICAL STATE OF CALIFORNIA

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1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

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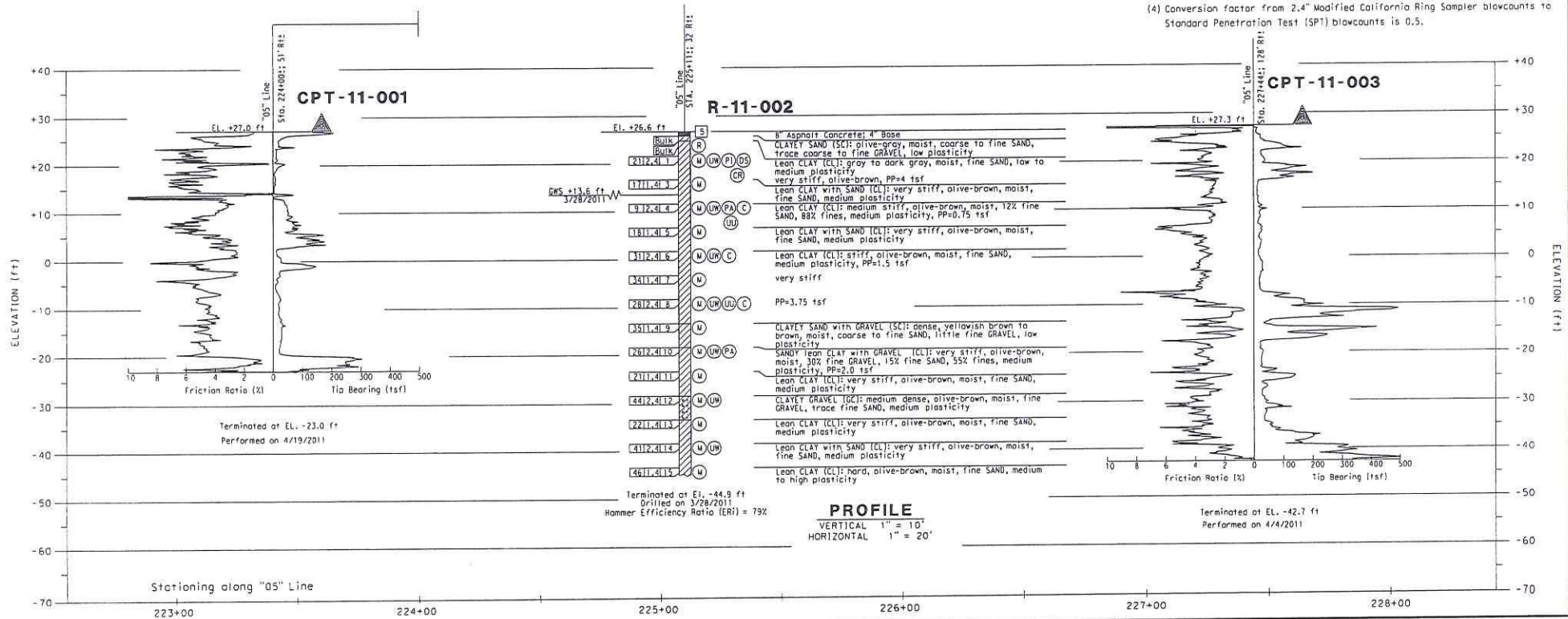

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			POST MILES Varies

RETAINING WALL No. 224 and 228
LOG OF TEST BORING 1 OF 1

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601
DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES | SHEET | OF
CONTRACT NO.: 04-0A7100 PROJECT ID:

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/15/10)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $TIME

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
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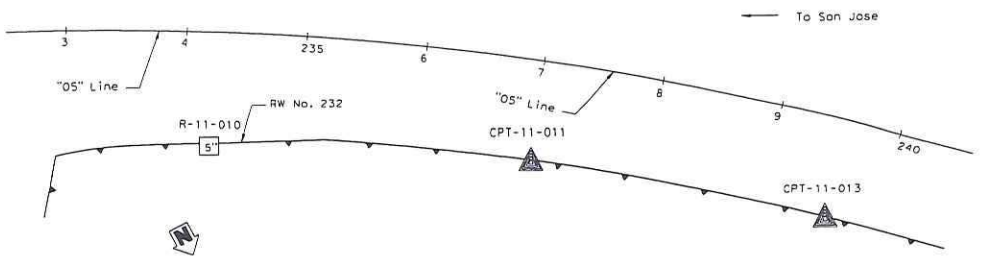

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	28.4/29.2		

REGISTERED ENGINEER — DATE

L. CHEANG, No. GE 2345, EXP. 9-30-13, GEOTECHNICAL, STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
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EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

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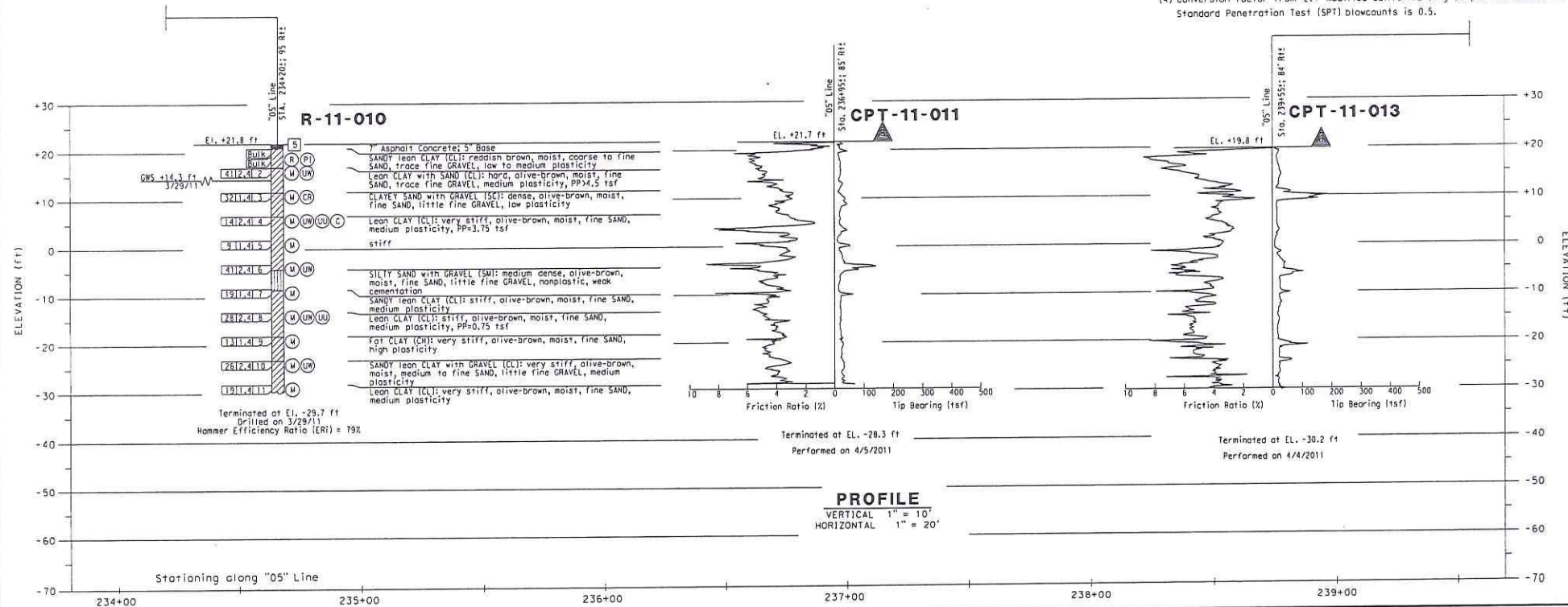

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 232
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

CONTRACT NO.:04-0A7100 PROJECT ID:

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

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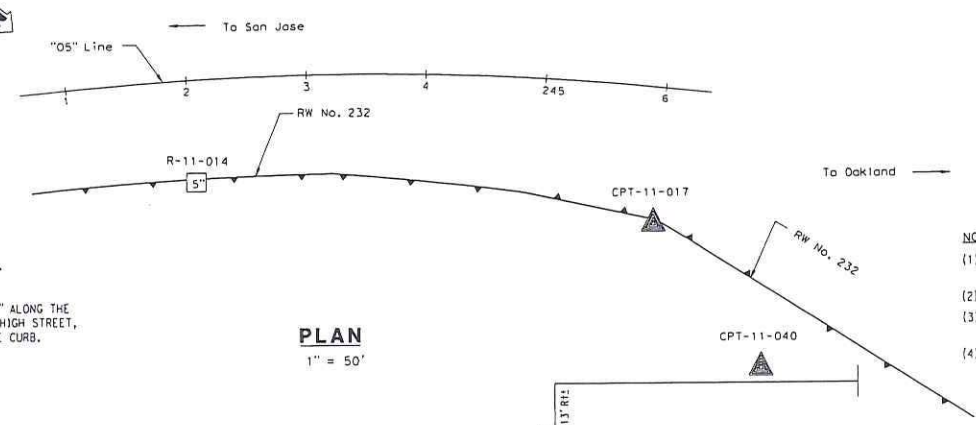

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE

L. CHEANG
NO. GE 2345
EXP. 9-30-13
REGISTERED PROFESSIONAL ENGINEER
GEOTECHNICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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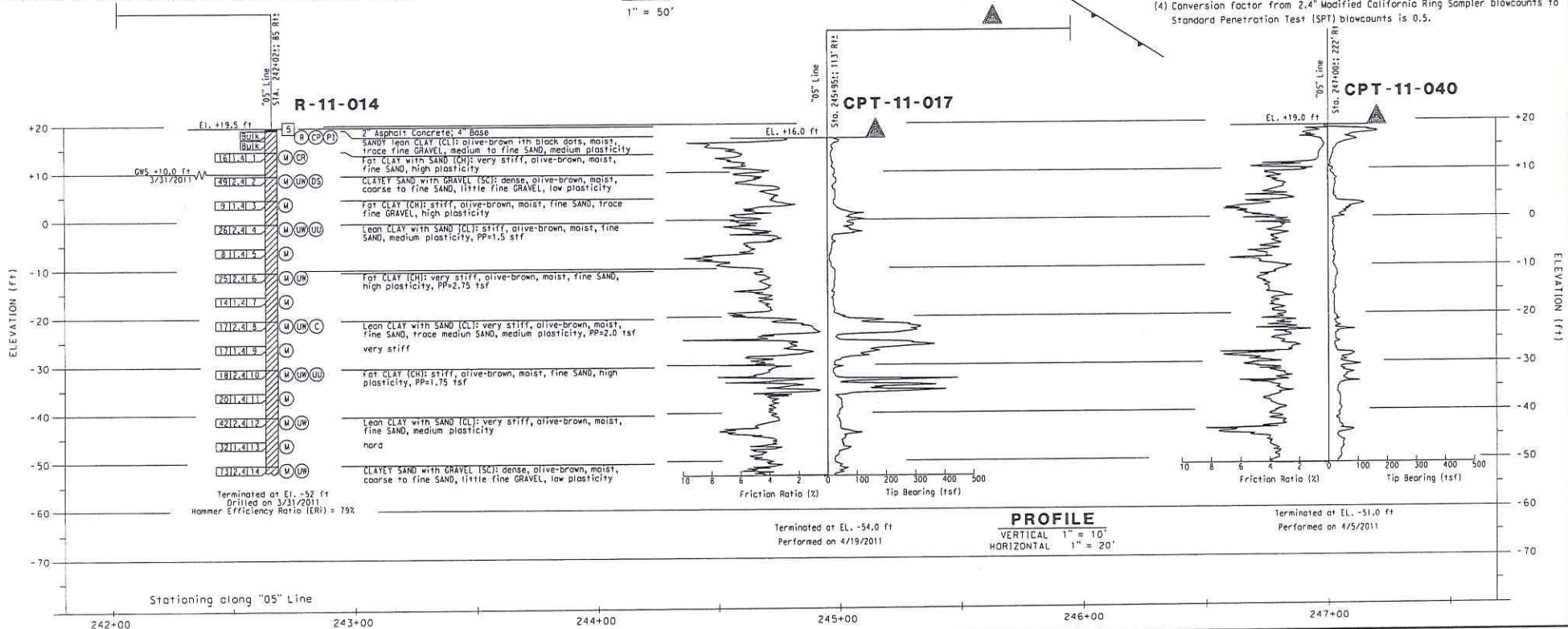


PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L.Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			POST MILES Varies

RETAINING WALL No. 232
LOG OF TEST BORINGS 2 OF 2

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601
DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES
CONTRACT NO.:04-0A7100 PROJECT ID:

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

Grade Elevation	+27.3 ft				
Boring Depth	25.0 ft	Driller	SoCal Drilling	SHEET 1 OF	1
Borehole Diameter	8 inches	Type of Rig	Mud Rotary	Comments	
Date Drilled	04-21-10	Drive Wt.	140-lb		
Logged By	P. F. Chan	Drop	30 inches		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	1			SILTY SAND (SM): dark olive-brown, moist, mostly medium to fine, little fines			R,CP
5	D	2	20		Poorly graded SAND (SP): loose, light olive-gray, moist, mostly coarse to fine SAND, slightly compact when handled	14	106	DS
10	S	3	20		Poorly graded SAND with SILT and GRAVEL (SP-SM): light olive-gray, moist, little GRAVEL, mostly coarse to fine SAND, few fines, compact	35	-	PA
15	D	4	40			24	108	

1. 'Sample Type' – Graphical representation of sample type as shown below.
   - S: Split Spoon – Standard Penetration Test Sample (SPT)
   - D: Drive Sample – California Drive Sampler
   - B: Bulk Sample – Obtained by collecting cuttings in a plastic bag
   - T: Tube Sample – Thin-walled Tube Sample
   - P: Thin-walled Pitcher Core Sample

2. 'Sample' – Sample Number

3. 'Blows/foot' – Number of blows required to advance sampler one foot (unless a distance is specified). Samplers in general were driven into the soil at the bottom of the hole with a 140-lb automatic trip hammer falling a standard 30 inches (as specified in header).

   'REC/RQD' – Sample Core Recovery (REC) in percent (%) and Rock Quality Designation (RQD) in percent (%). RQD is defined as the percentage of core in each run in which the spacing between natural fractures is greater than 4 inches. Mechanical breaks of the core are not considered.

4. 'Graphic Log' – Standard symbols for soil and rock types, as shown in Note B opposite

5. ▼ Groundwater elevation while drilling.

6. 'Geotechnical Description' (See also Note A, opposite).
   Soil – Soil classifications are in general accordance with the American Society for Testing and Materials (ASTM) D2488.84. Designations include consistency, moisture, and color. Field description have been modified to reflect results of laboratory analyses where deemed appropriate.

   Rock – Rock classifications generally include a rock type, color, moisture, mineral constituents, degree of weathering, alteration and the mechanical properties of the rock.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

EMI Project No.: 10-133 | Date: 8-15-11

LEGEND FOR LETTER-SIZE GEOTECHNICAL BORING LOGS (SHEET 1 OF 2)

7. 'Moisture Content' and 'Total Unit Weight' determined by laboratory testing.

8. 'Tests/Results' – Identify types of laboratory tests performed on samples collected from the field investigation. Abbreviations of tests are provided below:

C	Consolidation (ASTM D 2435)	P	Permeability (CTM 220)	SG	Specific Gravity (AASHTO T 100)
CL	Collapse Potential (ASTM D 5333)	PA	Particle Size Analysis (ASTM D 422)	SL	Shrinkage Limit (ASTM D 427)
CP	Compaction Curve (CTM 216)	PI	Plasticity Index (AASHTO T 90)	SW	Swell Potential (ASTM D 4546)
CR	Corrosivity Testing (CTM 643, CTM 422, CTM 417)		Liquid Limit (AASHTO T 89)	TV	Pocket Torvane
CU	Consolidated Undrained Triaxial (ASTM D 4767)	PL	Point Load Index (ASTM D 5731)	UC	Unconfined Compression–Soil (ASTM D 2166)
DS	Direct Shear (ASTM D 3080)	PM	Pressure Meter		Unconfined Compression–Rock (ASTM D 2938)
EI	Expansion Index (ASTM D 4829)	PP	Pocket Penetrometer	UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
M	Moisture Content (ASTM D 2216)	R	R–Value (CTM 301)	UW	Unit Weight (ASTM D 4767)
OC	Organic Content–% (ASTM D 2974)	SE	Sand Equivalent (CTM 217)	VS	Vane Shear (AASHTO T 223)

Criteria for Describing Moisture Condition

Description	Criteria (After ASTM D 2488)
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

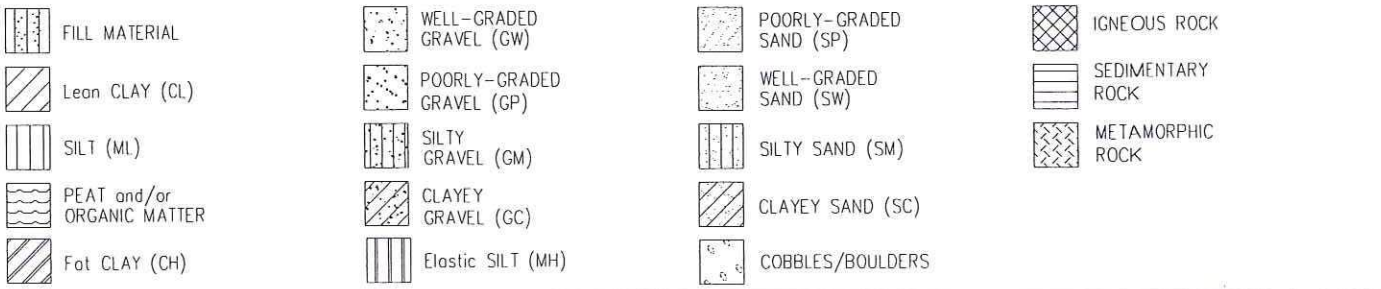
Relative Density of Coarse–Grained Soil

Blows/foot	Relative Density	Field Test (After Sowers, 1979)
0 – 4	Very Loose	Easily penetrated 12" with 0.5–inch steel rod pushed by hand
5 – 10	Loose	Easily penetrated with 0.5–inch steel rod pushed by hand
11 – 30	Medium Dense	Easily penetrated with 0.5–inch steel rod driven by 5–lb hammer
31 – 50	Dense	Penetrated a foot with 0.5–inch steel rod driven by 5–lb hammer
> 50	Very Dense	Penetrated a few inches with 0.5–inch steel rod driven by 5–lb hammer

Consistency of Cohesive Soils

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

Legend of Earth Materials



Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I–880 Operational and Safety Improvement

EMI Project No.: 10–133 | Date: 8–15–11

LEGEND FOR LETTER–SIZE GEOTECHNICAL BORING LOGS (SHEET 2 OF 2)

LOG OF BORING NO. HA-11-004

Grade Elevation:	+22.5 ft		
Boring Depth:	5.0 feet	Driller: EMI	SHEET 1 OF 1
Borehole Diameter:	3.5"	Type of Rig: Hand Auger	
Date Drilled:	4-20-11	Drive Wt. (lbs): -	
Logged By:	KT	Drop (inches): -	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			Lean CLAY with SAND (CL): dark brown, moist, fine SAND			PI,R,CP
5					Terminated Boring at 5.0 ft depth. Groundwater not encountered.			
10								
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-005

Grade Elevation:	+24.8 ft				
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1	
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler	
Date Drilled:	4-7-11	Drive Wt. (lbs):	140		
Logged By:	KT	Drop (inches):	30		

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY with GRAVEL (CL): very dark grayish brown, moist, little subangular fine GRAVEL, coarse to fine SAND, medium plasticity fines			
	B	1			SANDY lean CLAY (CL): very dark grayish brown, moist, trace subangular fine GRAVEL, coarse to fine SAND, medium plasticity fines			R, CP
5	S	2	8		stiff, olive-brown	-	-	
	B	3						
10	D	4	39		CLAYEY SAND with GRAVEL (SC): medium dense, brown, moist, little subangular fine GRAVEL, coarse to fine SAND, medium to high plasticity fines	-	-	
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-007

Grade Elevation:	+30.0 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SILTY SAND (SM): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	1			Lean CLAY with SAND (CL): dark gray to black, moist, fine SAND, medium to high plasticity			R
5	S	1	16		very stiff, olive-brown			
	B	2						
10	D	3	23		SANDY lean CLAY (CL): very stiff, olive-brown to yellowish brown mottled dark brown spots, moist, fine SAND, medium to high plasticity, PP=3.5 tsf			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-016

Grade Elevation:	+16.2 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-13-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					6" Asphalt, 4" Concrete, 14" Aggregate Base			
					SANDY lean CLAY (CL): brown mottled gray, moist, fine SAND, few fine GRAVEL, medium to high plasticity			
	B	0			Lean CLAY with SAND (CL): dark gray to black, moist, fine SAND, medium to high plasticity			R
5	S	1	15		very stiff, olive-brown			
	B	2						
10	D	3	26					
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-018

Grade Elevation:	+19.2 ft				
Boring Depth:	11.5 feet	Driller:	West Coast Exploration		SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler	
Date Drilled:	4-12-11	Drive Wt. (lbs):	140		
Logged By:	KT	Drop (inches):	30		

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					SILTY SAND (SM): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	0			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			
	B	1						
5	D	2	28		very stiff, olive-brown mottled yellowish brown, PP=3.0 tsf			
	B	3						
10	S	4	17		trace fine GRAVEL			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-020

Grade Elevation:	+20.2 ft				
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1	
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler	
Date Drilled:	4-13-11	Drive Wt. (lbs):	140		
Logged By:	KT	Drop (inches):	30		

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					0~3" Asphalt, 3"~12" Concrete			
	B	0			SANDY lean CLAY (CL): brown, moist, fine SAND, few fine GRAVEL, medium to high plasticity			
					Lean CLAY with SAND (CL): brown, moist, fine SAND, medium to high plasticity			CP,R,PI
5	D	1	28		very stiff, brown to strong brown			
	B	2						
10	S	3	7		stiff			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-022

Grade Elevation:	+17.8 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-13-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					2" Asphalt, 10" Concrete			
					CLAYEY SAND (SC): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	0			Lean CLAY with SAND (CL): brown to dark brown, moist, fine SAND, medium to high plasticity			R,PI
5	S	1	12		stiff			
	B	2						
10	D	3	7		medium stiff, mottled with reddish brown			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-023

Grade Elevation:	+19.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SILTY SAND (SM): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	1			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			R
5	S	2	12		stiff, olive-brown mottled yellowish brown			
10	D	3	9		medium stiff, PP=1.0 tsf			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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Project No.

Date: 8-15-11

LOG OF BORING NO. A-11-024

Grade Elevation:	+22.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			
5	S	1	12		stiff, olive-brown mottled yellowish brown			
	B	2						
10	D	3	27		very stiff, PP=2.75 tsf			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-025

Grade Elevation:	+21.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SILTY SAND with GRAVEL (SM): dark brown, moist, coarse to fine SAND, little fine GRAVEL, nonplastic, weak cementation			
	B	1			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			
5	D	2	13		no recovery			
	D	2A	18		stiff			
	D	3	15		very stiff, PP=3.5 tsf			
10	S	4	23		very stiff			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-11-026

Grade Elevation:	+22.4 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-7-11	Drive Wt. (lbs):	140	
Logged By:	GC	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY (CL): very dark grayish brown, moist, medium to fine SAND, few fine GRAVEL, medium plasticity			
	B	1			coarse to fine SAND, trace concrete and brick fragments			
5	D	2	43		very stiff, very dark grayish brown to very dark brown, coarse to fine SAND			
	B	3			CLAYEY SAND (SC): medium dense, brown, moist, coarse to fine SAND, medium to low plasticity			
10	S	4	20					
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-11-027

Grade Elevation:	+19.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-18-11	Drive Wt. (lbs):	140	
Logged By:	RH	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					5" Asphalt Concrete, 7" Concrete, 8"~10" Aggregate Base			
	B	1			Lean CLAY (CL): dark olive-brown, moist, fine SAND, low to medium plasticity			R,PI
5	D	2	26		stiff			
					SANDY lean CLAY (CL): stiff, dark reddish brown, moist, medium to fine SAND, few fine GRAVEL, low to medium plasticity			
10	S	3	12					
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-028

Grade Elevation:	+22.6 ft			
Boring Depth:	13.0 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-7-11	Drive Wt. (lbs):	140	
Logged By:	GC	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			CLAYEY SAND (SC) to SANDY lean CLAY (CL): very dark grayish brown, moist, medium to fine SAND, few fine GRAVEL, medium plasticity			
	B	1			coarse to fine SAND			R
5	D	2	12		CLAYEY SAND (SC) to SANDY lean CLAY (CL): medium stiff, very dark grayish brown, moist, fine SAND, few fine GRAVEL, medium plasticity			
	B	3						
10	S	4	11		stiff, brown			
	S	5	11					
					Terminated Boring at 13.0 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-029

Grade Elevation:	+20.0 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-19-11	Drive Wt. (lbs):	140	
Logged By:	RH	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					6" Asphalt Concrete, 6" Concrete, 6"~8" Aggregate Base			
	B	1			Lean CLAY (CL): dark olive-brown, moist, fine SAND, low to medium plasticity			R,PI
5	S	2	9		stiff			
10	S	3	15		very stiff			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

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Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-032

Grade Elevation:	+15.4 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-7-11	Drive Wt. (lbs):	140	
Logged By:	GC	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY to SANDY fat CLAY (CL to CH): very dark grayish brown, moist, fine SAND, medium to high plasticity			R
	B	1			medium to fine SAND			
5	S	2	11		stiff, yellowish brown, coarse to fine SAND, trace fine GRAVEL, medium to low plasticity			
	B	3			CLAYEY SAND (SC): yellowish brown, moist, coarse to fine SAND, few fine GRAVEL, low plasticity			
10	D	4	31		SILTY GRAVEL with SAND (GM): medium dense, brown to dark greenish gray, moist, coarse to fine GRAVEL, coarse to medium SAND, nonplastic, weak cementation			
					Terminated Boring at 11.5 ft depth. Groundwater encountered at 10.5'.			
15								
20								
25								
30								
35								

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Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-10-036

Grade Elevation:	+18.7 ft			
Boring Depth:	31.5 feet	Driller:	Pitcher Drilling	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-18-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					Asphalt Concrete; 6" Base			
	B	0			Lean CLAY with SAND (CL): dark brown, moist, fine SAND, low plasticity, few concrete debris			
5	D	1	24		SANDY lean CLAY (CL): hard, olive-brown, moist, 32% fine SAND, 68% fines, low plasticity, PP>4.5 tsf	14	121	PA,PI
10	S	2	4		Lean CLAY with SAND (CL): medium stiff, brown, moist, 2% fine GRAVEL, 13% fine SAND, 85% fines, low to medium plasticity	20	-	PA,PI
15	D	3	11		Lean CLAY (CL): medium stiff, brown, moist, fine SAND, medium plasticity, PP=0.5 tsf	20	134	
20	S	4	37		CLAYEY SAND with GRAVEL (SC): dense, brown to reddish brown, moist, 27% fine GRAVEL, 58% coarse to fine SAND, 15% fines, low plasticity	17	-	PA,PI
25	D	5	34		SANDY lean CLAY with GRAVEL (CL): very stiff, brown, moist, little fine GRAVEL, some coarse to fine SAND, low plasticity, PP=3.25 tsf	17	136	
30	S	6	19			14	-	
					Terminated Boring at 31.5 ft depth. Groundwater encountered at 11.0 ft.			
35								

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I-880 Operational and Safety Improvement

Project No. 10-133 Date: 8-15-11

Appendix B. Laboratory Test Results

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil-pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-002	D-1	5	CL	17.8	127.9	4.0				41/17/24	1300	7.3	65	219
R-11-002	S-3	10	CL	17.9										
R-11-002	D-4	15	CL	25.9	124.0	0.75		0:12:88						
R-11-002	S-5	20	CL	17.1										
R-11-002	D-6	25	CL	19.6	128.9	1.5								
R-11-002	S-7	30	CL	20.7										
R-11-002	D-8	35	CL	19.3	130.3	3.75								
R-11-002	S-9	40	SC	13.3										
R-11-002	D-10	45	CL	23.4	128.3	2.0		30:15:55						
R-11-002	S-11	50	CL	19.6										
R-11-002	D-12	55	GC	11.9	141.4									
R-11-002	S-13	60	CL	33.8										
R-11-002	D-14	65	CL	20.9	130.0	2.0								
R-11-002	S-15	70	CL	29.1										
R-11-006	D-1	5	CL	17.6	128.5	3.75					1600	7.6	65	164
R-11-006	S-2	10	CL	13.1										
R-11-006	D-3	15	GC	10.7	136.0									
R-11-006	S-4	20	CL	32.0				0:1:99						
R-11-006	D-5	25	CL	21.4	129.8	2.0								
R-11-006	S-6	30	CL	20.4										
R-11-006	D-7	35	CH	22.3	128.0	4.0								
R-11-006	S-8	40	CL	24.3										
R-11-006	D-9	45	CH	27.0	125.0	4.25								
R-11-006	S-10	50	CL	21.9										
R-11-006	D-11	55	SM	21.7	128.2									
R-11-006	S-12	62	CL	16.8				8:40:52						
R-11-006	D-13	70	CL	21.3	127.8	2.0								
R-11-008	S-1	5	CL	19.4										
R-11-008	D-2	10	CL	12.2	130.3	4.25								
R-11-008	S-3	15	CL	24.1										
R-11-008	D-4	20	SC	12.5	136.7									
R-11-008	S-5	25	CL	26.1				0:19:81						
R-11-008	D-6	30	CL	37.8	132.4	2.75								
R-11-008	S-7	35	CL	18.1										
R-11-008	D-8	40	CH	29.7	120.1	2.5								
R-11-008	S-9	45	CL	24.4										
R-11-008	D-10	50	CL	24.8	125.5	1.75								
R-11-008	S-11	60	CL	18.2										
R-11-008	D-12	70	SC	18.7	130.8									

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-010	S-1	2.5	CL	14.3										
R-11-010	D-2	5	CL	14.9	131.3	>4.5								
R-11-010	S-3	10	SC	11.0							5900	6.7	55	185
R-11-010	D-4	15	CL	22.0	127.9	3.75								
R-11-010	S-5	20	CL	26.9										
R-11-010	D-6	25	SM	9.8	144.2									
R-11-010	S-7	30	CL	20.8										
R-11-010	D-8	35	CL	24.2	98.2	0.75								
R-11-010	S-9	40	CH	33.0										
R-11-010	D-10	45	CL	19.5	129.3	3.25								
R-11-010	S-11	50	CL	26.0										
R-11-014	S-1	5	CH	17.6							1300	6.6	70	158
R-11-014	D-2	10	SC	10.3	144.6									
R-11-014	S-3	15	CH	30.9										
R-11-014	D-4	20	CL	14.3	133.0	1.5								
R-11-014	S-5	25	CL	28.4										
R-11-014	D-6	30	CH	28.4	125.2	2.75								
R-11-014	S-7	35	CH	26.9										
R-11-014	D-8	40	CL	22.8	127.9	2.0								
R-11-014	S-9	45	CL	22.1										
R-11-014	D-10	50	CH	27.5	123.8	1.75								
R-11-014	S-11	55	CH	19.6										
R-11-014	D-12	60	CL	18.9	131.6	3.0								
R-11-014	S-13	65	CL	21.3										
R-11-014	D-14	70	SC	12.5	133.7									
R-11-021	D-1	5	CL	18.8	122.8	3.0					1500	6.5	65	197
R-11-021	S-2	10	CL	19.5										
R-11-021	D-3	15	CL	21.7	128.2			0:15:85						
R-11-021	S-4	20	CH	31.0				5:14:81						
R-11-021	D-5	25	GP-GM	7.4	147.3									
R-11-021	S-6	30	SC-SM	12.5										
R-11-021	D-7	35	CL	7.7	137.5									
R-11-021	S-8	40	CH	35.2										
R-11-021	D-9	45	SC	17.2	135.2	2.25								
R-11-021	S-10	50	CL	25.7										

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-030	S-1	5	CL	13.7				14:31:55						
R-11-030	D-2	10	CL	30.9	121.0	1.0				47/21/26	1200	6.6	80	231
R-11-030	S-3	15	CH	29.0										
R-11-030	D-4	20	SC	14.7	135.9			12:67:21						
R-11-030	S-5	25	CH	44.3				1:15:84						
R-11-030	D-6	30	CH	34.1	115.2	2.0								
R-11-030	S-7	35	CL	38.6										
R-11-030	D-8	40	CL	30.2	118.5	2.25								
R-11-030	S-9	45	CL	24.3				0:37:63						
R-11-030	D-10	50	CL	20.6	125.5	2.0								
R-11-030	S-11	55	CL	14.8										
R-11-030	D-12	60	CL	25.0	122.9	2.0								
R-11-030	S-13B	65	SC	15.1										
R-11-030	S-13A	65	CL	19.9										
R-11-030	D-14	70	SW-SM	11.7	141.6									
R-11-031	D-1	5	CH	20.8	120.4	3.25					1300	6.9	170	221
R-11-031	S-2	10	SC	12.2				27:27:46						
R-11-031	D-3	15	SP-SC	11.8	143.8			37:52:11						
R-11-031	S-4	20	CL	22.3										
R-11-031	D-5	25	CH	27.4	113.0	1.75				52/22/30				
R-11-031	S-6	30	CL	23.2										
R-11-031	D-7	35	CL	27.7	117.3	3.0								
R-11-031	S-8	40	CL	26.0										
R-11-031	D-9	45	CL	22.4	124.2	3.0								
R-11-031	S-10	50	CL	31.1										
R-11-031	D-11	55	SM	19.8	129.9									
R-11-031	S-12T	60	CH	21.5										
R-11-031	S-12B	60	SC	15.4										
R-11-031	D-13	65	CL	18.6	129.8	1.5								
R-11-031	S-14	70	CL	15.3										
R-11-034	S-1	5	CL	15.5										
R-11-034	D-2	10	CH	29.2	119.7	0.75								
R-11-034	S-3B	15	CL	19.0							2500	7.1	252	160
R-11-034	S-3T	15	SM	19.9										
R-11-034	D-4	20	CL	20.3	127.5									
R-11-034	S-5	25	CL	30.5				0:19:81						
R-11-034	D-6	30	CL	15.8	132.9	3.5								
R-11-034	S-7	35	CL	22.3										
R-11-034	D-8	40	CL	18.6	129.8	1.75								
R-11-034	S-9	45	CL	19.7				1:40:59						

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-034	*D-10*	50	CL	20.1	128.4	1.75		0:11:89						
R-11-034	*S-11*	55	CL	23.1										
R-11-034	*D-12*	60	SC	15.7	133.2									
R-11-034	*S-13*	65	SM	22.6										
R-11-034	*D-14*	70	SM	12.8	137.0									
R-11-035	*D-1*	5	CH	17.6	125.0	3.5					1400	7.3	90	158
R-11-035	*S-2*	10	SC	12.2				36:47:17						
R-11-035	*D-3*	15	CL	27.5	120.1									
R-11-035	*S-4*	20	CL	29.8				12:15:73						
R-11-035	*D-5*	25	SC	11.5	139.7			30:55:15						
R-11-035	*S-6*	30	CL	21.9										
R-11-035	*D-7*	35	CL	18.9	129.0	3.0								
R-11-035	*S-8*	40	SC	20.8										
R-11-035	*D-9*	45	GP-GM	8.4	142.7									
R-11-035	*S-10*	50	SP-SM	10.0										
R-11-035	*D-11*	55	CL	21.7	122.7	2.75								
R-11-035	*S-12*	60	CL	18.2										
R-11-035	*D-13*	65	CL	23.3	125.8	3.25								
R-11-035	*S-14*	70	SC	13.0										
A-11-036	*D-1*	5	CL	14.1	120.7	>4.5		0:32:68		40/17/23				
A-11-036	*S-2*	10	CL	20.4				2:13:85		31/15/16				
A-11-036	*D-3*	15	CL	19.8	133.8	0.5								
A-11-036	*S-4*	20	SC	16.9				27:58:15		29/14/15				
A-11-036	*D-5*	25	CL	15.6	135.6	3.25								
A-11-036	*S-6*	30	CL	14.1										

Table B-2. Maximum Densities and Optimum Moisture Contents

Boring	Station (Offset)/ Station Line	Sample Depth (ft)	Soil Type	Max Wet Density (pcf)	Max Dry Density (pcf)	Opt. Moist Content (%)
HA-11-004	231+30 (80 Rt) / 05	0 – 5	CL	121.7	106.3	14.5
A-11-005	26+90 (30 Rt) / A	0 – 5	SC to CL	133.6	123.7	8.0
A-11-014	242+02 (85 Rt) / 05	2.5 – 5	CL	119.2	109.1	9.3
A-11-020 & A-11-036	27+93 (11 Lt) / B & 251+37 (105 Rt) / 05	0 – 7.5	CL	125.5	111.4	12.7
R-11-035	19+21 (33 Rt) / A	0 – 5	CL	121.7	105.8	15.0

Notes: 05 = I-880 Mainline; A = 29th Avenue; B = 23rd Avenue

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

One-Dimensional Swell or Settlement

Potential of Cohesive Soils

(ASTM D 4546-03)

PROJECT NAME: I-880 North safety and Operational Improvem LOCATION :

PROJECT NO.: 10-133

DATE : 07/10/11

BORING NO.: R-11-010 SAMPLE NO BK0 DEPTH(ft.): 0~2.5

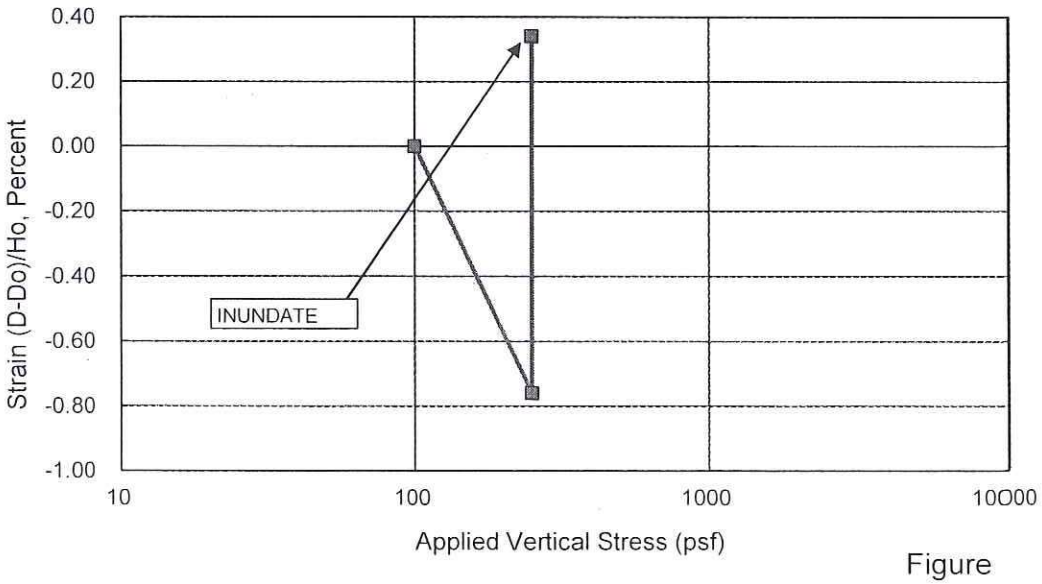
Soil Description : Dark olive-brown, SANDY lean CLAY (CL)

Initial Height (in.):	1.0000	Diameter(in):	2.416
Initial Dial Reading:	0.0500	Specific Gravity : (assumec	2.70
Initial Moisture (%):	13.0	Final Moisture (%) :	17.5
Initial Dry Density (pcf):	110.3	Final Dry Density (pcf) :	113.3
Initial Void Ratio:	0.528	Final Void Ratio:	0.523
Initial Saturation (%)	66	Final Saturation (%) :	97

PRESSURE (p) (psf)	FINAL READING (in)	APPARENT THICKNESS (in)	SETTLEMENT % OF SAMPLE THICKNESS	VOID RATIO
100	0.0500	1.0000	0.00	0.528
250	0.0576	1.0076	-0.76	0.539
H2O	0.0466	0.9966	0.34	0.523

Percent Swell (+) / Collapse (-) 1.10

Compression Curve of the Swell Potential



Figure

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546-03)

PROJECT NAME: I-880 North safety and Operational Improveme LOCATION :

PROJECT NO.: 10-133

DATE : 07/10/11

BORING NO.: R-11-010 SAMPLE NO BK0 DEPTH(ft.): 0~2.5

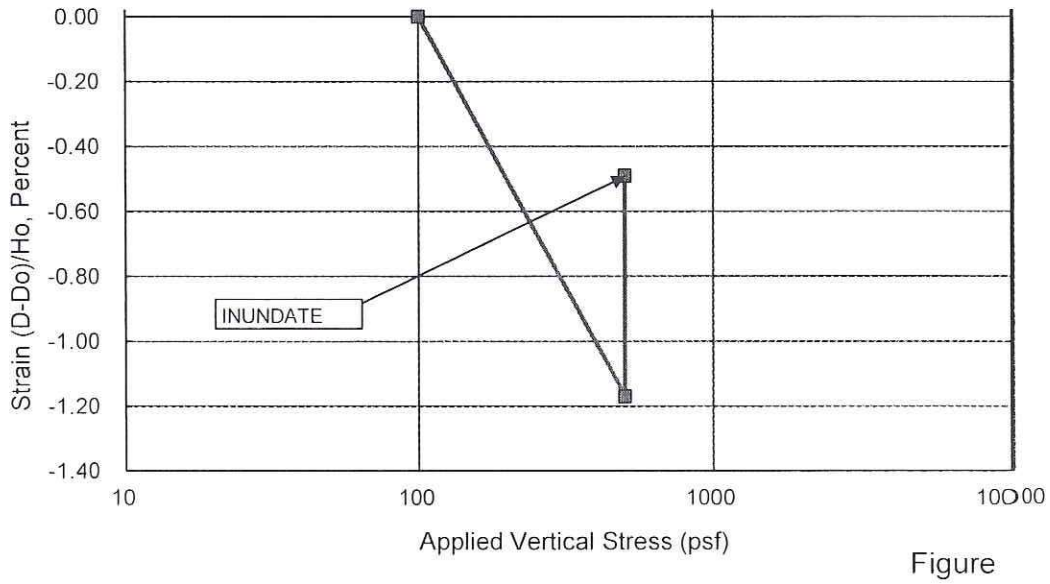
Soil Description : Dark olive-brown, SANDY lean CLAY (CL)

Initial Height (in.):	1.0000	Diameter(in):	2.416
Initial Dial Reading:	0.0500	Specific Gravity : (assumec	2.70
Initial Moisture (%):	12.9	Final Moisture (%) :	16.4
Initial Dry Density (pcf):	110.5	Final Dry Density (pcf) :	113.5
Initial Void Ratio:	0.526	Final Void Ratio:	0.533
Initial Saturation (%)	66	Final Saturation (%) :	91

PRESSURE (p) (psf)	FINAL READING (in)	APPARENT THICKNESS (in)	SETTLEMENT % OF SAMPLE THICKNESS	VOID RATIO
100	0.0500	1.0000	0.00	0.526
500	0.0617	1.0117	-1.17	0.543
H2O	0.0549	1.0049	-0.49	0.533

Percent Swell (+) / Collapse (-) 0.68

Compression Curve of the Swell Potential



Figure

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

One-Dimensional Swell or Settlement

Potential of Cohesive Soils

(ASTM D 4546-03)

PROJECT NAME: I-880 North safety and Operational Improveme LOCATION :

PROJECT NO.: 10-133

DATE : 07/10/11

BORING NO.: R-11-010 SAMPLE NO BK0 DEPTH(ft.): 0~2.5

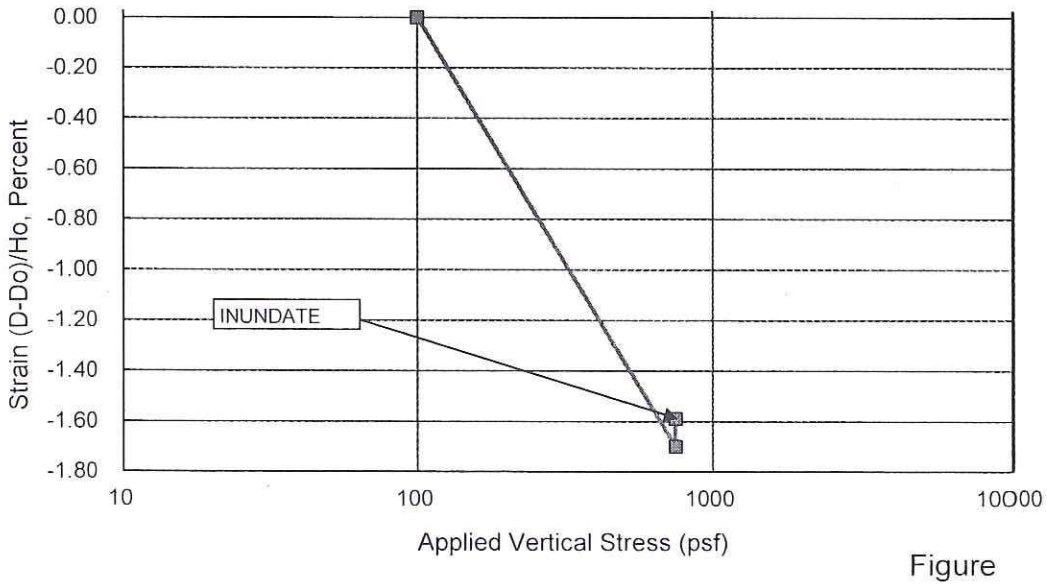
Soil Description : Dark olive-brown, SANDY lean CLAY (CL)

Initial Height (in.):	1.0000	Diameter(in):	2.416
Initial Dial Reading:	0.0500	Specific Gravity : (assumec	2.70
Initial Moisture (%):	12.8	Final Moisture (%) :	16.9
Initial Dry Density (pcf):	110.6	Final Dry Density (pcf) :	113.6
Initial Void Ratio:	0.524	Final Void Ratio:	0.548
Initial Saturation (%)	66	Final Saturation (%) :	94

PRESSURE (p) (psf)	FINAL READING (in)	APPARENT THICKNESS (in)	SETTLEMENT % OF SAMPLE THICKNESS	VOID RATIO
100	0.0500	1.0000	0.00	0.524
750	0.0670	1.0170	-1.70	0.550
H2O	0.0659	1.0159	-1.59	0.548

Percent Swell (+) / Collapse (-) 0.11

Compression Curve of the Swell Potential



Figure

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

One-Dimensional Swell or Settlement

Potential of Cohesive Soils

(ASTM D 4546-03)

PROJECT NAME: I-880 North safety and Operational Improveme LOCATION :

PROJECT NO.: 10-133

DATE : 07/08/11

BORING NO.: R-11-027 SAMPLE NO BK0 DEPTH(ft.): 0~5

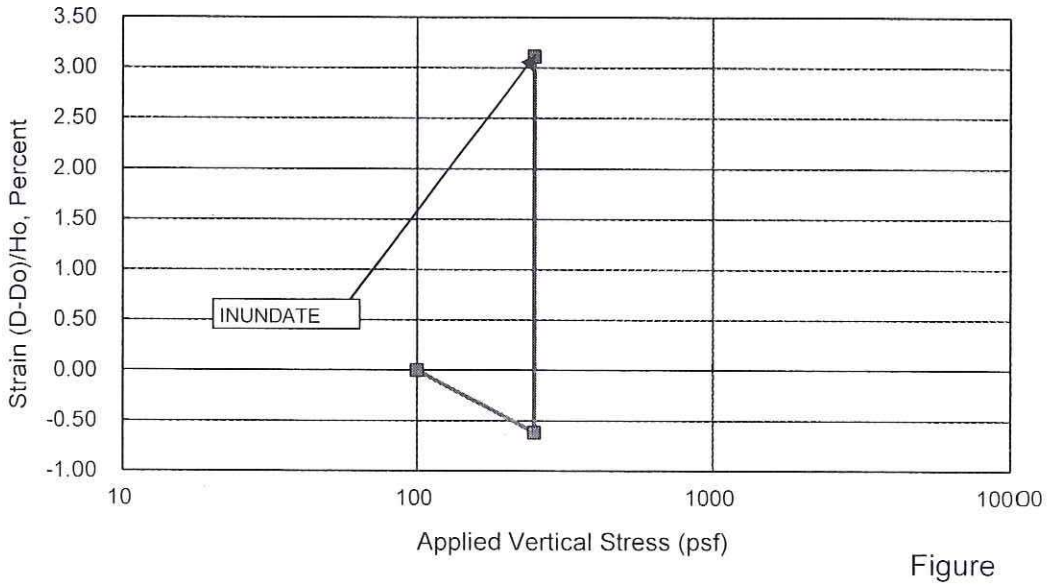
Soil Description : Dark olive-brown, Lean CLAY with SAND (CL)

Initial Height (in.):	1.0000	Diameter(in):	2.416
Initial Dial Reading:	0.0500	Specific Gravity : (assumec	2.70
Initial Moisture (%):	16.4	Final Moisture (%) :	24.6
Initial Dry Density (pcf):	107.1	Final Dry Density (pcf) :	110.0
Initial Void Ratio:	0.574	Final Void Ratio:	0.525
Initial Saturation (%)	77	Final Saturation (%) :	100

PRESSURE (p) (psf)	FINAL READING (in)	APPARENT THICKNESS (in)	SETTLEMENT % OF SAMPLE THICKNESS	VOID RATIO
100	0.0500	1.0000	0.00	0.574
250	0.0562	1.0062	-0.62	0.584
H2O	0.0189	0.9689	3.11	0.525

Percent Swell (+) / Collapse (-) 3.73

Compression Curve of the Swell Potential



Figure

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

One-Dimensional Swell or Settlement

Potential of Cohesive Soils

(ASTM D 4546-03)

PROJECT NAME: I-880 North safety and Operational Improveme LOCATION :

PROJECT NO.: 10-133

DATE : 07/08/11

BORING NO.: R-11-027 SAMPLE NO BK0 DEPTH(ft.): 0~5

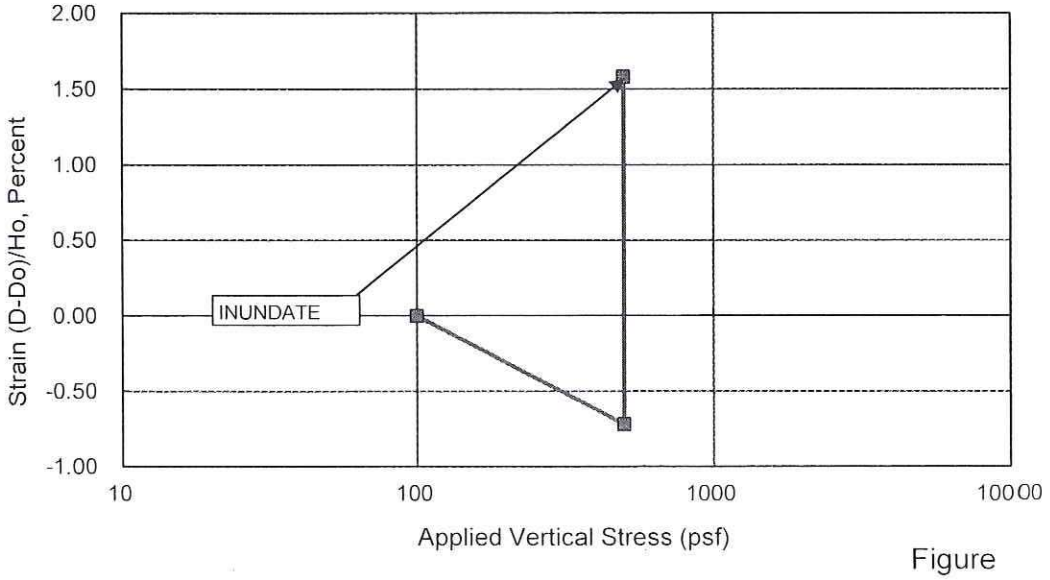
Soil Description : Dark olive-brown, Lean CLAY with SAND (CL)

Initial Height (in.):	1.0000	Diameter(in):	2.416
Initial Dial Reading:	0.0500	Specific Gravity : (assumec	2.70
Initial Moisture (%):	16.2	Final Moisture (%) :	22.8
Initial Dry Density (pcf):	107.4	Final Dry Density (pcf) :	110.3
Initial Void Ratio:	0.569	Final Void Ratio:	0.545
Initial Saturation (%)	77	Final Saturation (%) :	100

PRESSURE (p) (psf)	FINAL READING (in)	APPARENT THICKNESS (in)	SETTLEMENT % OF SAMPLE THICKNESS	VOID RATIO
100	0.0500	1.0000	0.00	0.569
500	0.0572	1.0072	-0.72	0.581
H2O	0.0342	0.9842	1.58	0.545

Percent Swell (+) / Collapse (-) 2.30

Compression Curve of the Swell Potential



Figure

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

One-Dimensional Swell or Settlement

Potential of Cohesive Soils

(ASTM D 4546-03)

PROJECT NAME: I-880 North safety and Operational Improveme LOCATION :

PROJECT NO.: 10-133

DATE : 07/08/11

BORING NO.: R-11-027 SAMPLE NO BK0 DEPTH(ft.): 0~5

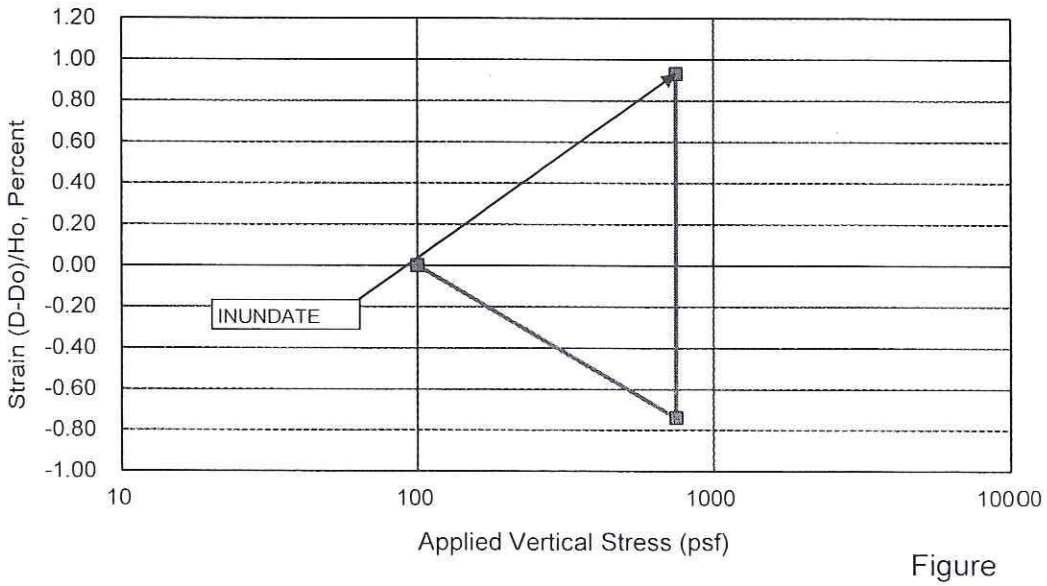
Soil Description : Dark olive-brown, Lean CLAY with SAND (CL)

Initial Height (in.):	1.0000	Diameter(in):	2.416
Initial Dial Reading:	0.0500	Specific Gravity : (assumec	2.70
Initial Moisture (%):	16.2	Final Moisture (%) :	23.0
Initial Dry Density (pcf):	107.3	Final Dry Density (pcf) :	110.2
Initial Void Ratio:	0.570	Final Void Ratio:	0.556
Initial Saturation (%)	77	Final Saturation (%) :	100

PRESSURE (p) (psf)	FINAL READING (in)	APPARENT THICKNESS (in)	SETTLEMENT % OF SAMPLE THICKNESS	VOID RATIO
100	0.0500	1.0000	0.00	0.570
750	0.0574	1.0074	-0.74	0.582
H2O	0.0407	0.9907	0.93	0.556

Percent Swell (+) / Collapse (-) 1.67

Compression Curve of the Swell Potential



Figure

AP Engineering & Testing, Inc.

CT 373-MOISTURE-DENSITY RELATION

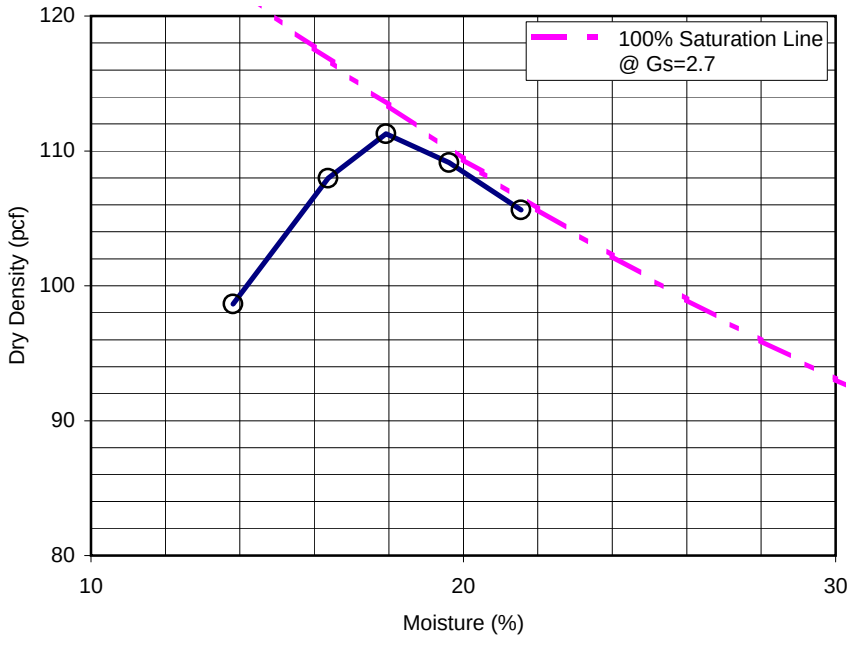
Client:	Earth Mechanics, Inc.			AP Number:	12-0354
Project Name:	I-880 Improvement	Tested By:	JP/KM	Date:	03/02/12
Project No. :	10-133	Calculated By:	AP	Date:	03/12/12
Mixture:	Blend #1	Checked By:	AP	Date:	03/21/12
Sample No. :	N/A	Depth (ft.):	N/A		

Visual Sample Description: Lean Clay with 6% Lime

Trial No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3469	3667	3580	3407	3367	
Wt. of Mold (gm.)	1972	1973	1958	1812	1972	
Net Wt. of Soil (gm.)	1497	1694	1622	1595	1395	
Height of Sample (inches)	3.619	3.922	3.774	3.774	3.774	
Diameter of Sample (inches)	3.996	3.996	3.996	3.996	3.996	
Wt. of Container (gm.)	483.87	483.91	484.01	483.90	611.46	
Wet Wt. of Soil + Cont. (gm.)	586.87	557.08	590.51	590.10	678.11	
Dry Wt. of Soil + Cont. (gm.)	572.38	545.96	573.04	571.27	670.02	
Moisture Content (%)	16.37	17.92	19.62	21.55	13.82	
Wet Density (pcf)	125.65	131.20	130.55	128.38	112.27	
Dry Density (pcf)	107.97	111.26	109.14	105.61	98.64	

Maximum Dry Density (pcf) **111.3**

Optimum Moisture Content (%) **18.0**



AP Engineering & Testing, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF LIME TREATED SOILS (CT 373)

Project Name:	I-880 Improvement	Prepared by:	JP	Date	03/02/12
Project No.:	10-133	Tested by:	ST	Date	03/09/12
Boring No.:	Blend #1	Calculated by:	AP	Date	03/12/12
Sample No.:	3	Checked by:	AP	Date	03/12/12
Depth (feet):	N/A	Curing Time:	7	Days	
Description of Soils:	Lean Clay treated with 6% Lime				

INITIAL CONDITION OF SPECIMEN

Diameter (d)	3.995	in
Sample Area (A)	12.5350	in^2
Length (L)	3.932	in
Volume(Vo)	0.02852	ft^3
Weight Before	1692.00	g
Wet Density	130.8	pcf
Dry Density	111.1	pcf

Moisture Content Determination	
Wt. Wet Soil+Container(gms)	172.29
Wt. Dry Soil+Container(gms)	153.97
Wt. Container (gms)	50.25
Moisture, (%)	17.66

SHEARING DATA

Strain Rate (mm/min)	Strain Rate (%/min)	Temperature (^0F)	Curing Time Days	Maximum Load Pounds	Compressive Strength (psi)
1.27	1.27	73.8	7	5025	401

*Failure Types:			
	1	Cone	
	2	Cone and Split	
X	3	Columnar Vertical Cracking	
	4	Shear	
	5	Side Fracture (Top or Bottom)	
	6	Side Fracture (Pointed)	
	7	Other	

Remarks:

AP Engineering & Testing, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF LIME TREATED SOILS (CT 373)

Project Name:	I-880 Improvement	Prepared by:	JP	Date	03/02/12
Project No.:	10-133	Tested by:	ST	Date	03/09/12
Boring No.:	Blend #1	Calculated by:	AP	Date	03/12/12
Sample No.:	4	Checked by:	AP	Date	03/12/12
Depth (feet):	N/A	Curing Time:	7	Days	
Description of Soils:	Lean Clay treated with 6% Lime				

INITIAL CONDITION OF SPECIMEN

Diameter (d)	3.995	in
Sample Area (A)	12.5350	in^2
Length (L)	3.934	in
Volume(Vo)	0.02854	ft^3
Weight Before	1662.00	g
Wet Density	128.4	pcf
Dry Density	109.1	pcf

Moisture Content Determination	
Wt. Wet Soil+Container(gms)	172.29
Wt. Dry Soil+Container(gms)	153.97
Wt. Container (gms)	50.25
Moisture, (%)	17.66

SHEARING DATA

Strain Rate (mm/min)	Strain Rate (%/min)	Temperature (^0F)	Curing Time Days	Maximum Load Pounds	Compressive Strength (psi)
1.27	1.27	73.8	7	4377	349

*Failure Types:			
	1	Cone	
	2	Cone and Split	
X	3	Columnar Vertical Cracking	
	4	Shear	
	5	Side Fracture (Top or Bottom)	
	6	Side Fracture (Pointed)	
	7	Other	

Remarks:

AP Engineering & Testing, Inc.

CT 373-MOISTURE-DENSITY RELATION

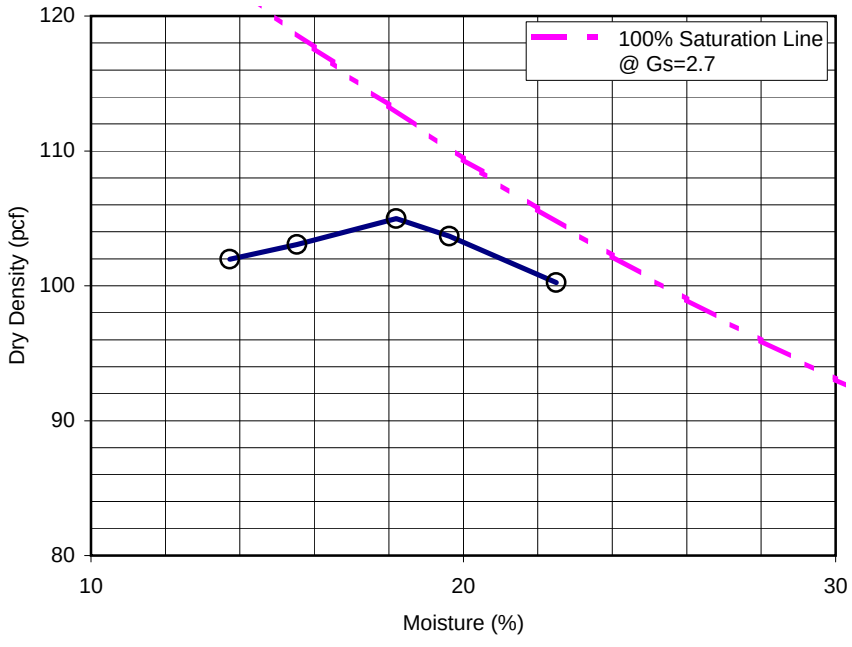
Client:	Earth Mechanics, Inc.			AP Number:	12-0354
Project Name:	I-880 Improvement	Tested By:	JP/KM	Date:	03/09/12
Project No. :	10-133	Calculated By:	AP	Date:	03/12/12
Mixture:	Blend #2	Checked By:	AP	Date:	03/21/12
Sample No. :	N/A	Depth (ft.):	N/A		

Visual Sample Description: Lean Clay with 6% Lime

Trial No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3565	3611	3607	3615	3575	
Wt. of Mold (gm.)	1970	1969	1968	1970	1969	
Net Wt. of Soil (gm.)	1595	1642	1639	1645	1606	
Height of Sample (inches)	4.178	4.189	4.012	4.029	3.973	
Diameter of Sample (inches)	3.996	3.996	3.996	3.996	3.996	
Wt. of Container (gm.)	149.91	149.93	149.00	484.08	150.00	
Wet Wt. of Soil + Cont. (gm.)	676.71	718.84	570.09	562.10	679.45	
Dry Wt. of Soil + Cont. (gm.)	613.12	642.36	505.25	549.30	582.21	
Moisture Content (%)	13.73	15.53	18.20	19.63	22.50	
Wet Density (pcf)	115.96	119.07	124.09	124.03	122.79	
Dry Density (pcf)	101.97	103.06	104.98	103.68	100.24	

Maximum Dry Density (pcf) **105.0**

Optimum Moisture Content (%) **18.2**



AP Engineering & Testing, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF LIME TREATED SOILS (CT 373)

Project Name:	I-880 Improvement	Prepared by:	JP	Date	03/09/12
Project No.:	10-133	Tested by:	ST	Date	03/16/12
Mixture:	Blend #2	Calculated by:	AP	Date	03/19/12
Sample No.:	2	Checked by:	AP	Date	03/19/12
Depth (feet):	N/A	Curing Time:	7	Days	
Description of Soils:	Lean Clay treated with 6% Lime				

INITIAL CONDITION OF SPECIMEN

Diameter (d)	3.996	in
Sample Area (A)	12.5413	in^2
Length (L)	3.975	in
Volume(Vo)	0.02885	ft^3
Weight Before	1647.40	g
Wet Density	125.9	pcf
Dry Density	105.9	pcf

Moisture Content Determination	
Wt. Wet Soil+Container(gms)	156.57
Wt. Dry Soil+Container(gms)	139.74
Wt. Container (gms)	50.46
Moisture, (%)	18.85

COMPRESSIVE STRENGTH DATA

Strain Rate (in/min)	Strain Rate (%/min)	Temperature (^0F)	Curing Time Days	Maximum Load Pounds	Compressive Strength (psi)
1.27	1.26	72.1	7	3828	305

*Failure Types:			
	1	Cone	
	2	Cone and Split	
X	3	Columnar Vertical Cracking	
	4	Shear	
	5	Side Fracture (Top or Bottom)	
	6	Side Fracture (Pointed)	
	7	Other	

Remarks:

AP Engineering & Testing, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF LIME TREATED SOILS (CT 373)

Project Name:	I-880 Improvement	Prepared by:	JP	Date	03/09/12
Project No.:	10-133	Tested by:	ST	Date	03/16/12
Mixture:	Blend #2	Calculated by:	AP	Date	03/19/12
Sample No.:	3	Checked by:	AP	Date	03/19/12
Depth (feet):	N/A	Curing Time:	7	Days	
Description of Soils:	Lean Clay treated with 6% Lime				

INITIAL CONDITION OF SPECIMEN

Diameter (d)	3.996	in
Sample Area (A)	12.5413	in^2
Length (L)	3.966	in
Volume(Vo)	0.02878	ft^3
Weight Before	1638.66	g
Wet Density	125.5	pcf
Dry Density	105.6	pcf

Moisture Content Determination	
Wt. Wet Soil+Container(gms)	156.57
Wt. Dry Soil+Container(gms)	139.74
Wt. Container (gms)	50.46
Moisture, (%)	18.85

COMPRESSIVE STRENGTH DATA

Strain Rate (in/min)	Strain Rate (%/min)	Temperature (^0F)	Curing Time Days	Maximum Load Pounds	Compressive Strength (psi)
1.27	1.26	72.1	7	4177	333

*Failure Types:			
	1	Cone	
	2	Cone and Split	
X	3	Columnar Vertical Cracking	
	4	Shear	
	5	Side Fracture (Top or Bottom)	
	6	Side Fracture (Pointed)	
	7	Other	

Remarks:

Appendix C. Caltrans Review Comments and Our Responses

Response to Caltrans Review Comments dated September 27, 2011

Materials Report
04-ALA-880 PM 28.4/29.2
04-0A7100
Operational and Safety Improvements

- The use of SEG (subgrade enhancement geotextile) is not applicable to mitigate the expansive properties of the subgrade soil. Per our discussion with Imad Basheer of HQ – the author of the "Guide for Designing Subgrade Enhancement Geotextile", SEG are not capable to stop expansion/contraction of an expansive soil. Therefore, this option should be deleted from the mitigation alternatives.

Response: SEG has been deleted.

- The existing facility and/or the existing pavement section on the mainline I-880 do not have a 0.33' CTB (Drained Base). RBF consulting provided the as-built and it has only CTB under the PCCP. The edge drains were placed adjacent to the ETW (PCCP) and below the AC shoulder but no drained or permeable layer were placed.

Response: All new pavements will be "undrained". The existing edge drains will be moved to the sawcut line between the Mainline ETW and the proposed Auxiliary Lane. The relocation of the existing edge drains is also temporary because the District has a pavement rehabilitation project that is scheduled to follow immediately after this project, and the edge drains will be abandoned then.

- The recommended structural sections should have no ATPB layer because there is no existing drained/permeable base layer. Any existing edge drain should be removed.

Response: see above response.

- Provide an alternative structural section recommendation for Jointed Plain Concrete Pavement (JPCP) section on the Mainline Auxiliary Lane, Ramps, Mainline Shoulder, and Local Streets.

Response: For Mainline auxiliary lane and shoulders, Hot-Mixed Asphalt, HMA (flexible), pavement is recommended over Jointed Plain Concrete Pavement, JPCP (rigid), section because the upcoming Mainline rehabilitation project will crack, seat, and overlay with about 10 inches of HMA. Rigid pavement is not cost effective for local streets, thus flexible pavement is recommended. Both rigid and flexible pavements are feasible for the ramps and they are provided in our Materials Report; the final selected pavement type for the ramps should be based on cost and/or construction schedule.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: HALIM MATHKOUR
District Branch Chief
Design East-Alameda I

Attention: Rao Nagar

Date: September 27, 2011

File: 04-ALA-880 PM 28.4/29.2
04-0A7100
Operational and Safety Improvements

From: LEONARDO DELEON
Materials Design Engineer
Engineering Services I - Materials A

Concurred by: TINU MISHRA, P.E.
District Materials Engineer
District Branch Chief - Materials A

Subject: Review of Materials Report and Pavement Strategy Checklist

This is in response to your circulation routing form dated September 7, 2011 requesting our review comments on the submitted Materials Report by Earth Mechanics, Inc. In addition, we have included in this memorandum our review of the updated September 2, 2011 Pavement Strategy Checklist.

The project proposes to replace the 29th Avenue overcrossing and the two 23rd Avenue overcrossings. In addition, the proposed project will widen the mainline outside shoulders and lengthen the existing northbound auxiliary lane, reconstruct the ramps and local streets, for the I-880 operation and safety improvements in the City of Oakland, Alameda County.

Our review comments are below.

MATERIALS REPORT

- The use of SEG (subgrade enhancement geotextile) is not applicable to mitigate the expansive properties of the subgrade soil. Per our discussion with Imad Basheer of HQ – the author of the "Guide for Designing Subgrade Enhancement Geotextile", SEG are not capable to stop expansion/contraction of an expansive soil. Therefore, this option should be deleted from the mitigation alternatives.

- The existing facility and/or the existing pavement section on the mainline I-880 do not have a 0.33' CTB (Drained Base). RBF consulting provided the as-built and it has only CTB under the PCCP. The edge drains were placed adjacent to the ETW

(PCCP) and below the AC shoulder but no drained or permeable layer were placed.

- The recommended structural sections should have no ATPB layer because there is no existing drained/permeable base layer. Any existing edge drain should be removed.

- Provide an alternative structural section recommendation for Jointed Plain Concrete Pavement (JPCP) section on the Mainline Auxiliary Lane, Ramps, Mainline Shoulder, and Local Streets.

PAVEMENT STRATEGY CHECKLIST

- Revise the proposed mainline and shoulder pavement structural section without the ATPB and SEG. SEG should be replaced with either replacement of expansive subgrade with non-expansive subbase, or lime treating the subgrade.

- Ramps should be JPCP section.

- Local Roads should not use the SEG.

- Item # 9 should be "yes". There are highly expansive basement soils present.

If you have any questions, please call Leonardo Deleon at 622-5444.

c: Daily File, Route File,
L. Deleon/ld/Ala-880 Operational & Safety Improvements Review of Materials Report and Pavement Strategy Checklist.

INITIAL SITE ASSESSMENT UPDATE
I-880 NORTH SAFETY IMPROVEMENTS PROJECT
NORTHBOUND I-880 OFFRAMP AT 29TH AVENUE
OAKLAND, CALIFORNIA

PREPARED FOR:
AECOM
2101 Webster Street, Suite 100
Oakland, California

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612

October 6, 2009
Project No. 401145002

October 6, 2009
Project No. 401145002

Mr. Fred Kelley
AECOM
2101 Webster Street, Suite 100
Oakland, California 94612

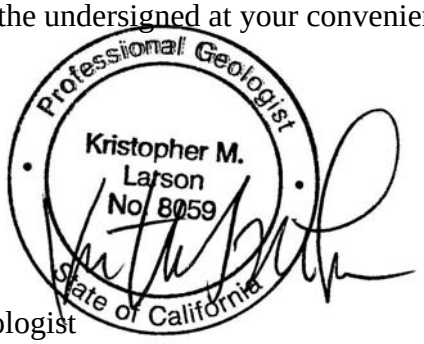
Subject: Initial Site Assessment Update
I-880 North Safety Improvements Project
Northbound I-880 Offramp at 29th Avenue
Oakland, California

Dear Mr. Kelley:

In accordance with your Notice to Proceed, dated November 13, 2006, Ninyo & Moore has performed an Initial Site Assessment for the above-referenced site. The attached report presents our methodology, findings, conclusions and recommendations regarding the environmental conditions at the site.

We appreciate the opportunity to be of service to AECOM. If you have any questions regarding this report, please contact the undersigned at your convenience.

Sincerely,
NINYO & MOORE



Kris M. Larson, P.G. 8059
Senior Environmental Geologist

KML/csj

Distribution: (2) Addressee
(2) Caltrans District 4 (& CD)

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Appendix A – Site Historical Documents and ISA Checklist
Appendix B – Photographic Documentation
Appendix C – Environmental Database Search and Update
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1. INTRODUCTION

AECOM has authorized Ninyo & Moore to perform an Initial Site Assessment (ISA) for the I-880 North Safety Improvements Project (site). The site boundaries for the ISA include the Ford Street to the south, 23rd Avenue to the west, the Fruitvale Station Shopping Center to the east and the northern edge of the Lazear School property to the north, in the City of Oakland, County of Alameda, California (Figures 1 and 2). The I-880 North Safety Improvements Project consists of reconfiguring the off-ramps at 23rd and 29th Avenues, the on-ramp at Lisbon Avenue, and constructing a sound wall on the north side of I-880 between 29th Avenue and 23rd Avenue. Road work will also occur on East 8th, 9th, and 10th Streets, and Portwood Avenue. The site vicinity is composed of residential properties and commercial businesses. This ISA has been performed in accordance with the Caltrans Project Development Procedures Manual, Appendix DD, *Preparation Guidelines for Initial Site Assessment (ISA) Checklist for Hazardous Waste* (Caltrans 1999) and current ASTM standards, as appropriate. A copy of the checklist is included in Appendix A.

1.1. Purpose

The purpose of this ISA was to evaluate the possibility that hazardous materials may be present in shallow [less than three meters/ten feet below ground surface (bgs)] soil and groundwater. To evaluate the likelihood of encountering contamination during improvements within the site vicinity, Ninyo & Moore has performed a limited evaluation of properties within and adjoining the site with regard to the presence of hazardous materials.

1.2. Scope of Services

Ninyo & Moore's scope of work for the ISA included the activities listed below.

- Performed a site reconnaissance to visually identify areas of potentially contaminated surficial soil or surface water, improperly stored hazardous materials, and possible risks of contamination from activities at the site and adjacent properties.
- Reviewed readily available lease records, documents (including ISAs), maps, and reports pertaining to the site.

- Reviewed local regulatory agency files and available regulatory agency databases for the site and for properties located adjacent to the site. The purpose of this review was to evaluate the possible environmental impact to the site. These databases list locations of known hazardous waste sites, landfills, and leaking underground storage tanks, permitted facilities that utilize underground storage tanks, and facilities that use, store, or dispose of hazardous materials.

- Reviewed readily available historical documents, including aerial photographs (site and adjacent properties), Sanborn Insurance Maps (site and adjacent properties), and reverse city directories (site and adjacent properties).

- Prepared this ISA report documenting findings, providing opinions and conclusions regarding possible environmental conditions at the site and providing recommendations for additional work (e.g. phase II ESA, Aerially deposited Lead Study, hazardous building material survey, etc.), if required. Color photographs are provided in Appendix B.

2. SITE DESCRIPTION

This section provides a general description of the land uses adjoining the site.

2.1. Overview

The site is located in both commercial and residential districts and consists of approximately 2,360 meters (7,750 feet) of existing roadways. The site boundaries for the ISA include Ford Street to the south, 23rd Avenue to the west, the Fruitvale Station Shopping Center to the east and the northern edge of the Lazear School property to the north, in the City of Oakland, County of Alameda, California (Figures 1 and 2).

Ninyo & Moore performed a site reconnaissance on November 20, 2006 to evaluate current environmental conditions of the site and adjacent properties. Properties of possible environmental concern discussed in the following sections are those properties that were identified from environmental databases of regulated facilities, historical sources reviewed, and our site reconnaissance. Please refer to Figure 2 for a site vicinity map, including designated properties and businesses that currently and/or historically use hazardous materials identified during research of historical resources and site reconnaissance activities. A more detailed discussion of the historical sources is included in Section 3. A more detailed

description of the facilities listed on the regulatory environmental databases is included in Section 5. Photographs of the site are included in Appendix B.

2.2. Site Description

The site encompasses approximately 2,360 meters (7,750 feet) of roadway, and includes approximately 3,300 linear feet of Interstate I-880 (and frontage roadway) between 600 feet east of the east-bound Interstate 880 / 23rd Avenue off-ramp and the approximately 400 feet east of the Fruitvale / I-880 intersection; 1,300 feet of roadway east of I-880, which includes East 8th, 9th, and 10th Streets, and Portwood Avenue; 1,800 feet of 23rd Avenue roadway between Chapman Street (south) and East 11th Street (north); and 1,350 feet of 29th Avenue roadway between the north boundary of the Lazaer School property (north) and Ford Street (south).

The properties included within the site consisted of residential developments or commercial and industrial businesses, churches, and schools (Figure 2). Tenants in the Fruitvale Station Shopping Center on E. 9th Street consisted primarily of commercial enterprises, including banks, offices, restaurants, retail stores, laundromats, automobile parts stores, video stores, and a grocery store. An AT&T cell-phone tower was located by the southwestern-most entrance to the Fruitvale Station Shopping Center parking lot. The section of 29th Avenue south of I-880 was composed of commercial and industrial warehouses, café's, gyms, machine shops and auto repair facilities. The north side of 29th Avenue included Lazaer School, vacant lots, and residential property. The properties on East 9th and 10th Streets, and Portwood Avenue were mostly residential, with some commercial. Properties on East 8th Street and 23rd Avenue were mostly commercial and included auto repair facilities, carpet and upholstery cleaners, sheet metal fabricators, machine shops, and electrical and painting contractors.

3. SITE AND VICINITY HISTORY

This section describes historical land use on and adjacent to the site.

3.1. Fire Insurance Rate Maps

Ninyo & Moore contracted with Environmental Data Resources, Inc. (EDR) to conduct a fire insurance rate map (Sanborn map) review of the site vicinity. Three sets of Sanborn Maps were reviewed to cover the site area, and the site area was then divided into four sections for review, which are outlined below.

- Western section covering East 9th Street between 25th Avenue and 27th Avenue as well as 23rd Avenue between Chapman Street and East 10th Street.
- Center section covering East 8th Street between 27th Avenue and 29th Avenue, as well as 29th Avenue between I-880 and the northern extent of the Lazear School property.
- Eastern section along East 9th Avenue between 29th Avenue and the current Fruitvale Station Shopping Center.
- Southern section covering the southern edge of I-880 between 23rd Avenue and Derby Avenue, as well as 29th Avenue between I-880 and Ford Street.

The years available for review included 1903, 1911, 1950, 1952, 1953, 1957, 1960, 1965, 1967 and 1969. This review was conducted to evaluate previous land use on the site and adjoining properties, which may suggest the past use of hazardous substances. Copies of the Sanborn Maps are presented in Appendix A. Table 1 summarizes our observations for each section of the Sanborn Map review.

3.2. City Directories

City directories were reviewed by Ninyo & Moore personnel at the City of Oakland Public Library for the site and adjacent properties. Haines and Polk city directories were reviewed for the years 1967, 1973, 1979, 1986, 1992, 1998, and 2004. The search was completed for a range of addresses along the site and in the immediate site vicinity

Table 2 lists the properties historically located along the site and in the immediate site vicinity that may be a possible environmental concern based on potential use or storage of hazardous materials.

3.3. Aerial Photographs

Historical aerial photographs were available for the site for the years 1939, 1946, 1959, 1965, 1982, 1993, and 1998 from EDR. In addition, historical aerial photographs were reviewed at Pacific Aerial Surveys (PAS) for the years 1950, 1959, 1968, 1975, 1981, 1985, 1990, 1996, and 2003. This review was conducted to evaluate previous land use on the site and adjacent properties, which may suggest the past use of hazardous substances. The following are notable observations from each photograph.

1939 (EDR) – This aerial photograph shows the site and adjacent properties to be comprised of residential, commercial, and industrial structures. The roadways encompassing the site and surrounding area are in the same configuration as seen during the site reconnaissance with the following exceptions: State Route I-880 and adjoining on and off ramps, and the 29th Avenue overpass, are not present; East 9th Street trends in a straight line (east-west) from Fruitvale Avenue to 29th Avenue; East 8th Street trends between Fruitvale and 23rd Avenue; 23rd Avenue trends in a straight line in a north-south direction; and Portwood Avenue only exists between East 8th Street and East 9th Street. Properties on site are residential except from north of East 9th Street, and east of 29th Avenue, where a group of industrial/commercial structures can be seen. A vacant swath of land approximately 100-feet wide is observed west of 29th Avenue, between East 9th and East 10th Streets. Vacant land is observed east of and adjacent to the site, north of East 9th Street and west of Fruitvale Avenue. The Southern Pacific Railway line is observed north of the site, trending northwest-southeast. A grove of trees is observed immediately north of the site at the north corner of East 10th Street and 29th Avenue.

1946 (EDR) – No changes were observed for the site and adjacent properties in the 1946 photograph.

1950 (PAS) – The configuration of the roadways encompassing the site and surrounding area in this photograph was observed to be the same as their configuration on the site reconnaissance. State Route I-880 and the adjoining on and off ramps, and the 29th Avenue overpass, were observed, displacing residential housing; East 9th Street was observed to

have a slight bend in it approximately 200 feet from the eastern end of the site; East 8th Avenue trends east-west on the north side of I-880 for two blocks between the 29th Avenue overpass and Lisbon Avenue; 23rd Avenue was observed as a freeway overpass between East 7th and 10th Streets; Portwood Avenue was observed between East 8th Street and East 10th Street. The site area was developed with mostly commercial development. Del Monte, Inc. was observed in the northeast section of the site. I-880, along with 29th Avenue and 23rd Avenue and all other surface roads currently within the site boundaries were observed. The area southwest of the intersection of 23rd Avenue and I-880 appears as a vacant lot. Future photos show this lot as a truck and auto wrecking yard. Exposed areas of soil were observed at the 29th Avenue / East 8th Street intersection, and in several areas along the north side of I-880. Several containers were observed on an unpaved surface at the northwest corner of the East 10th Street and 29th Avenue intersection. No other areas of potential environmental concern were observed.

1959 (EDR) – The configuration of most of the buildings in the property north of East 9th Street, and east of 29th Avenue, including the buildings closest to the site, has been altered. However, all of these buildings still appear to be either commercial and/or industrial, and a parking lot can be seen adjacent to and north of East 9th Street. Another parking lot can be seen west of 29th Avenue, between East 9th and East 10th Streets. Areas of soil patches were observed southeast of the I-880 and 29th Avenue overpass, and north and adjacent to I-880 between Lisbon Avenue and 26th Avenue.

1959 (PAS) – No containers were observed at the northwest corner of 29th Avenue and 10th Street. No other changes were observed.

1965 (EDS) – The only significant changes or additions observed in this aerial photograph were the Wallace Electric building, located at 823 27th Avenue, and the Supreme Interior Custom Upholstery building, at 2800 East 8th Street. A grove of trees, previously observed immediately north of the site at the corner of East 10th Street and 29th Avenue, has been re-placed by a commercial and/or industrial structures.

1968 (PAS) – The area at the southwest corner of the 23rd Avenue / I-880 interchange was observed as an auto / truck maintenance facility and potential wrecking yard with two rectangle buildings. No other changes were noted.

1975 (PAS) – The auto maintenance facility at the southwest corner of the 23rd Avenue / I-880 interchange appears to be cluttered with debris. No other changes were noted.

1981 (PAS) – The auto maintenance facility at the southwest corner of 23rd Avenue and I-880 is vacant other than the two buildings. Some staining on the ground in the property was observed. There is a discoloration of soil on the west side of 29th Avenue, south of the I-880 overpass. No other changes were noted.

1982 (EDR) – No changes were observed for the site and adjacent properties except for the appearance of the present configuration of the Shell Gasoline Station at 820 Portwood Avenue.

1985 (PAS) – No changes were noted from previous photograph.

1990 (PAS) – The auto maintenance facility at the southwest corner of 23rd Avenue and I-880 contains vehicles once again. No other changes were noted.

1993 (EDR) – No changes were observed for the site and adjacent properties except for the removal of the industrial structures immediately north of the site at the north corner of East 10th Street and 29th Avenue.

1996 (PAS) – Residential development construction was observed at the northwest corner of East 10th Street and 29th Avenue. The Del Monte Plant has been demolished and was being replaced by the Fruitvale Shopping Center northwest of the Fruitvale Avenue / East 9th Street intersection, and a sports field was observed north and adjacent to Lazear School. No other changes were noted.

1998 (EDR) – No changes were observed from previous photograph.

2003 (PAS) – The truck repair facility and auto maintenance facility at the southeast corner of I-880 and 23rd Avenue is now gone and has been replaced by a marble facility currently in the location. The area of discolored soil on the western side of 29th Avenue south of I-880 appears to have been re-landscaped, and is no longer discolored.

3.4. Historical Topographic Maps

Historical topographic maps were available for the site for the years 1915, 1948, 1949, 1959, 1968, 1973, and 1980. Copies of the topographic maps are presented in Appendix A. This review was conducted to evaluate previous land use on-site, which may suggest the past use of hazardous materials. The following are notable observations from each historical topographic map.

1915 (Concord) – The Western Pacific (WP) and Southern Pacific (SP) railroads were observed on the northeastern boundary of the site, trending northwest to southeast. 29th Avenue and Fruitvale Avenue were observed and had bridges extending southwest to Alameda over the Tidal Canal between Alameda and Oakland. Although few buildings are denoted on this map, the site was observed to be developed with industrial and commercial properties. A building adjacent to the SP railroad tracks suggests it may be train station / stop.

1948 (Concord) – Highway 17 was observed adjacent to the WP tracks along 13th Street and north of the site. Additional commercial and industrial buildings were observed in and around the site. The building that is Lazear Elementary School appears at the northeast corner of East 9th St and 29th Avenue. On the same block, just to the north of the Lazear building, a large industrial building was observed. The building was most likely the Del Monte Canning Factory. Additional large industrial building can be seen adjacent to the SP tracks on the north and south side.

1949 (Oakland East) – Bench marks (BM) were observed at the Lazear School (24ft.), and at the intersection of 23rd Avenue and 11th Street. (17 ft.). Several other BM elevation markers were noted outside of the site area. No other changes to the site or vicinity were observed.

1959 (Concord) – This is the first map in the sequence where I-880 was observed. I-880 follows the same path as it currently does, between East 7th and East 8th Street on the Southeast portion of the site, and between 23rd Avenue and present day Kennedy Street on the Northwest portion of the site, trending northwest-southeast. I-880 is labeled as a 6-lane freeway. 29th and 23rd Avenue overpasses (above I-880) were observed. An industrial building on the north edge of the site adjacent to SP tracks is labeled as Fruitvale Station. Highway 17 was no longer observed in this map.

1959 (Oakland East) – Individual buildings at the Lazear School site are observed. An additional benchmark at the corner of Glascock Street and Peterson Street (12 ft.) was observed. Additional streets located on the southwest edge of site between I-880 and the Tidal Canal were observed.

1968 (Oakland East) – The WP tracks were replaced by BART tracks, which were under construction. There is a second Lazear School denoted on this map at the corner of East 14th Street and 29th Avenue. I-880 is labeled as an 8-lane freeway.

1973 (Oakland East) – BART line along former WP tracks (north edge of site) is no longer under construction and is active. The Fruitvale BART station is observed at East 12th Street and 34th Avenue. No other changes to the site or vicinity were observed.

1980 (Oakland East) – More industrial buildings are observed on entire map, most noticeably on the southwest edge of the site between I-880 and the Tidal Canal. No other changes to the site or vicinity were observed.

4. PHYSICAL SETTING

The following sections include discussions of topographic, geologic, and hydrogeologic conditions in the vicinity of the site, based upon our document review and our visual reconnaissance of the site and adjacent areas.

4.1. Site Topography

The USGS, Oakland East, California, 7.5-minute quadrangle map, shows the site situated at an elevation of approximately 6 meters (20 feet) above mean sea level (MSL).

4.2. Site Geology

The site is located within the Coast Ranges Geomorphic province. The Coast Ranges extend about 965.6 kilometers (600 miles) from the Oregon border to the central coast of California. The Coast Ranges are northwest trending and are underlain by marine and non-marine sedimentary rocks. Based on information contained in subsurface investigations performed for the property at 2980-3100 East 9th Street (Del Monte Plants 37 and 237, see Section 6), the shallow soil beneath the site consists primarily of "silts and sandy silts from the surface to approximately 15 feet bgs. From 15 to 25 feet bgs, sandy silts and lean clays were encountered" (CH2M HILL, 1995). Soil composition was noted to change to orangey/brown sandy clay below approximately 30 feet (Exceltech, 1985).

4.3. Site Hydrology

The following sections discuss the site hydrology including both surface waters and groundwater.

4.3.1. Surface Waters

No natural surface water bodies, including ponds, streams, or other bodies of water, are present on the site. According to topographic maps of the region, the closest body of water relative to the site is the Tidal Canal, located approximately 400 meters (1300 feet) southwest of the site between Oakland and Alameda Island. The San Francisco Bay is located approximately 2 kilometers (1.2 miles) southeast of the site.

4.3.2. Groundwater

Groundwater information was obtained from groundwater monitoring reports conducted for four properties within or adjacent to the site. Groundwater was encountered between

15 and 20 feet bgs and groundwater flow was reported to the west and northwest at the Del Monte property (2980-3100 East 9th Street) (CH2M HILL, 1995). Groundwater was encountered between 8 and 11 feet bgs, with groundwater flow reportedly to the southwest at approximately 0.01 feet-per-foot at the Caltrans Maintenance Station (1112 29th Avenue) (GEOCON, 2005). Groundwater was reported at approximately 7 to 9 feet bgs at the Golden Gate Petroleum property on 421 23rd Avenue with flow direction toward the southwest (Hydro Analysis, Inc., 2002). Groundwater flow was reported toward the west at the Lemoine Cold Storage property located at 630 29th Avenue (Clayton Group Services, 2006).

5. REGULATORY RECORDS REVIEW

The following sections include the results and a discussion of the computerized environmental information database searches of State and Federal standard environmental records sources.

5.1. Environmental Database Searches

A computerized, environmental information database search was performed by Environmental Data Resources (EDR) on November 30, 2006, and an updated EDR database search was performed on July 24, 2009. The EDR searches included federal, state, and local databases. The EDR was updated to review any potential changes in the respective databases for cases or facilities listed in the 2006 EDR report. The reviews were conducted to evaluate whether the site or properties within the vicinity of the site have been identified as having experienced significant unauthorized releases of hazardous substances or other events with potentially adverse environmental effects. A summary of the 2009 environmental databases searched, their corresponding search radii, and number of noted sites of environmental concern, is presented in a CD in Appendix C.

The database searches identified several surrounding properties of potential environmental concern on various databases. In addition, numerous non-geocoded properties were identified in the vicinity of the site. However, based on the address information provided, it

appears that these facilities are located at distances from the site that would not present an environmental concern.

The following paragraphs describe the databases that were searched as part of the 2006 environmental database search and include a discussion of the regulatory status of the listed facilities and any potential environmental impact to the site. Several database changes were observed while reviewing the 2009 EDR report, and the changes are presented in a summary table in Appendix C. The groundwater gradient information provided indicates whether the individual facility is upgradient of, downgradient from, or crossgradient to the site in terms of groundwater flow. Groundwater directions were determined based on a review of groundwater information contained in subsurface evaluation reports reviewed for properties in the site vicinity (Section 4.3.2), which indicated that groundwater flow varied from the northwest to southwest direction.

National Priorities List (NPL)
This list identifies hazardous material sites slated for cleanup under the federally sponsored Superfund program. These facilities receive remedial funding under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This database was updated in April, 2005.

No properties within a 0.8-kilometer (0. 5-mile) radius of the site were listed.

Resource Conservation and Recovery Act (RCRA)-TSD Facilities List
The RCRA treatment, storage and disposal (TSD) database includes facilities which have obtained an EPA identification number for the purpose of generating, treating, storing, or disposing of hazardous wastes. This database was updated in June, 2006.

One property was located within a 0.8-kilometer (0. 5-mile) radius of the site. However this property was crossgradient of the site and far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)
This list is a federally maintained database and contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons. CERCLIS contains sites, which are either proposed to or on the National Priorities List (NPL), and sites which are in the screening and assessment phase for possible inclusion on this database. This database was updated in August, 2006.

One property was located within a 0.8-kilometer (0. 5-mile) radius of the site. However this property was downgradient of the site and far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

United States Environmental Protection Agency, CORRACTS List

This list identifies RCRA facilities that are undergoing "corrective action." A "corrective action order" is issued pursuant to RCRA when there has been a release of hazardous waste into the environment from a RCRA facility. This database was updated in March, 2006.

One property was located within a 0.8-kilometer (0. 5-mile) radius of the site. However this property was crossgradient of the site and far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

Department of Toxic Substances Control, State Sites List, CAL-SITES List

The California EPA Department of Toxic Substances Control (DTSC) maintains a database of information on properties in California where hazardous substances have been released, or where the potential for such release exists. The types of properties in the CALSITES database are categorized as Annual Work Plan, Backlogged Properties, Certified/De-listed Sites, No Further Action, Preliminary Endangerment Assessment in Progress, Removal Action Required, Expedited Remedial Action Program, Voluntary Cleanup Program, Deed Restricted Properties, and Referred Properties. This database was updated in August, 2005.

Two properties were listed within a 0.5-mile radius of the site. Both properties were located either downgradient of the site, crossgradient to the site, and/or far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

Leaking Underground Storage Tank (LUST) Lists

The Leaking Underground Storage Tank (LUST) Incident Reports contain an inventory of reported leaking underground storage tank incidents. These lists are maintained by the State Water Resources Control Board Leaking Underground Storage Tank Information System, Regional Water Quality Control Boards, and County Environmental Health Departments. This database was updated in October, 2006.

A total of sixty-five properties were listed within a 0.5-mile radius of the site.

Sixty of those properties were either listed as "case closed", or were located either downgradient of the site, crossgradient to the site, and/or far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

A total of five properties were listed on-site, upgradient of, and/or close enough to the site to be of potential environmental concern. These properties are listed below, and are further described in Table 3.

1. Caltrans District 4, 1112 29th Avenue
   Location: Approximately 200 meters (650 feet) northeast of the site
   Described in Table 3, No. 2

2. Lemoine Cold Storage, 630 29th Avenue
   Location: Adjacent to the south section of the site
   Described in Table 3, No.12

3. Eandi Metal Works Inc., 976 23rd Avenue
   Location: Approximately 120 meters (380 feet) north-northwest of the site
   Described in Table 3, No. 13

4. 23rd Avenue Partners / Heitz Trucking, Inc., 1125 Miller Avenue
   Location: Approximately 275 meters (900 feet) north-northwest of the site
   Described in Table 3, No. 16

5. Bay Area Diablo (Golden Gate) Petroleum Company, 421 23rd Avenue
   Location: Approximately 56 meters (186 feet) west-southwest of the site
   Described in Table 3, No. 14

State Landfills and/or Solid Waste Disposal Sites

As legislated under the Solid Waste Management and Resource Recovery Act of 1972, the California Waste Management Board maintains lists of active solid waste disposal facilities, inactive or closed solid waste disposal facilities and transfer facilities. This database was updated in June, 2005.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

Multiple Agency, Underground Storage Tank (UST) and Aboveground Storage Tank (AST) Lists

Information regarding underground storage tanks registered with the Local Oversight Program (LOP) for their location is listed for sites within a one-half mile of the property. These LOP's are referred to as CUPA's. CUPA's are Certified Unified Program Agencies certified by the CAL EPA to implement six state environmental programs with local agency jurisdiction. One of the programs is the UST program, which is applicable to this information category. A CUPA may be a County or City agency. In addition, many counties within California have several CUPA's within them because some cities prefer to act as the local oversight whereas others do not and defer that responsibility to their county program. Each CUPA maintains some form of tank registration list/s. Information regarding aboveground storage tanks registered with the California SWRCB is provided on the agency's AGT list. Included in this report are properties within one-quarter mile of the site that are listed on the SWRCB AGT (AST) list. The UST/AST lists consist of properties that have registered tanks, and are not necessarily indicative of sites where a release of hazardous substances has occurred. This database was updated in April, 2005.

A total of seventy properties were listed within 0.8-kilometer (0.5-mile) radius of the site.

Sixty-two of those properties were located either downgradient of the site, crossgradient to the site, and/or far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

A total of eight properties were listed on-site, upgradient of, and/or close enough to the site to be of potential environmental concern. These properties are listed below, and are described further in Table 3.

1. Caltrans District 4, 1112 29th Avenue
   Location: Approximately 200 meters (650 feet) northeast of the site
   Described in Table 3, No. 2

2. Portwood Shell Station, 820 Portwood Avenue
   Location: Adjacent to the north section of the site
   Described in Table 3, No. 1

3. Eandi Metal Works Inc., 976 23rd Avenue
   Location: Approximately 120 meters (380 feet) north-northwest of the site
   Described in Table 3, No. 13

4. 23rd Avenue Partners / Heitz Trucking, Inc., 1125 Miller Avenue
   Location: Approximately 275 meters (900 feet) north-northwest of the site
   Described in Table 3, No. 16

5. Bay Area Diablo (Golden Gate) Petroleum Company, 421 23rd Avenue
   Location: Approximately 56 meters (186 feet) west-southwest of the site

   Described in Table 3, No.14

6. Kilpatricks / Earthgrains Bakery, 955 Kennedy Street
   Location: Approximately 61 meters (200 feet) northwest of the site
   Described in Table 3, No. 21

7. Former Del Monte Plant #237, 3100 East 9th Street
   Location: Adjacent to northeast section of the site
   Described in Table 3, No. 20

8. Esposito Plating and Polishing Company, 2904 Chapman Street
   Location: Adjacent to south section of the site

   Described in Table 3, No. 23

State Water Resources Control Board/s, SLIC (SPILLS) Lists
The Nine California State Regional Water Quality Control Boards (SWRCB) each maintain reports of sites that have records of spills, leaks, investigations, and cleanups for areas in their jurisdiction. This database was updated in April, 2005.

Fourteen properties within a 0.8-kilometer (0.5-mile) radius of the site were listed. All fourteen of those properties were located either downgradient of the site, crossgradient to the site, and/or far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

United States Environmental Protection Agency, Resource Conservation and Recovery Act (RCRA) Generator (GNRTR)
This database identifies USEPA-listed facilities that report generation of reportable quantities (>100 kilograms) of hazardous waste under the RCRA program for the identification and tracking of hazardous waste. The list consists of properties that generate hazardous waste, and is not necessarily indicative of facilities where a release of hazardous substances has occurred. This database was updated in May, 2005.

Thirty-eight properties were listed within a 0.8-kilometer (0.5-mile) radius of the site as small-quantity or large-quantity generators with no reported violations. Based on this information, there is a low likelihood that these facilities have negatively impacted the environmental integrity of the site. One Property was listed with violations, however, it was located downgradient and far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

Emergency Response Notification System (ERNS)
The Emergency Response Notification System (ERNS) is a national database used to collect information on reported releases of oil and hazardous substances. The database contains information from spill reports made to federal authorities including the EPA, the United States Coast Guard, the National Response Center, and the Department of Transportation. This database was updated in December, 2004.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

California Hazardous Material Incident Report System (CHMIRS)
The California Hazardous Material Incident Report System contains information on reported hazardous materials incidents, i.e. accidental releases or spills. The source is the California Office of Emergency Services. This database was updated in December, 2004.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

CORTESE
This database identifies public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, sites with known toxic material identified through the abandoned site assessment program, sites with USTs having a reportable

release and all solid waste disposal facilities from which there is known migration. The source is the California Environmental Protection Agency/Office of Emergency Information. This database was updated in April, 2001.

A total of sixty-three properties were listed within 0.8-kilometer (0.5-mile) radius of the site. Sixty of those properties were located either downgradient of the site, crossgradient to the site, and/or far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

The remaining three properties were listed upgradient of and/or close enough to the site to be of potential environmental concern. All three of these properties were noted above in the "LUST" section, and are discussed further in Table 3:

1. Caltrans District 4, 1112 29th Avenue
   Location: Approximately 200 meters (650 feet) northeast of the site
   Described in Table 3, No. 2

2. Lemoine Cold Storage, 630 29th Avenue
   Location: Adjacent to the south section of the site
   Described in Table 3, No. 12

3. Eandi Metal Works Inc., 976 23rd Avenue
   Location: Approximately 120 meters (380 feet) north-northwest of the site
   Described in Table 3, No. 13

Notify 65

Notify 65 records contain facility notifications about any release that could impact drinking water and thereby expose the public to a potential health risk. The data comes from the State Water Resources Control Board's Proposition 65 database. The Notify 65 database was updated in October, 1993.

Thirteen properties within a 0.8-kilometer (0.5-mile) radius of the site were listed. All thirteen of those properties were located either downgradient of the site, crossgradient to the site, and/or far enough from the site to have a low likelihood of negatively impacting the environmental integrity of the site.

CERCLIS-No Further Remedial Action Planned (CERCLIS-NFRAP)

NFRAP sites are sites removed from CERCLIS sites that were designated "No Further Remedial Action Planned" (NFRAP). NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund Action or NPL consideration. The CERCLIS-NFRAP database was updated in March, 2005.

Three properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. Two of these properties were located either downgradient of the site or far enough from the site to be of potential environmental concern, and therefore there is a low likelihood that these properties have adversely affected the environmental integrity of the site. The remaining property is Esposito Plating and Polishing Company at 2904 Chapman Street, adjacent to the south section of the site, and a further description of the property is described in Table 3.

Voluntary Cleanup Program Properties (VCP)

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have requested that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs. The VCP database was updated in May, 2005.

Two properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. Both properties were located far enough from the site to be of potential environmental concern, and therefore there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

Alameda Contaminated Sites (CS)

CS sites include a listing of contaminated sites overseen by the toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and groundwater contamination from leaking petroleum USTs). The CS database was updated in May, 2005.

A total of seventy-three properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. Sixty-four of these properties were located either downgradient of the site or far enough from the site to be of potential environmental concern, and therefore there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

The remaining nine properties were listed upgradient of and/or close enough to the site to be of potential environmental concern, and are further discussed in Table 3.

1. Caltrans District 4, 1112 29th Avenue
   Location: Approximately 200 meters (650 feet) northeast of the site
   Described in Table 3, No. 2

2. Lemoine Cold Storage, 630 29th Avenue
   Location: Adjacent to the south section of the site
   Described in Table 3, No. 12

3. Eandi Metal Works Inc., 976 23rd Avenue
   Location: Approximately 120 meters (380 feet) north-northwest of the site
   Described in Table 3, No. 13

4. 23rd Avenue Partners / Heitz Trucking, Inc., 1125 Miller Avenue
   Location: Approximately 275 meters (900 feet) north-northwest of the site
   Described in Table 3, No. 16

5. Bay Area Diablo (Golden Gate) Petroleum Company, 421 23rd Avenue
   Location: Approximately 56 meters (186 feet) west-southwest of the site

   Described in Table 3, No. 14

6. Kilpatricks / Earthgrains Bakery, 955 Kennedy Street
   Location: Approximately 61 meters (200 feet) northwest of the site
   Described in Table 3, No. 21

7. Former Del Monte Plant #237, 3100 East 9th Street
   Location: Adjacent to northeast section of the site
   Described in Table 3, No. 20

8. Hans and Gunter Roofing Company, 2834 East 7th Street
   Location: Adjacent to south section of the site

   Described in Table 3, No. 19

9. Lucasey Manufacturing Corporation, 2744 East 11th Street
   Location: Approximately 37 meters (120) feet north of the site
   Described in Table 3, No. 7

Facility Index System (FINDS)

The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System), FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FUIC); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS. The FINDS database was updated in April, 2005.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

RCRA Administration Action Tracking System (RAATS)

RCRA contains records based on enforcement actions issued under RCRA and pertaining to major violators. It includes administrative and civil actions brought by the United States Environmental Protection agency. The source of this database is the U.S. EPA. The RAATS database was updated in April 1995.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

Toxic Chemical Release Inventory System (TRIS)
TRIS identifies facilities that release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 313. The source of this database is the U.S. EPA. The TRIS database was updated in December, 2002.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

Toxic Substances Control Act (TSCA)
TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site. The TSCA database was updated in December, 2002.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

Section 7 Tracking Systems (SSTS)
Section 7 of FIFRA requires all registered pesticide-producing establishments to submit a report to the EPA by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year. The SSTS database was updated in December, 2003.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

FTTS
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-know Act) over the previous five years. The FTTS database was updated in April, 2005.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

Dry Cleaners
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaners agents; linen supply; coin operated laundries and cleaning; dry cleaning plants except rugs; carpet upholster cleaning; industrial launderers; laundry and garment services. The drycleaner's database was updated in April, 2005.

One property was listed within a 0.8-kilometer (0.5-mile) radius of the site. This property was located downgradient from the site and far enough from the site to be of potential environmental concern, and therefore there is a low likelihood that this property has adversely affected the environmental integrity of the site.

California Water Resources Control Board - Waste Discharge System (WDS)
The WDS database was updated in June, 2005.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

Emissions Inventory Data (EMI)
Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies. The EMI database was updated in December, 2002.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

School Property Evaluation Program (SCH)
This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases these properties may be listed in the Cal-Sites category depending on the level of threat to public health and safety, or the environmental risk they pose. The SCH database was updated in May, 2005.

One property was listed within a 0.8-kilometer (0.5-mile) radius of the site. This property was located far enough from the site that there is a low likelihood that this property has adversely affected the environmental integrity of the site.

HAZNET
The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. Data are from the manifests submitted without correction, and therefore may contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. The source is the DTSC. The HAZNET database was updated in May, 2005.

No properties within a 0.8-kilometer (0.5-mile) radius of the site were listed.

US Brownfields
This database records the EPA's listing of Brownfields properties addressed by Cooperative Recipients and Brownfields properties addressed by Targeted Brownfields Assessments. The US Brownfields database was updated in July, 2006.

Two properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. Both properties were located far enough from the site that there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

BEP
This database lists sites where the Department of Health Services has an expenditure plan for appropriation of Hazardous Substance Cleanup Bond Act Funds. The BEP database is no longer updated.

Two properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. Both properties were located far enough from the site that there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

SWRCY

This database lists recycling facilities in California. The SWRCY database was last updated October, 2006.

One property was listed within a 0.8-kilometer (0.5-mile) radius of the site. This property was located far enough from the site that there is a low likelihood that this property has adversely affected the environmental integrity of the site.

DEED

This database lists the use of recorded land use restrictions the DTSC uses to protect the public from unsafe exposures to hazardous substances and wastes. The DEED database was last updated October, 2006.

One property was listed within a 0.8-kilometer (0.5-mile) radius of the site. This property was located far enough from the site that there is a low likelihood that this property has adversely affected the environmental integrity of the site.

RESPONSE

This database identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk. The RESPONSE database was last updated August, 2006.

Four properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. The properties were located far enough from the site that there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

ENVIROSTOR

This DTSC Site Mitigation and Brownfields Reuse Program database identifies sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites. The EVIROSTOR database was last updated August, 2006.

Nine properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. The properties were located far enough from the site that there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

EDR Historical Auto Stations

This database identifies sites from selected national collections of business directories and has collected listings of potential gas station / filling station / service station sites that were available to EDR researchers. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

Twelve properties were listed within a 0.8-kilometer (0.5-mile) radius of the site. The properties were located far enough from the site and/or have been out of operation for a significant period, and there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

EDR Historical Cleaners

This database identifies sites from selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry, etc.

Ten properties were listed within a 0.8-kilometer (0.5-mile) radius of the site.

Nine of the properties were located far enough from the site and/or have been out of operation for enough time that there is a low likelihood that these properties have adversely affected the environmental integrity of the site.

The remaining property, the former Exchange Linen Service, at 527 23rd Avenue received a LUST "Case Closure" by ACDEH in April of 1996 and there is a low likelihood that this property has adversely affected the environmental integrity of the site (ACDEH, 1996). A copy of this report can be viewed in Appendix D.

Refer to Appendix C for a listing of the properties appearing on the databases reviewed for this ISA.

6. ENVIRONMENTAL RECORDS REVIEW

Based on historical research, review of previous reports, and environmental database review, information regarding relevant surrounding properties was requested from the Bay Area Air Quality Management District (BAAQMD), the Alameda County Department of Environmental Health (ACDEH), the Department of Toxic Substances (DTSC), the Oakland Fire Department (OFD), and

the San Francisco Bay Regional Water Quality Control Board (RWQCB). A summary of information regarding properties of environmental concern obtained from the agencies contacted is presented below. Copies of pertinent documentation obtained during file reviews are provided in Appendix D.

Del Monte Plants 37 and 237, 2980-3100 East 9th Street

Files reviewed at the OHD and ACEHD reported environmental activities at the Del Monte canning plant, formerly located north of the school on the northeast corner of East 9th Street and 29th avenue. The cannery and an associated warehouse, occupied the property from approximately the 1920s until the 1980s. A 16,000-gallon heavy fuel oil UST was removed from an area adjacent to the present day Lazear School playground in 1985. The UST was severely corroded with numerous holes along the side. Soil samples, collected beneath the tank at two foot intervals between 20 and 31 feet bgs, indicated concentrations as high as 4,900 milligrams per kilogram (mg/kg) of oil and grease, 260 mg/kg of extractable petroleum hydrocarbons, and 16 mg/kg of volatile hydrocarbons. A groundwater monitoring well was constructed down gradient of the USTs in 1986 to monitor the contaminant concentrations in groundwater beneath the former 16,000-gallon UST, and also to provide soil and groundwater samples from below an adjacent 25,000-gallon fuel oil UST. Groundwater flow was reported by CH2M Hill in the report titled "Remedial Action Plan Del Monte Plants 37 and 237" (CH2M Hill, 1995), to be in a west to northwest direction.

The 25,000-gallon fuel UST was removed from the property, along with a 1,200-gallon UST containing bunker fuel, in 1995. Soil samples were collected from beneath the 1,200 gallon tank and from the composite-soil stockpile associated with its overexcavation. No contamination was reported in these samples. A Case Closure letter, prepared by the RWQCB in January, 2005, reported that after the 25,000-gallon tank was removed, the underlying soils were overexcavated and confirmation soil sample data reported maximum concentrations after excavation of 310 mg/kg and 210 mg/kg for total petroleum hydrocarbons as motor oil (TPH-mo) and as gasoline (TPHg), respectively. Additionally, petroleum hydrocarbons were not detected in two rounds of groundwater sampling. No dates were discussed in the closure letter regarding groundwater sampling. The depths at which the samples were taken was not indicated.

Shell Gasoline Station, 820 Portwood Avenue

A Shell Gasoline Service Station is located adjacent to the site on the northeast corner of East 8th Street and Portwood Avenue. A gas station has occupied the property since 1967. A report prepared by Cambria Environmental Technology, Inc., dated November 24, 2004 (Cambria, 2004), reported soil samples collected from beneath each of three gasoline dispensers at depths of 4.0 feet bgs during an upgrade of the station's UST sumps and fuel dispensers. Staining and odor were observed in the soil samples. Groundwater flow direction and flow rate were not reported.

Soil sample analytical results reported TPHg in concentrations as high as 1,000 parts per million (ppm), total petroleum hydrocarbons as diesel (TPHd) was reported in concentrations

as high as 120 ppm, ethylbenzene, xylenes, and MTBE were reported at concentrations as high as 17 ppm, 65 ppm, and 9.1 ppm, respectively. As a result of the reported petroleum hydrocarbons, Shell filed an Unauthorized Release Report on September 27, 2004.

This property was not listed as an open LUST site, or was not included in the RWQCB Geotracker Database, however there is a potential that local groundwater was impacted by this property.

Soeth Brass Company (Brass and Aluminum Foundry, 829 27th Avenue

As observed on the 1950 Sanborn, Soeth Brass Company was located adjacent to the site on the north side of I-880 between 26th and 27th Avenue. A roofing and wood pressing manufacturer was observed adjacent to the foundry. Foundry business potentially used hazardous materials, including heavy metals that may have impacted soil and groundwater in the proposed excavation area. Wood preservative manufacturer may also used heavy metals that may have impacted the soil and groundwater in the excavation area.

Former Tire Repair Shop, East 8th Street and Lisbon Avenue

As observed on the 1967 Sanborn, a tire repair shop was located adjacent to the site on the northeast corner of East 8th and Lisbon Avenue. The shop potentially used solvents and petroleum hydrocarbon compounds that may have impacted the soil and groundwater within the proposed area of excavation.

Lemoine Cold Storage, 630 29th Avenue

Files reviewed from the ACEHD reported environmental activities at Lemoine Cold Storage located at 630 29th Avenue between Chapman and East 7th Street. The property is listed as an open LUST case. A 2006 report by Clayton Group Services (Clayton, 2006) indicated BTEX, TCE, and DCE groundwater contamination on 29th Avenue and Chapman Street, so site soil and groundwater is potentially affected and areas of excavation may be impacted.

Eandi Metal Works, Inc., 976 23rd Avenue

Eandi Metal Works is located on 23rd Avenue between East 10th and 11th Street. This property is listed as an open LUST case in the EDR report, with groundwater potentially affected. It was not however listed on RWQCB's Geotracker Website, nor do the ACDEH have records for property. There is a moderate possibility that site soil and groundwater contaminated.

Hans and Gunter Roofing Company, 2834 East 7th Street

Hans and Gunter Roofing Company is located on East 7th Street between Peterson and 29th Avenue. This property is listed as "Leak being confirmed" in the EDR report, and an open LUST case with RWQCB. A 2004 report by Cambria Environmental Technologies, Inc. (Cambria, 2004) indicated minor TPH-G and TPH-D impacted soil at 10.5 ft bgs. No groundwater samples were collected. No groundwater data was reviewed, so impact to site groundwater is unknown.

Former Truck Repair Yard, 2700 East 7th Street
As observed on the 1969 Sanborn, a truck repair yard was located at the northeast corner of East 7th Street and 23rd Avenue. This facility may have stored and used petroleum hydrocarbon materials and automotive solvents. There is a moderate possibility that site soil and groundwater contaminated.

Former Machine Shop, 2744 East 7th Street
As observed on the 1969 Sanborn, a machine shop was located on the north side of East 7th Street between 23rd and 29th Avenue. This facility may have stored and used lubricants containing petroleum hydrocarbon compounds and cleaning solvents. There is a moderate possibility that site soil and groundwater contaminated.

7. SITE RECONNAISSANCE

On November 20, 2006, a site reconnaissance was conducted by Mr. Kris Larson of Ninyo & Moore. The site visits involved a walking tour of the site, and visual observations of the roadway and adjoining properties. Properties adjoining the site were observed from public right-of-ways only. Individual property inspections and interviews were not conducted.

7.1. Polychlorinated Biphenyls (PCBs)

Transformers may be a source of PCBs. During the site reconnaissance, Ninyo & Moore conducted a visual survey of the site for potential PCB-containing transformers, related equipment, drums, and storage containers. One pad-mounted transformer, owned and operated by PG&E, was noted at Lazear School, 10 meters (30 feet) from East 9th Street. At the time of the site reconnaissance, the transformer appeared to be in good condition, with no signs of leakage on the transformer, or on the ground surface beneath the area of the transformer. An AT&T cell-phone tower was located by the southwestern-most entrance to the Fruitvale Station Shopping Center parking lot, at the southeastern end of the site. A warning placard was placed the concrete-pad mounted operating equipment at its base stating “Detectable amounts of chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm may be found in and around this facility”. No cracking or staining was observed around the operating equipment.

7.2. Hazardous Substances

Hazardous substances were not observed within the site, nor were they observed from public right-of-ways on adjoining properties. However, based on the current operating status of the Shell Gasoline Station hazardous materials and hazardous wastes are likely to be stored at these facilities. Other properties that may contain hazardous materials include: Universal Metal Polishing; Supreme Interior Custom Upholstery; D. Nichols Painting; Wallace Electric; Wow Carpet Cleaning; Bay Area Auto; Eandi Metal Works; Mor-Drop Blacksmith Shop, an auto shop at 3009 Elmwood Avenue, and a machine shop at 2834 7th Street (Figure 2). Several areas of exposed soil were observed under and adjacent to I-880. The soils appeared to be composed of fill in many areas, which may be from sources where hazardous materials were stored or used. Additionally, aerial deposited lead originating from vehicular emissions may have impacted the areas of exposed soil adjacent to I-880. The facilities and areas above are located on Figure 2 and are discussed in Table 3.

7.3. Utilities

Utility providers in the area of the site include East Bay Municipal Utilities District (EBMUD) for water and sanitary wastewater; PG&E for gas and electricity; the City of Oakland for storm water; and AT&T for telephone services. Trenches containing underground utilities are generally backfilled with permeable materials including sand and base rock that may act as conduits for constituents to migrate along or through the site.

8. SUMMARY OF FINDINGS AND CONCLUSIONS

Properties of potential environmental concern to the site were identified by field observations, historical research, an environmental database search, and review of agency files, and they are listed in Table 3. Based on factors including discussions with regulatory agencies, review of agency files, historical research, and distances from the site, we believe there are nine properties that have a potential to impact shallow soils and groundwater in areas where excavation will occur during site construction activities. These properties present a concern in potential excavation, dewatering, or any other activity involving potential exposure to groundwater or soil.

9. RECOMMENDATIONS

Based upon the findings of this ISA, soil and groundwater characterization should be conducted at the properties listed in Table ___ that are a potential environmental concern during excavation, dewatering, and construction activities within the site vicinity. Additionally, an ADL survey should be conducted in areas with exposed soil within the project boundaries and where soil was historically exposed. Ninyo & Moore recommends that a work plan be prepared to define the methodologies and areas of soil and groundwater characterization prior to sampling.

10. LIMITATIONS AND EXCEPTIONS OF THE ASSESSMENT

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Please note that this study did not include an evaluation of geotechnical conditions or potential geologic hazards.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information or has questions regarding the content, interpretations presented, or completeness of this document.

Our conclusions, recommendations and opinions are based on an analysis of the observed site conditions and the referenced literature. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

11. REFERENCES

Cambria Environmental Technology, 2004, Dispenser Upgrade Sampling Report: prepared for Office of Emergency Services Oakland Fire Department: dated November.

CH2M Hill, 1995 Remedial Action Plan Del Monte Plants 37 and 237, Oakland, California: prepared for Del Monte Foods: dated May.

Environmental Data Resources, Inc., 2005, The EDR-Aerial Photo Decade Package: dated July 13.

Environmental Data Resources, Inc., 2005, The EDR-Sanborn Map Report: dated August 5 (one set) and August 10 (two additional sets).

Environmental Data Resources, Inc., 2006, The EDR-Radius Map Report: dated November 30.

Environmental Data Resources, Inc., 2009, The EDR-Radius Map Report: dated July 9.

Exceltech, 1985 Del Monte Fruitvale Plant No. 37 Initial Fuel Tank Leak Report for Del Monte Corporation 1 Market Plaza San Francisco California: dated December 10.

Geocon Consultants, Inc., 2005 Annual Groundwater Monitoring Report for South Oakland Maintenance Station 1112 29th Avenue, Oakland, California: Report prepared for California Department of Transportation, Oakland, California: dated June 20.

United States Geological Survey, 1997 Oakland East Quadrangle, California: 7.5-minute series (topographic), Scale 1:24,000.

Cambria Environmental Technology, 2006, Dispenser Upgrade Sampling Report, Shell-branded Service Station, 820 Portwood Street, Oakland, CA, dated November.

Geocon Consultants, Inc., 2006, Low Risk Case-Closure Report, Caltrans South Oakland Maintenance Station, 1112 29th Avenue, Oakland, CA, dated June.

Clayton Group Services, 2nd Quarter 2006 Groundwater Monitoring Report, Former Lemoine Sausage Factory, 630 29th Avenue, Oakland, CA, dated July.

Hydro Analysis, Inc., 2002, Quarterly Groundwater Monitoring Report, Golden Gate Petroleum, 421-23rd Avenue, Oakland, CA, dated July.

Clearwater Group, 2006, Subsurface Investigation Results, 23rd Avenue Partners, 1125 Miller Avenue, Oakland, CA, dated February.

Cambria Environmental Technologies, Inc. 2004 Subsurface Investigation Report, 2834 East 7th Street, Oakland, CA, dated January.

RWQCB, 2005, Confirmation of Case Closure for former Del Monte Cannery 37/237, 3100 East 9th Street, Oakland, CA, dated January.

Phillip Environmental Services, Inc., 2005 UST System Closure Report, Earthgrain Baking Companies, Inc., 955 Kennedy Street, Oakland, CA, dated April.

ACDEH, 1996, Case Closure Summary for former Exchange Lined Service, 527 23rd Avenue, Oakland, CA, dated April.

Table 1 – Sanborn Map Summary

Year	Western Section	Central Section	Eastern Section	Southern Section
	East 9th Street between 25th and 27th Avenue; 23rd Avenue between Chapman Street and East 10th Street	East 8th Street between 27th and 29th Avenue; 29th Avenue between I-880 and north end of Lazear School	East 9th Street between 29th Avenue and Fruitvale Shopping Center	29th Avenue between I-880 and Ford Street; South edge of I-880 between 23rd and Derby Avenue
1903	Residential property including sheds throughout most of site.	Residential property throughout most of area. 28th Avenue listed as Park Street, 23rd Avenue listed as Park Avenue and Lisbon Avenue is listed as 28th Avenue. Portwood Avenue has	No map available	No map available
1911	Vacant property north of East 9th Street/26th Avenue intersection established. Brass foundries located at 406 and 492 Park Avenue (Current 23rd Avenue) between E 10th and 11th Street	No map available	East 9th is listed as Elmwood. Property is vacant land.	Residential property throughout most of area. Street on North edge (currently I-880) listed as Warder, East 7th is listed as Boehmer, Ford Street is listed as Valdez Street; 23rd Avenue listed as Park Avenue and 29th Avenue listed as Park Street.

Table 1 – Sanborn Map Summary

Year	Western Section	Central Section	Eastern Section	Southern Section
	East 9th Street between 25th and 27th Avenue; 23rd Avenue between Chapman Street and East 10th Street	East 8th Street between 27th and 29th Avenue; 29th Avenue between I-880 and north end of Lazear School	East 9th Street between 29th Avenue and Fruitvale Shopping Center	29th Avenue between I-880 and Ford Street; South edge of I-880 between 23rd and Derby Avenue
1950	A neon sign and spray painting company is located on the northeast corner of East 9th and 23rd Street. A metal works user is observed near East 10th Street. A roofing and wood pressing manufacturer, Brass and Alum Foundry, is located at 760-762 23rd Avenue, between 27th Avenue and 9th Street along I880 freeway. I880 freeway and 23rd Street observed for the first time. A machine shop and laundry service are located along 23rd Avenue between East 10th and East 11th Street. Contra Costa Laundry Co. is located on north end of narrow block located between Kennedy Street and 23rd Avenue, approximately 300 feet and downgradient from the site.	Portwood Avenue and Lisbon Avenue first observed. 29th Avenue, I880 freeway overpass first observed. Residential property throughout area except for store located at the northwestern corner of East 8th Street and 29th Avenue.	9th Avenue observed for the first time. A public school built in 1913 occupies the northeast corner of 9th Avenue and Elmwood. Auto and Truck facility and possible repair shop is located at the eastern boundary of Elmwood. I880 freeway is observed for the first time.	Sheet metal works is observed on 29th Avenue between Chapman and Ford Street. A roofing materials business is located at the northwest corner of 29th Avenue and Chapman Street. I880 Freeway is observed for the first time; East 7th Street, Ford Street, 23rd Avenue and 29th Avenue are all labeled as their current names. A machine shop and a foundry are located at the southeast corner of 23rd Avenue and East 7th Street.
1952-1953	No map available	No map available	No changes	No changes

Table 1 – Sanborn Map Summary

Year	Western Section	Central Section	Eastern Section	Southern Section
	East 9th Street between 25th and 27th Avenue; 23rd Avenue between Chapman Street and East 10th Street	East 8th Street between 27th and 29th Avenue; 29th Avenue between I-880 and north end of Lazear School	East 9th Street between 29th Avenue and Fruitvale Shopping Center	29th Avenue between I-880 and Ford Street; South edge of I-880 between 23rd and Derby Avenue
1957	No map available	No map available	More classrooms for the school are located along East 9th Street. Elmwood changes to East 9th Street. Auto/Truck facility changes to BBL Storage.	No changes
1960	Northeast corner of East 9th and 23rd Street, same as in 1950. An electrical contractor occupies the property where the roofing business was in the 1950 map. The foundry is still located in the 1950 map location. A steel fabrication business and a machine shop are located along 23rd Avenue between East 10th and East 11th Street. A building labeled "chemical mixing" is located at the corner of 23rd Avenue and East 10th Street.	Same except for commercial property west, and adjacent to store on northwest corner of East 8th Street and 29th Avenue.	No changes	Truck maintenance and repair yard located at northeast corner of East 7th and 23rd Avenue. Roofing materials business located at the northwest corner of 29th Avenue and Chapman Street is now electrical contractor.

Table 1 – Sanborn Map Summary

Year	Western Section	Central Section	Eastern Section	Southern Section
	East 9th Street between 25th and 27th Avenue; 23rd Avenue between Chapman Street and East 10th Street	East 8th Street between 27th and 29th Avenue; 29th Avenue between I-880 and north end of Lazear School	East 9th Street between 29th Avenue and Fruitvale Shopping Center	29th Avenue between I-880 and Ford Street; South edge of I-880 between 23rd and Derby Avenue
1965-1967	No map available	Painting contractor located at northeast corner of I880 Freeway and 27th Avenue. A tire repair shop is located at the northeast corner of East 8th and Lisbon Avenue. A commercial building is located at the northwest corner of Portwood Avenue and East 8th Avenue.	No changes	Building materials warehouse added to property containing the truck repair yard at NE corner of East 7th and 23rd Avenue. Machine shop and a foundry located at the southeast corner of 23rd Avenue and East 7th Street are now vacant.
1969	Electric refrigerator repair facility located at 716 Kennedy between Frederick Street and Shasta Avenue and next to 23rd Avenue overpass.	Hoist Service and Cookie Baker in commercial building at Portwood and East 8th Street.	No changes	Machine Shop located at 2744 East 7th Street between 23rd and 29th Avenue. Formerly vacant machine shop and a foundry located at the southeast corner of 23rd Avenue and East 7th Street are now a private garage (auto repair) and newspaper assemblage facility.

Table 2 – Criss-Cross Directory Summary

Year	Address and Company	Potential Hazardous Materials
1967	910 23rd Avenue: Wes-Co Blower and Pipe Company	Potential Solvent Storage
	829 27th Avenue: Soeth Brass Foundry	Potential Solvent Storage
	820 Portwood Avenue: Shell Self Service Station	Potential USTs
	1112 29th Avenue: California Highway Division (Signs Department)	Potential USTs, Solvent Storage
	3100 East 9th Avenue: California Packing Corporation Canners (Plant #237)	Potential USTs, Solvent Storage
1973	910 23rd Avenue: Wes-Co Industries	Potential Solvent Storage
	820 Portwood Avenue: Shell Self Service Station	Potential USTs
	823 27th Avenue: Wallace Electric	Potential Solvent Storage
	2639 East 9th Street: Lucasey Manufacturing and Die Company	Potential Solvent Storage
	1112 29th Avenue: California Highway Division (Signs Department)	Potential USTs, Solvent Storage
	3100 East 9th Avenue: Del Monte Corporation (Plant 237/37)	Potential Solvent Storage
1979, 1986	910 23rd Avenue: Wes-Co Industries	Potential Solvent Storage
	820 Portwood Avenue: Shell Self Service Station	Potential USTs
	823 27th Avenue: Wallace Electric	Potential Solvent Storage
	1112 29th Avenue: California Highway Division (Signs Department)	Potential USTs, Solvent Storage
	3100 East 9th Avenue: Del Monte Corporation (Plant 237/37)	Potential Solvent Storage
1992, 1998	910 23rd Avenue: Wes-Co Industries	Potential USTs and PCE
	820 Portwood Avenue: Shell Self Service Station	Potential USTs
	823 27th Avenue: Wallace Electric	Potential PCE
	1112 29th Avenue: California Highway Division (Signs Department)	Potential USTs
2004	910 23rd Avenue: Wes-co Industries	Potential Solvent Storage
	820 Portwood Avenue: Shell Self Service Station	Potential USTs
	823 27th Avenue: Wallace Electric	Potential Solvent Storage
	1112 29th Avenue: California State Transportation Maintenance Station	Potential USTs, Solvent Storage
	816 27th Avenue: Metalmorphic Fabrication	Potential Solvent Storage

Table 3 – Properties of Potential Environmental Concern

*No	Property and Address	Location	Reason for Listing	Reason for Environmental Concern Status	Proximity to Site	Additional Notes and Environmental Concern Potential
1	**Shell Gasoline Station, 820 Portwood Avenue.**	Corner of Portwood Avenue and East 8th Street.	Agency information reviewed indicates a subsurface assessment is ongoing.	Soil samples indicated soil contamination near E. 8th Street.	On-site	[1]2004 soil sampling report reported concentrations of TPH-G, BTEX and MTBE in soil within 100 feet of East 8th Street. No groundwater samples were collected. No updated documentation available from RWQCB or ACDEH. Due to the proximity of this property to the site, there is potential impact for site soil and groundwater.
2	Caltrans South Oakland Maintenance Yard, 1112 29th Avenue.	200 meters (650 feet) northeast of the site.	Listed as an open LUST case in the EDR report; presently operates as a maintenance yard.	Groundwater plume containing MTBE may affect off site and downgradient groundwater in the vicinity of the site excavation areas.	North	[2]MTBE GW plume is contained within or just outside property boundaries according to 2006 report, does not appear to be a threat to site soil or GW.
3	**Soeth Brass Company (Brass and Alum Foundry), 829 27th Avenue. A roofing and wood pressing manufacturer was observed adjacent to the foundry**	Adjacent to the I880 between 26th and 27th Avenue	Located on 1950 Sanborn adjacent to the I880 freeway.	Foundry business potentially used hazardous materials, including heavy metals that may have impacted soil and groundwater in the proposed excavation area. Wood preservative manufacturer may also used heavy metals that may have impacted the soil and groundwater in the excavation area.	On-site	This property is a potential environmental concern to the soil and groundwater on-site due to probable use of chemicals, including heavy metals.
4	**Tire Repair Shop East 8th Street and Lisbon Avenue**	Northeast corner of East 8th Street and Lisbon Avenue	Located on 1965 Sanborn	Potentially used solvents and petroleum hydrocarbon compounds that may have impacted the soil and groundwater within the proposed area of excavation	On-site	Moderate possibility that site soil and groundwater contaminated.

Table 3 – Properties of Potential Environmental Concern

*No	Property and Address	Location	Reason for Listing	Reason for Environmental Concern Status	Proximity to Site	Additional Notes and Environmental Concern Potential
5	Painting contractor located at northeast corner of I880 Freeway and 27th Avenue.	Northeast corner of I880 Freeway and 27th Avenue	Located on 1967 Sanborn Map	Potentially used hazardous materials relating to paint coatings and solvents that may have impacted the soil and groundwater within the proposed area of excavation	On-site	Minor possibility that site soil and groundwater contaminated.
6	Auto and Truck facility and possible repair shop	East 9th Street at the eastern end of the site.	Located on 1950 Sanborn.	Potentially used solvents and petroleum hydrocarbon compounds that may have impacted the soil and groundwater within the proposed area of excavation	On-site	Minor possibility that site soil and groundwater contaminated.
7	Lucasey Manufacturing and Die Company, 2639 East 9th Street	On East 9th Street between 26th and 27th Avenue	Located in 1973 City Directories	May have stored and used solvents that impact groundwater within the proposed area of excavation.	North	Minor possibility that site soil and groundwater contaminated.
8	Wallace Electric, 823 27th Ave	Adjacent to I880, between 26th and 27th Avenue	Located on 1960 Sanborn Map	May have stored and used solvents that impact soil and/or groundwater within the proposed area of excavation	On-site	Minor possibility that site soil and groundwater contaminated.
9	Metalmorphic Fabrication, 816 27th Avenue	Near I880 on 27th Avenue	Located in 2004 City Directory	May have stored and used solvents that impact groundwater within the proposed area of excavation	North	Minor possibility that site soil and groundwater contaminated.
10	890 23rd Avenue	On 23rd Avenue between East 9th Street and East 10th Street	Listed as an ERNS case in the EDR report	Shallow soils potentially impacted by paint leaking into soils.	On-site	Minor possibility that site soil and groundwater contaminated.
11	Bay Area Auto Center, 810 23rd Avenue	On the northeast corner of 23rd and 26th Avenues	Observed during site reconnaissance.	Potential use and store hydrocarbon compounds and solvents that could impact local soil and groundwater.	On-site	Minor possibility that site soil and groundwater contaminated.

Table 3 – Properties of Potential Environmental Concern

*No	Property and Address	Location	Reason for Listing	Reason for Environmental Concern Status	Proximity to Site	Additional Notes and Environmental Concern Potential
12	**Lemoine Cold Storage, 630 29th Avenue**	On 29th Avenue between Chapman and East 7th Street	Listed as an open LUST case in the EDR report; groundwater potentially affected	Groundwater plume containing TPH-G, BTEX and Solvents. GW in areas of excavation may be impacted. Depth to GW between 5 and 7 feet bgs.	On-site	[3]2006 Report indicated GW flow direction toward the west. Property has history of GW contamination, including TPH-G, BTEX, TCE, DCE, DCA and vinyl chloride. 2006 GW monitoring report indicates BTEX, TCE, and DCE GW contamination on 29th Ave and Chapman Street, so site oil and GW potentially affected.
13	**Eandi Metal Works, Inc., 976 23rd Avenue**	On 23rd Avenue between East 10th and East 11th Street	Listed as an open LUST case in the EDR report; upagradient groundwater potentially affected	MTBE detected	On-site	Not listed on Geotracker Website, nor does ACDEH have records for property. Moderate possibility that site soil and groundwater contaminated.
14	Golden Gate Petroleum Company, 421 23rd Ave	On 23rd Avenue between Kennedy and East Chapman Street	Listed as an open LUST case in the EDR report;	MTBE detected; contamination is upgradient from site	South	[4]2002 report indicated Elevated TPH-G and MTBE GW concentrations, however groundwater flow is toward the southwest, and contamination does not appear to impact site soil or GW.
15	East Bay Transmission, 501 23rd Ave	On 23rd Avenue between Kennedy and East 7th Street	Agency information reviewed indicates potential oxygenated solvents.	Although at a slightly lower elevation, PX is 122 ft from site and is upgradient.	On-site	Not listed on Geotracker Website, nor does ACEHD have records for property. Minor possibility that site soil and groundwater contaminated.

Table 3 – Properties of Potential Environmental Concern

*No	Property and Address	Location	Reason for Listing	Reason for Environmental Concern Status	Proximity to Site	Additional Notes and Environmental Concern Potential
16	Heitz Trucking, Inc; 23rd Avenue Partners, 1125 Miller Ave	On Miller Avenue at the corner of Calcot and Miller Avenue	Listed as an open LUST case in the EDR report;	Potential Diesel water contamination where aquifer is affected	North	[5]Minor TPH-D GW contamination from former diesel UST reported in 2006, no GW gradient information, however site soil or GW unlikely to be impacted by this property.
17	War-Drop Blacksmith and Fabrication, 600 29th Avenue	On 29th Avenue between Chapman and East 7th Street	Listed as a Historical Auto Station in the EDR report; 1933/1943	Potentially used solvents and petroleum hydrocarbon compounds that may have impacted the soil and groundwater.	On-site	Minor possibility that site soil and groundwater contaminated.
18	Bakke & Neilson (The Authorized Haynes Shop), 447 25th Avenue	On 25th Avenue between East 10th and East 11th Street	Listed as a Historical Auto Station in the EDR report; 1925	Potentially used solvents and petroleum hydrocarbon compounds that may have impacted the soil and groundwater.	North	Minor possibility that site soil and groundwater contaminated.
19	**Hans and Gunter Roofing Company, 2834 East 7th Street**	On East 7th Street between Peterson and 29th Avenue	Listed in Alameda CS database as "Leak being confirmed", open LUST case with RWQCB.	Possible detectable levels of aquifer water contamination - contaminant unknown	On-site	[6]2004 Subsurface evaluation indicated minor TPH-G and TPH-D impacted soil at 10.5 ft bgs. No groundwater samples were collected. No GW data was reviewed, so impact to site GW is unknown.
20	Former Del-Monte Plant # 237, 3100 East 9th Street	On East 9th Street between Fruitvale and 29th Avenue	Listed in Alameda CS database as "Post remedial action monitoring"	Possible detectable levels of aquifer water contamination - contaminant unknown	On-site	[7]Former Del-Monte Plant, received case-closure from RWQCB in January 2005. Residual GW contamination may exist in areas of excavation south of property within the site boundaries.

Table 3 – Properties of Potential Environmental Concern

*No	Property and Address	Location	Reason for Listing	Reason for Environmental Concern Status	Proximity to Site	Additional Notes and Environmental Concern Potential
21	Kilpatrick's Bakery Inc Garage, 955 Kennedy Street	On Kennedy Street between Frederick and Dennison Street	Listed in Alameda CS database as "Leak being confirmed"	Possible detectable levels of aquifer water contamination - contaminant unknown	West	[8]On-going GW investigation, contamination appears to be TPH-D. No GW gradient information, however GW probably flowing toward south SW and does not appear to impact site soil or GW.
22	Dutch H H, 401 29th Avenue	On 29th Avenue between Ford and Glascock Street	Listed as a Historical Auto Station in the EDR report; 1928/1933	Potentially used solvents and petroleum hydrocarbon compounds that may have impacted the soil and groundwater.	South	Minor possibility that site soil and groundwater contaminated.
23	Esposito Plating and Polishing Company, 2904 Chapman Street	On Chapman Street between Peterson Street and Derby Avenue	When in operation as a plating and polishing facility the property was listed as a small quantity generator RCRA facility with a violation of an unreported violation	Stored and used sulfuric acid, sodium hydroxide, chromium, copper, nickel, and lead that may have impacted groundwater within the proposed area of excavation	South and East	Minor possibility that site soil and groundwater contaminated.
24	Universal Metal Polishing, 815 Portwood Avenue	NE corner of Portwood and East 8th Street	Site reconnaissance	Potentially stored and used cleaning solvents	On-site	Minor possibility that site soil and groundwater contaminated.
25	WOW Carpet cleaning	NE corner of Lisbon and East 8th Street	Site reconnaissance	Potentially stored and used cleaning solvents	On-site	Minor possibility that site soil and groundwater contaminated.
26	Supreme Interior Custom Upholstery, 2700 east 8th Street	East 8th Street between Lisbon and Portwood	Site reconnaissance	Potentially stored and used cleaning solvents	On-site	Minor possibility that site soil and groundwater contaminated.
27	Auto repair, 3009 Elmwood Avenue	Derby Avenue and I880	Site reconnaissance	Potentially stored and used petroleum hydrocarbon materials and automotive solvents	On-site	Minor possibility that site soil and groundwater contaminated.
28	**Machine shop, 2834 7th Street**	Southwest corner of I880 and 29th Avenue	Site reconnaissance	Potentially stored and used petroleum hydrocarbon materials and automotive solvents	On-site	Moderate possibility that site soil and groundwater contaminated.

Table 3 – Properties of Potential Environmental Concern

*No	Property and Address	Location	Reason for Listing	Reason for Environmental Concern Status	Proximity to Site	Additional Notes and Environmental Concern Potential
29	Former foundry located at 516 23rd Avenue	East side of 23rd Avenue. between East 7th Street and Chapman Street.	1950 Sanborn Map	Foundry business potentially used hazardous materials, including heavy metals that may have impacted soil and groundwater in the proposed excavation area.	On-site	Minor possibility that site soil and groundwater contaminated.
30	Former Machine Shop located at 534 23rd Avenue	SE corner of 23rd Avenue. and East 7th Street.	1950 Sanborn Map	Potentially stored and used lubricants containing petroleum hydrocarbon compounds and cleaning solvents	On-site	Minor possibility that site soil and groundwater contaminated.
31	Former Sheet Metal Business located at Northwest corner of Ford and 29th Avenue	NW Corner of Ford Street and 29th Avenue	1952 Sanborn Map	Potentially stored and used cleaning solvents	On-site	Minor possibility that site soil and groundwater contaminated.
32	**Former Truck Repair Yard located at 2700 East 7th St.**	NE Corner of East 7th St. and 23rd Avenue.	1969 Sanborn Map	Potentially stored and used petroleum hydrocarbon materials and automotive solvents	On-site	Moderate possibility that site soil and groundwater contaminated.
33	**Former Machine Shop located at 2744 East 7th Street**	North side of East 7th Street between 23rd and 29th Avenue.	1969 Sanborn Map	Potentially stored and used lubricants containing petroleum hydrocarbon compounds and cleaning solvents	On-site	Moderate possibility that site soil and groundwater contaminated.

Notes:

* Corresponds with numbered properties on Figure 2, Properties of Potential Environmetnal Concern

[1] = Cambria 2006 Dispenser Upgrade Sampling Report, Shell-branded Service Station, 820 Portwood Street, Oakland, CA, dated November.

[2] = Geocon 2006 Low Risk Case-Closure Report, Caltrans South Oakland Maintenance Station, 1112 29th Avenue, Oakland, CA, dated June.

[3] = Clayton Group Services, 2nd Quarter 2006 Groundwater Monitoring Report, Former Lemoine Sausage Factory, 630 29th Avenue, Oakland, CA, dated July.

[4] = Hydro Analysis, Inc 2002 Quarterly Groundwater Monitoring Report, Golden Gate Petroleum, 421-23rd Avenue, Oakland, CA, dated July.

[5] = Clearwater Group, 2006 Subsurface Investigation Results, 23rd Avenue Partners, 1125 Miller Avenue, Oakland, CA, dated February.

[6] = Cambria Environmental Technologies, Inc. 2004 Subsurface Investigation Report, 2834 East 7th Street, Oakland, CA, dated January.

[7] = RWQCB 2005 Confirmation of Case Closure for former Del Monte Cannery 37/237, 3100 East 9th Street, Oakland, CA, dated January.

[8] = Phillip Environmental Services, Inc., 2005 UST System Closure Report, Earthgrain Baking Companies, Inc., 955 Kennedy Street, Oakland, CA, dated April.

Bold properties are facilities that present the greatest potential for impacted soil and / or groundwater within the site boundaries.

REFERENCE: STREET GUIDE FOR METRO AREAS OF ALAMEDA, CONTRA COSTA, MARIN, SAN FRANCISCO, SAN MATEO, AND SANTA CLARA COUNTIES, THOMAS GUIDE 2008.

N

APPROXIMATE SCALE IN FEET

0 1900 3800

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore	SITE LOCATION MAP	FIGURE
PROJECT NUMBER: 401145004 / DATE: 2/09	I-880 OPERATION AND SAFETY IMPROVEMENT AT 29th AVENUE AND 23rd AVENUE OVERCROSSING OAKLAND, CALIFORNIA	1

APPENDIX A

SITE DOCUMENTS

Initial Site Assessment (ISA) Checklist

Project Information

District 4 County AL Route 1880 Kilometer Post (Post Mile) _____ EA _____

Description Highway I880 & 29th Ave & 23rd Ave Interchanges

Is the project on the HW Study Minimal-Risk Projects List (HW1)? No

Project Manager Kris Larson phone # (510) 633-5646

Project Engineer _____ phone # _____

Project Screening

Attach the project location map to this checklist to show location of all know and/or potential HW sites identified. Refer to Figures 1 & 2

1. Project Features: New R/W? _____ Excavation? X Railroad Involvement? _____
   Structure demolition/modification? X Subsurface utility relocation? X
2. Project Setting Roadways and Residential/Commercial Development
   Rural or Urban Urban
   Current land uses Highway and access roads
   Adjacent land uses Residential/commercial/light industrial
   (industrial, light industry, commercial, agricultural, residential, etc.)
3. Check federal, State, and local environmental and health regulatory agency records as necessary, to see if any known hazardous waste site is in or near the project area. If a known site is identified, show its location on the attached map and attach additional sheets, as needed, to provide pertinent information for the proposed project.
4. Conduct Field Inspection. Date 11/20/06 Use the attached map to locate potential or known HW sites.

STORAGE STRUCTURES / PIPELINES:

Underground tanks	No	Surface tanks	No
Sumps	No	Ponds	No
Drums	No	Basins	No
Transformers	1 located north of Lazear School	Landfill	No
Other			

Initial Site Assessment (ISA) Checklist
(continued)

CONTAMINATION: (spills, leaks, illegal dumping, etc.)

Surface staining No obvious soil staining observed during site reconnaissance Oil sheen None

Odors None Vegetation damage No severe damage observed. Some stressed vegetation observed along North + Southbound shoulders of I880

Other _____

HAZARDOUS MATERIALS: (asbestos, lead, etc.)

Buildings N/A Spray-on fireproofing N/A

Pipe wrap N/A Friable tile N/A

Acoustical plaster N/A Serpentine N/A

Paint Potential yellow striping paint on Roadway Other _____

5. Additional record search, as necessary, of subsequent land uses that could have resulted in a hazardous waste site. Use the attached map to show the location of potential hazardous waste sites. - See figure 2

6. Other comments and/or observations: _____

ISA Determination

Does the project have potential hazardous waste involvement? yes If there is known or potential hazardous waste involvement, is additional ISA work needed before task orders can be prepared for the Investigation? No If "YES," explain; then give an estimate of additional time required: _____

A brief memo should be prepared to transmit the ISA conclusions to the Project Manager and Project Engineer.

ISA Conducted by _____ **Date** 12/8/06

EDR Historical Topographic Map Report

I-880/29th Avenue Interchange Project

I-880/29th Avenue
Oakland, CA 94601

Inquiry Number: 1795521.4

November 14, 2006

EDR® Environmental Data Resources Inc

The Standard in Environmental Risk Management Information

440 Wheelers Farms Rd
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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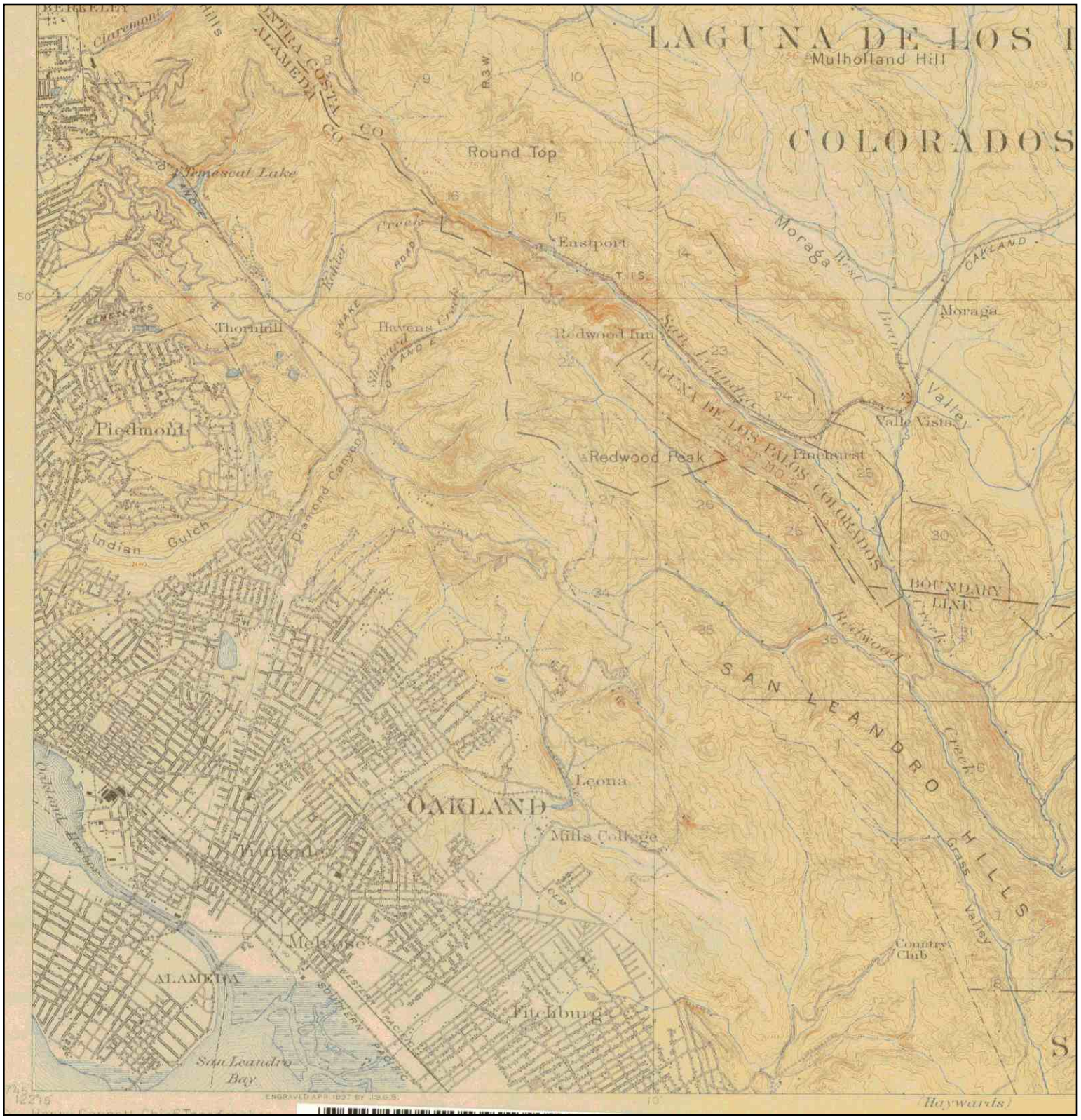
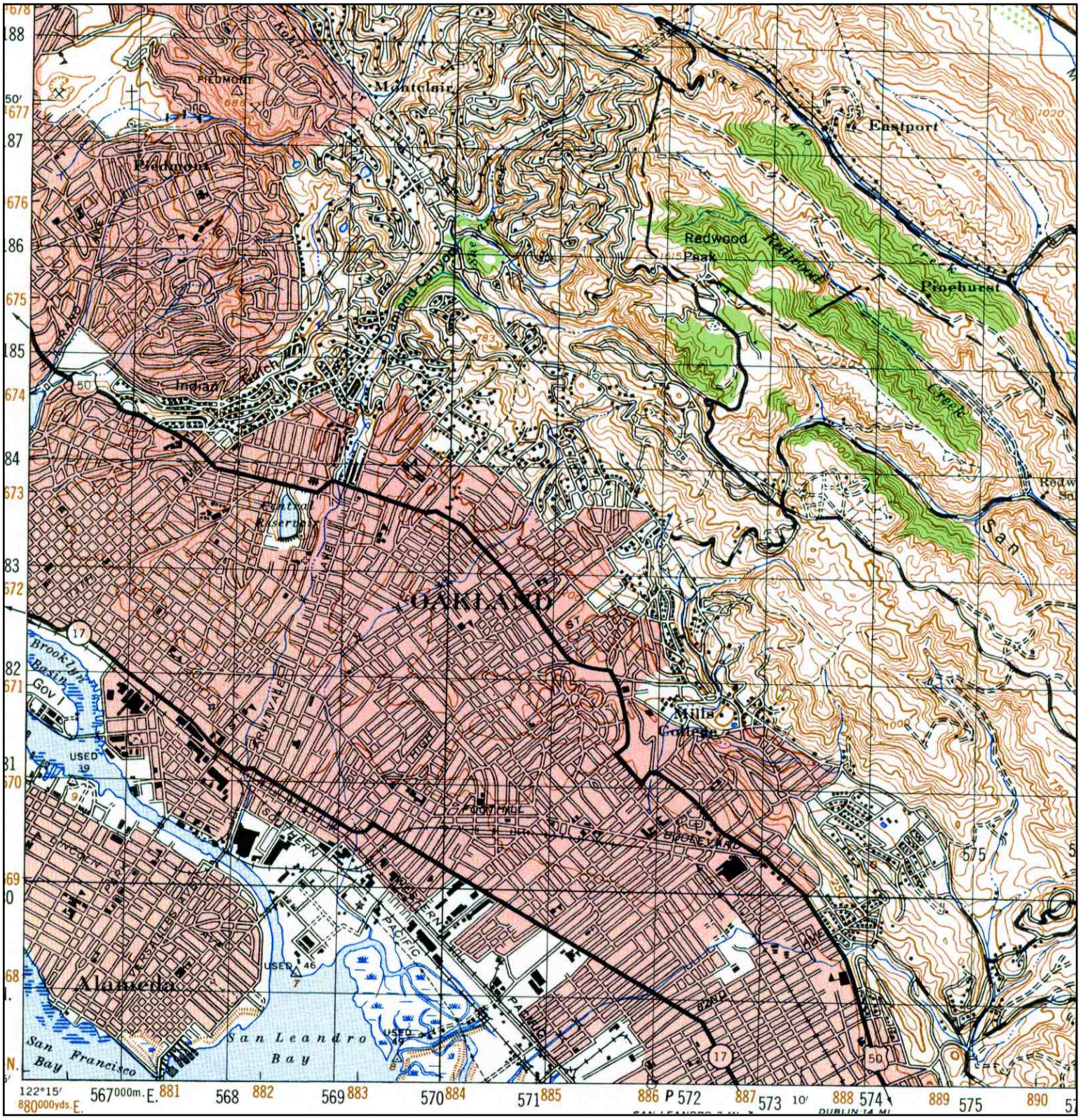
Historical Topographic Map



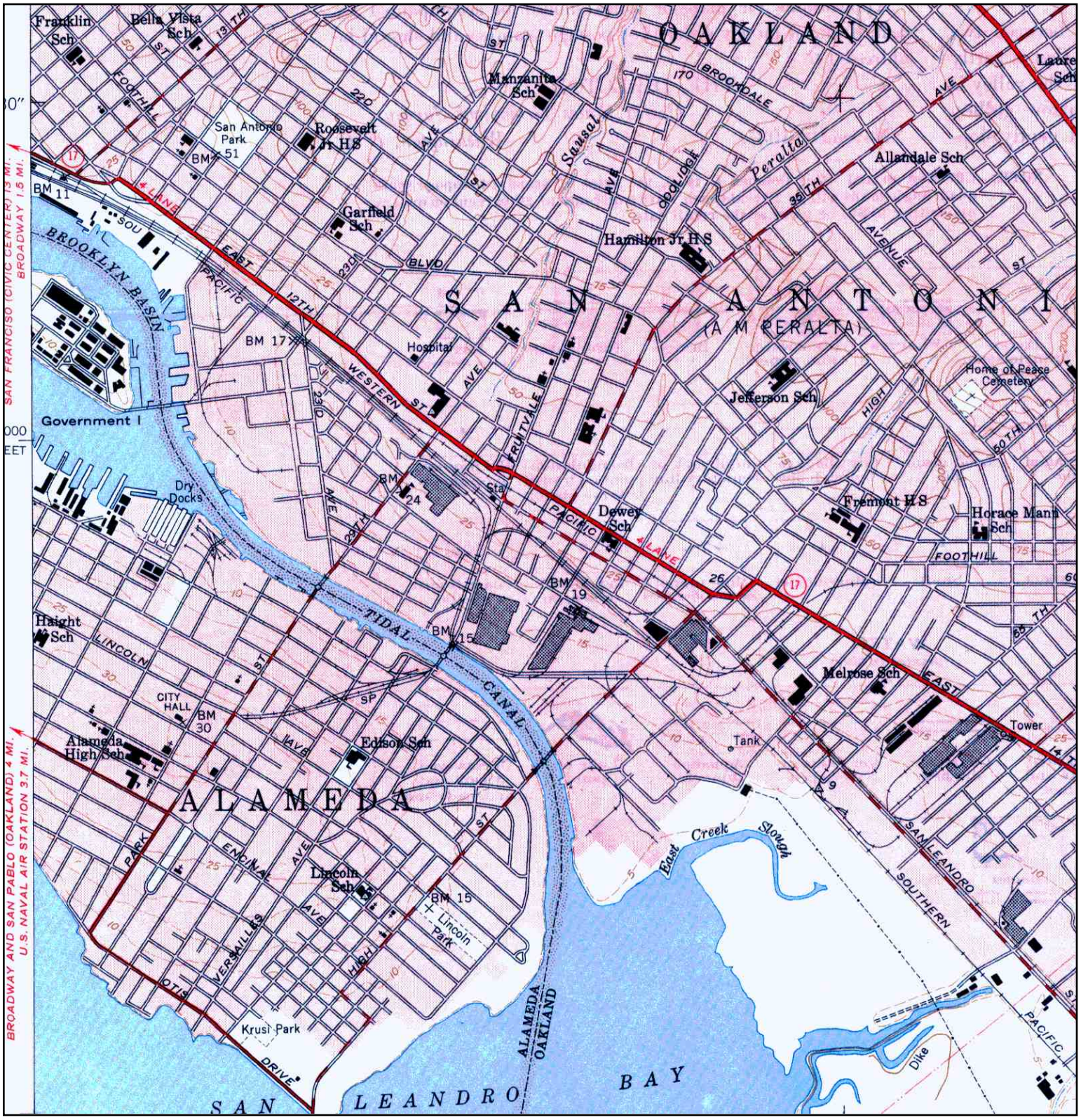
N	TARGET QUAD NAME: CONCORD MAP YEAR: 1915 SERIES: 15 SCALE: 1:62500	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

Historical Topographic Map



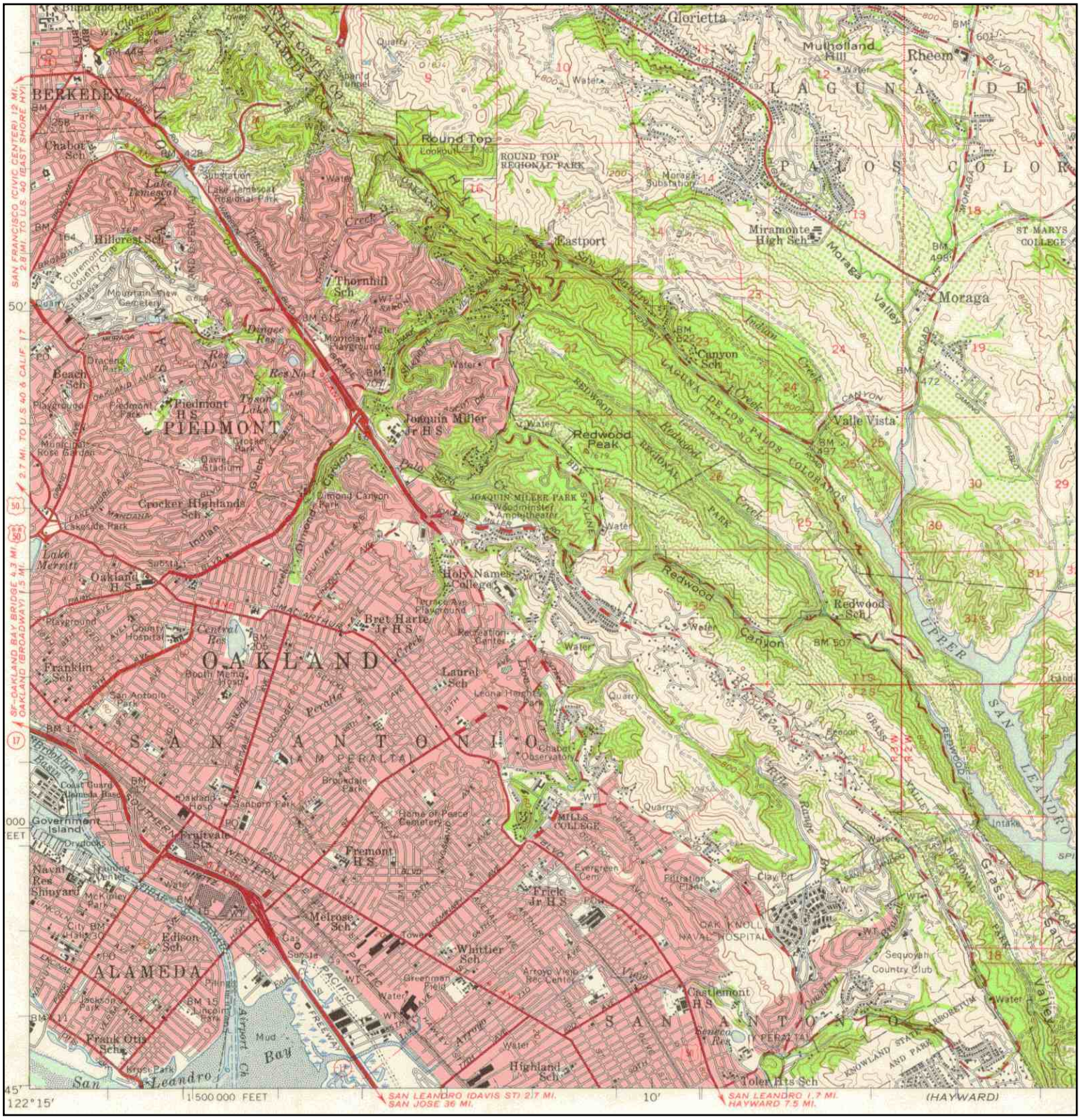
N	TARGET QUAD NAME: CONCORD MAP YEAR: 1948 SERIES: 15 SCALE: 1:50000	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

Historical Topographic Map



N	TARGET QUAD NAME: OAKLANDEAST MAP YEAR: 1949 SERIES: 7.5 SCALE: 1:24000	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

Historical Topographic Map



N	TARGET QUAD NAME: CONCORD MAP YEAR: 1959 SERIES: 15 SCALE: 1:62500	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

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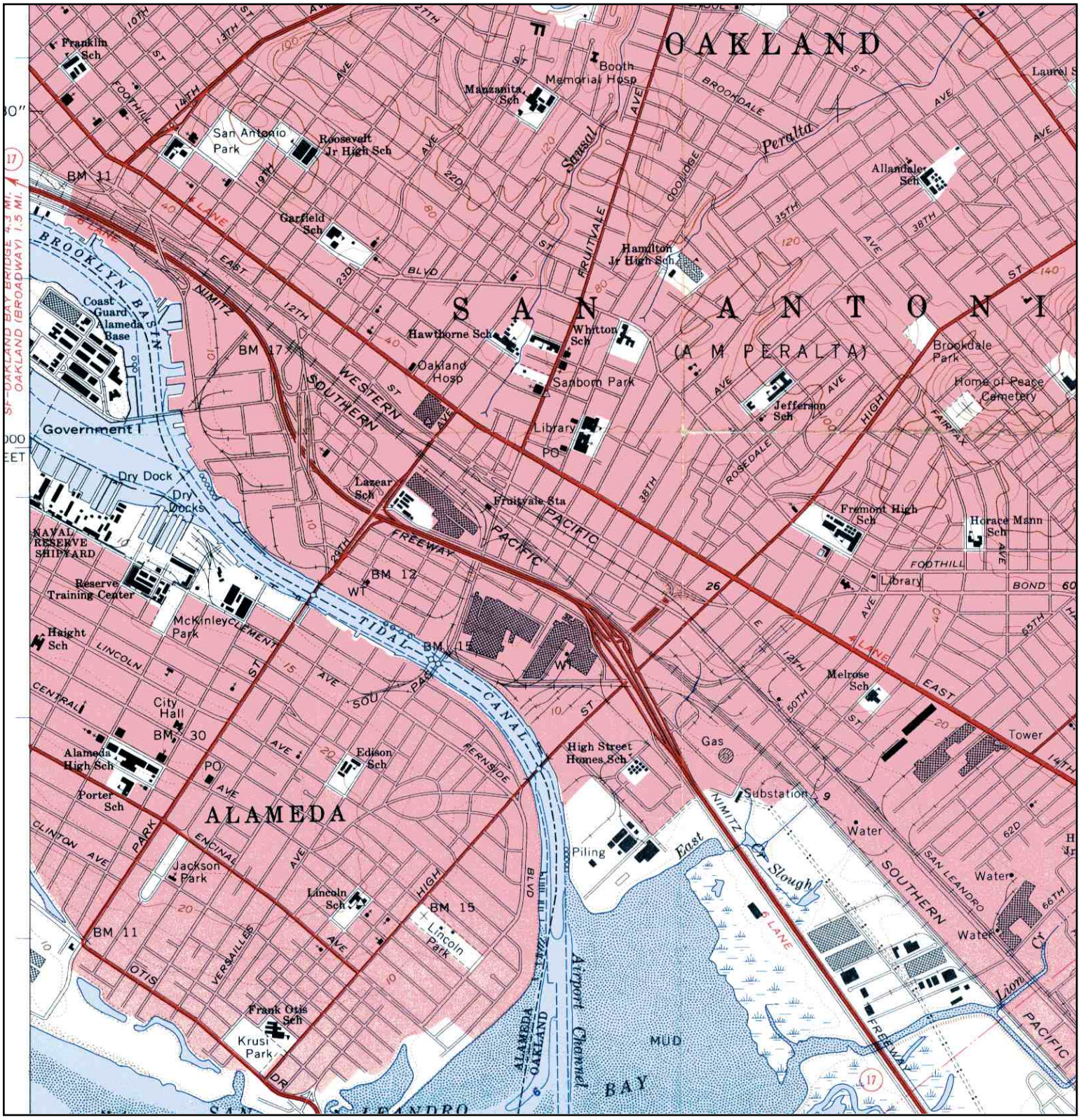

N	TARGET QUAD NAME: OAKLANDEAST MAP YEAR: 1959 SERIES: 7.5 SCALE: 1:24000	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

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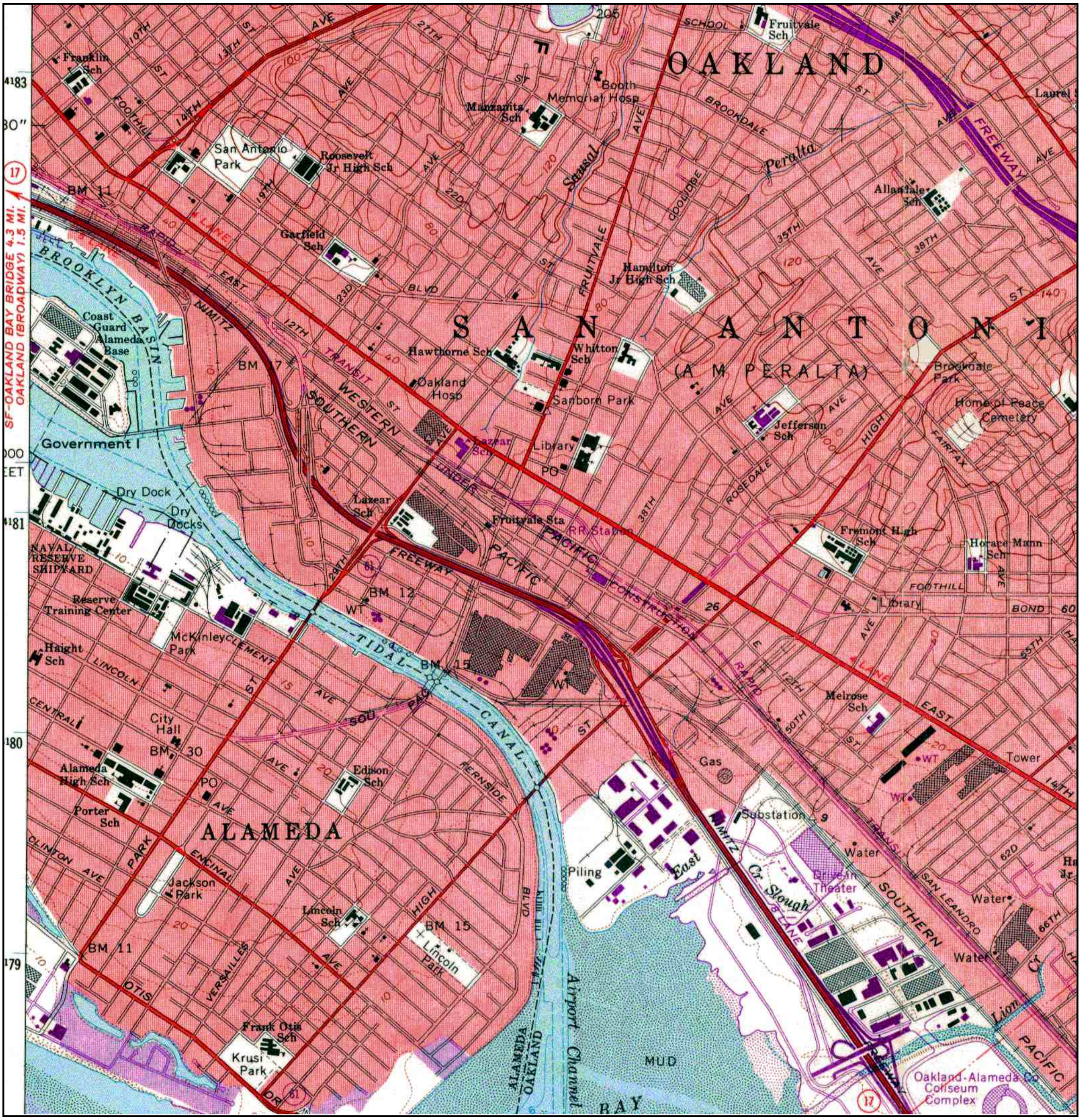
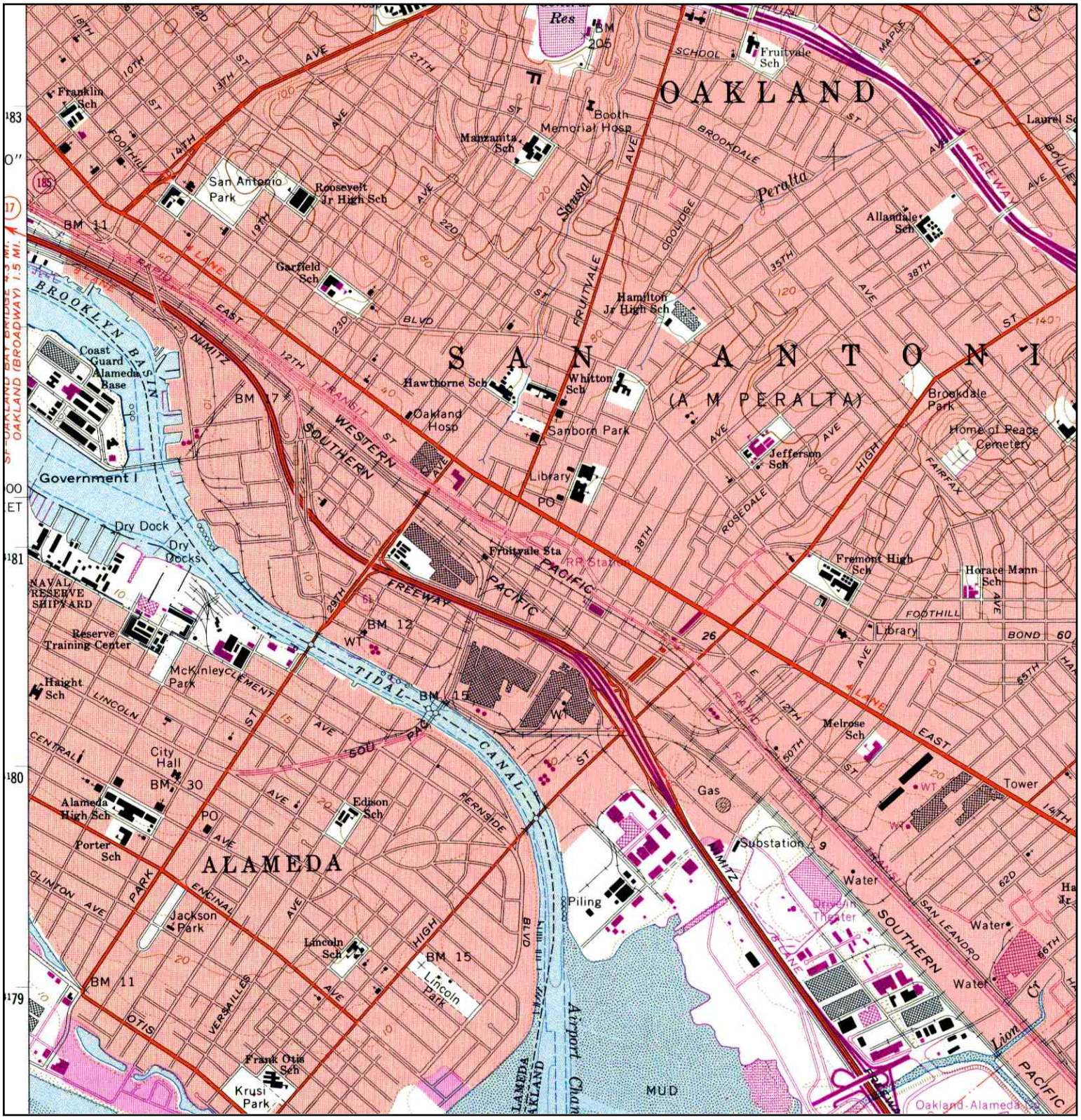


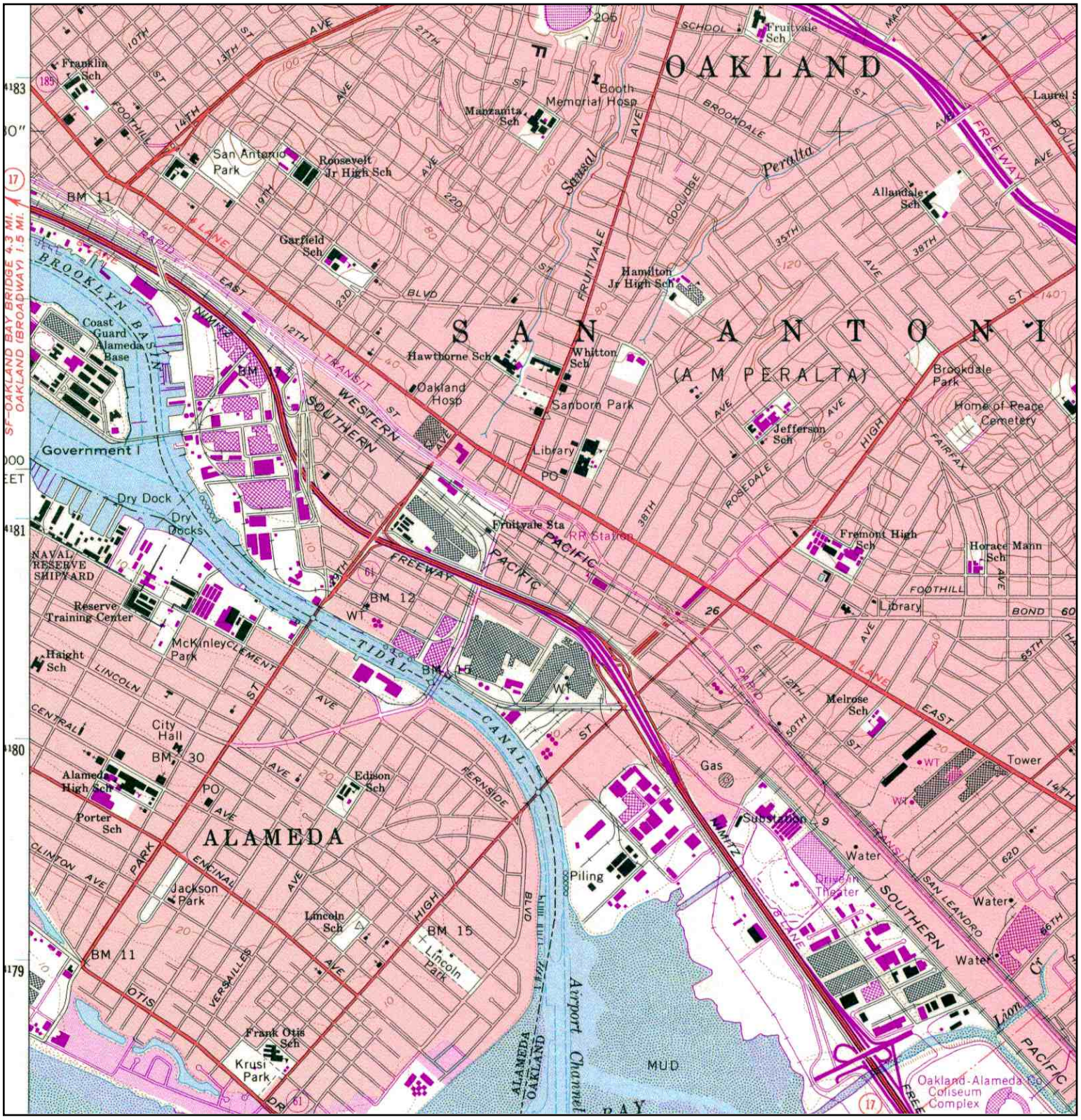
N ↑	TARGET QUAD NAME: OAKLANDEAST MAP YEAR: 1968 PHOTOREVISED FROM:1959 SERIES: 7.5 SCALE: 1:24000	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

Historical Topographic Map



N	TARGET QUAD NAME: OAKLANDEAST MAP YEAR: 1973 PHOTOREVISED FROM:1959 SERIES: 7.5 SCALE: 1:24000	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

Historical Topographic Map



N	TARGET QUAD NAME: OAKLANDEAST MAP YEAR: 1980 PHOTOREVISED FROM:1959 SERIES: 7.5 SCALE: 1:24000	SITE NAME: I-880/29th Avenue Interchange Project ADDRESS: I-880/29th Avenue Oakland, CA 94601 LAT/LONG: 37.775 / 122.2333	CLIENT: Ninyo & Moore CONTACT: Kris Larson INQUIRY#: 1795521.4 RESEARCH DATE: 11/14/2006

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Sanborn® Map Transmittal

Ship To: Kris Larson
Ninyo & Moore
1956 Webster Street
Oakland, CA 94612

Order Date: 11/21/2006 **Completion Date:** 11/22/2006
Inquiry #: 1802148.1s
P.O. #: na
Site Name: I-880/29th Ave Interchange Project
Address: I-880/29th Ave
City/State: Oakland, CA 94601
Cross Streets:

Customer Project: 401145002
1033871VLA 510-633-5640

Based on client-supplied information, fire insurance maps for the following years were identified

1911 - 10 Maps
1950 - 10 Maps
1960 - 10 Maps
1969 - 10 Maps

Limited Permission to Photocopy

Total Maps: 40

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USER'S GUIDE

This User's Guide provides guidelines for accessing Sanborn Map® images and for transferring them to your Word Processor.

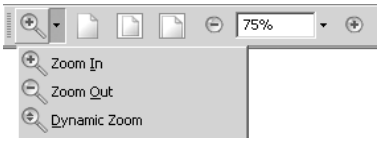
Reading Sanborn Maps

- Sanborn Maps document historical property use by displaying property information through words, abbreviations, and map symbols. The Sanborn Map Key provides information to help interpret the symbols and abbreviations used on Sanborn Maps. The Key is available from EDR's Web Site at: http://www.edrnet.com/reports/samples/key.pdf

Organization of Electronic Sanborn Image File

- Sanborn Map Report, listing years of coverage
- User's Guide
- Oldest Sanborn Map Image
- Most recent Sanborn Map Image

Navigating the Electronic Sanborn Image File

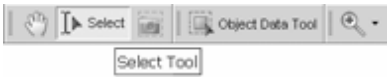


1. Open file on screen.
2. Identify TP (Target Property) on the most recent map.
3. Find TP on older printed images.
4. Using Acrobat® Reader®, zoom to 250% in order to view more clearly. (200-250% is the approximate equivalent scale of hardcopy Sanborn Maps.)
   A. On the menu bar, click "View" and then "Zoom to..."
   B. Or, use the magnifying tool and drag a box around the TP

Printing a Sanborn Map From the Electonic File

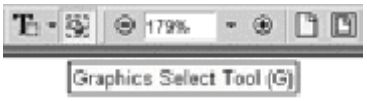
- EDR recommends printing images at 300 dpi (300 dpi prints faster than 600 dpi)
- To print only the TP area, cut and paste from Acrobat to your word processor application.

Acrobat Versions 6 and 7



1. Go to the menu bar
2. Click the "Select Tool"
3. Draw a box around the area selected
4. "Right click" on your mouse
5. Select "Copy Image to Clipboard"
6. Go to Word Processor such as Microsoft Word, paste and print.

Acrobat Version 5



1. Go to the menu bar
2. Click the "Graphics Select Tool"
3. Draw a box around the area selected
4. Go to "Menu"
5. Highlight "Edit"
6. Highlight "Copy"
7. Go to Word Processor such as Microsoft Word, paste and print.

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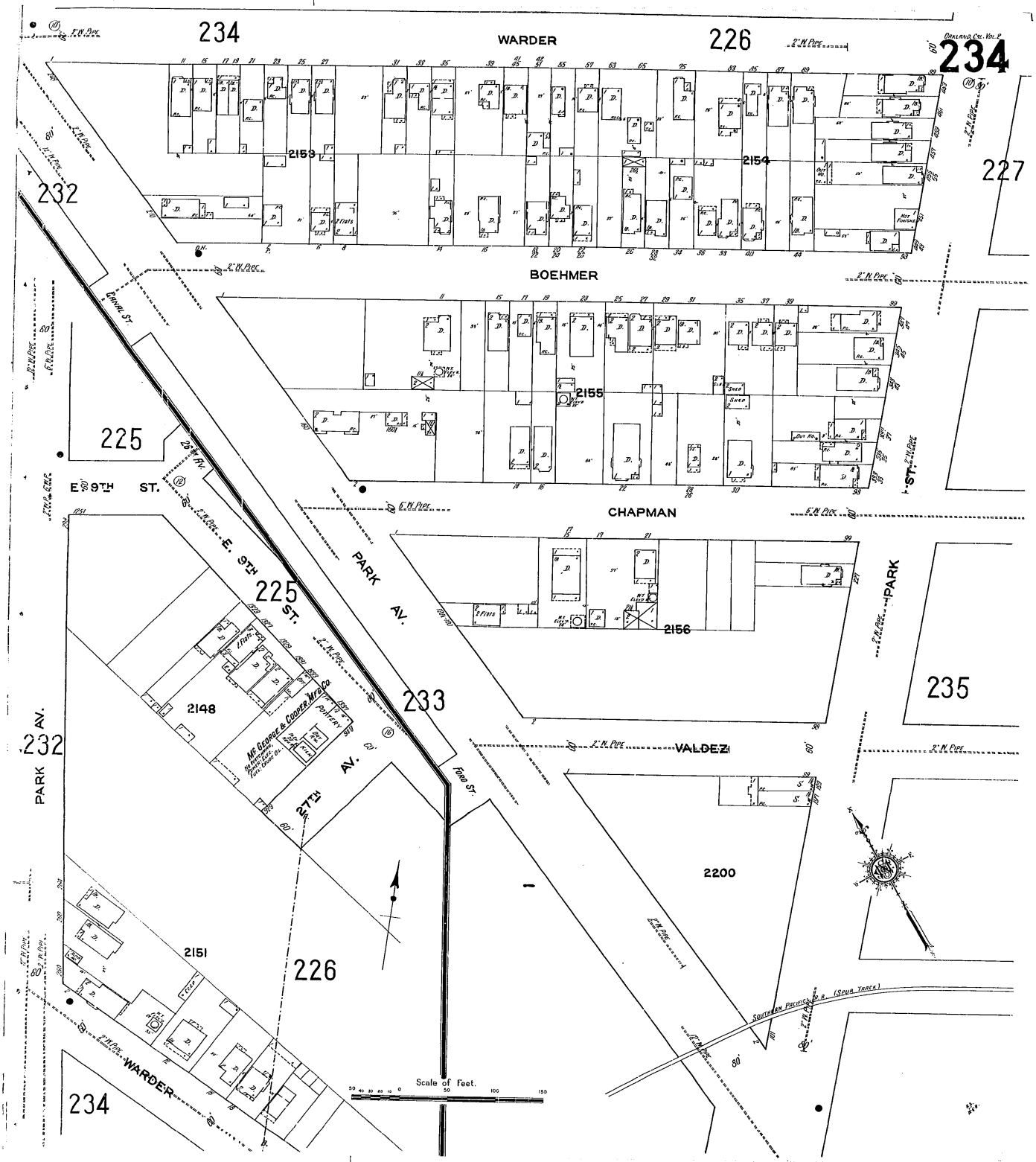
- Images are grouped intro one file, up to 2MB.
- In cases where in excess of 6-7 map years are available, the file size typically exceeds 2MB. In these cases, you will receive multiple files, labeled as "1 of 3", "2 of 3", etc. including all available map years.
- Due to file size limitations, certain ISPs, including AOL, may occasionally delay or decline to deliver files. Please contact your ISP to identify their specific file size limitations.



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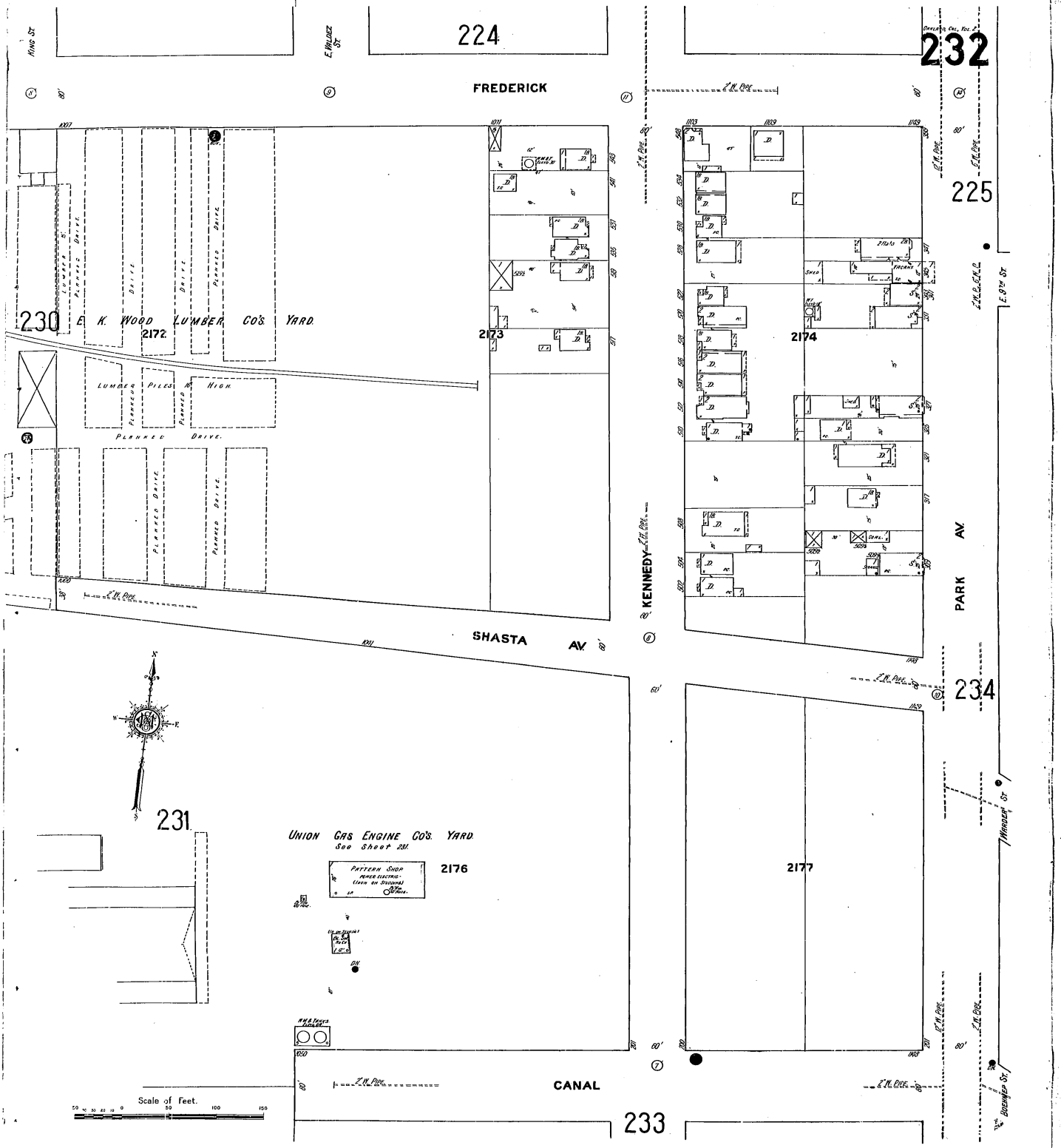

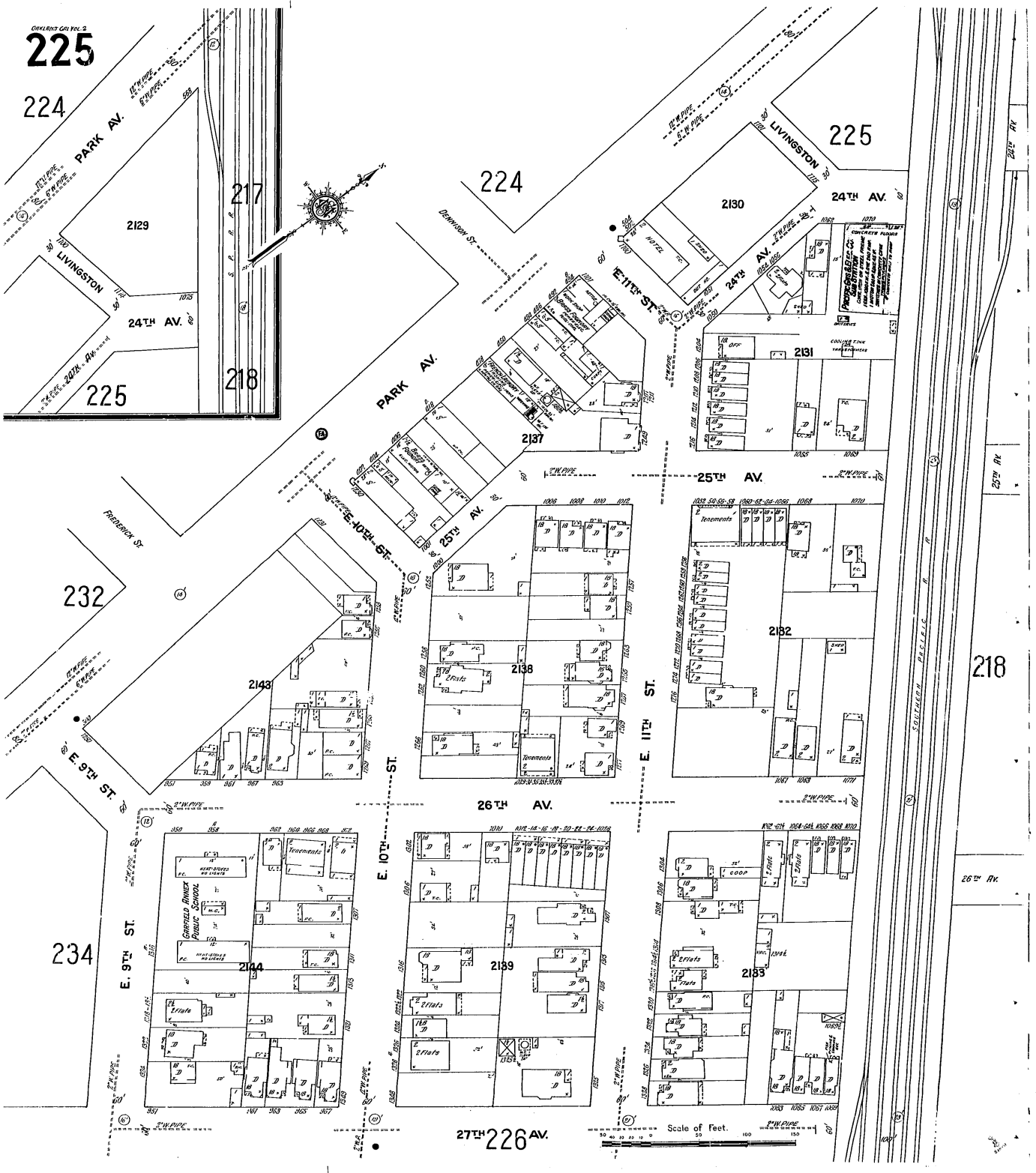

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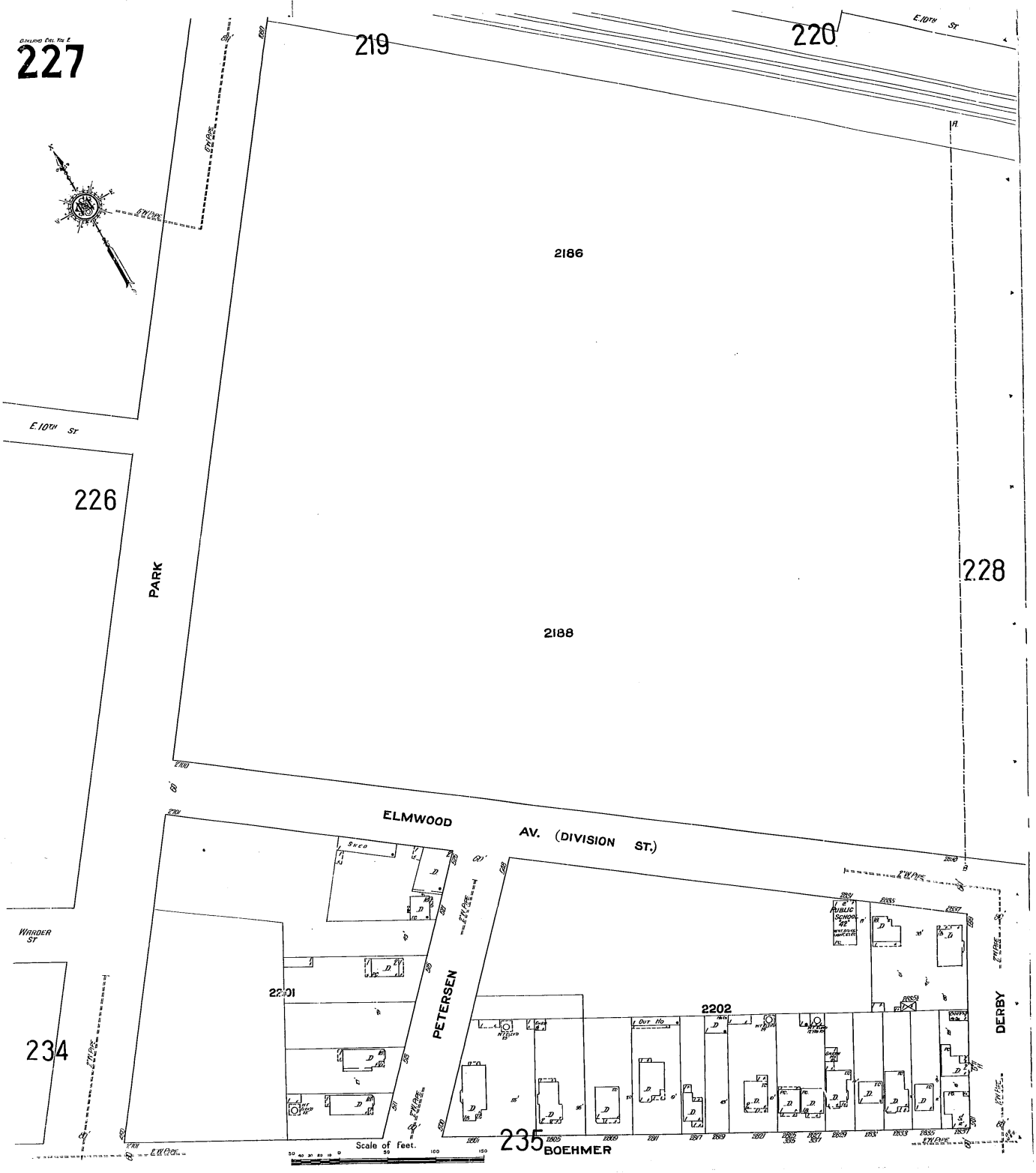

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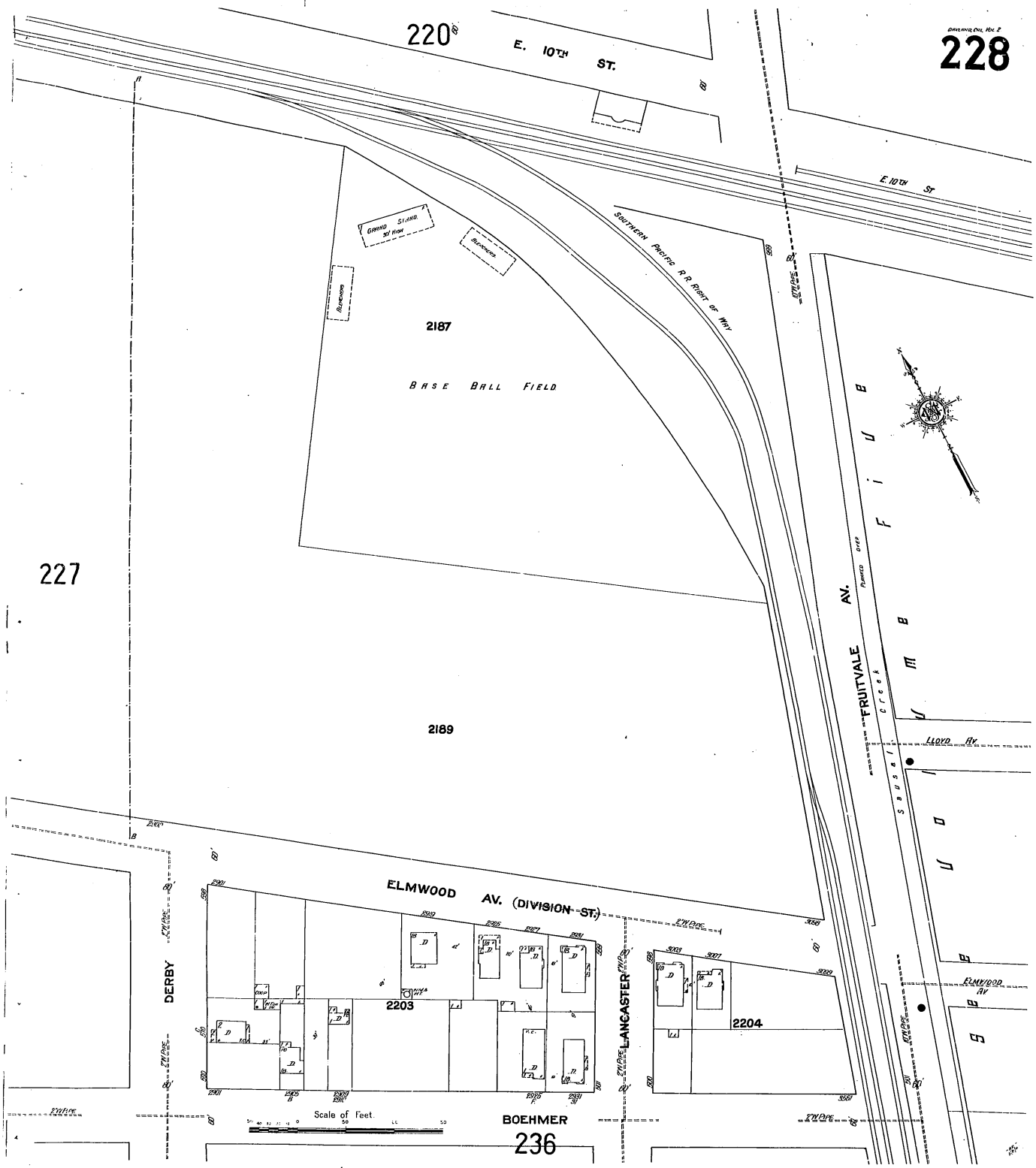

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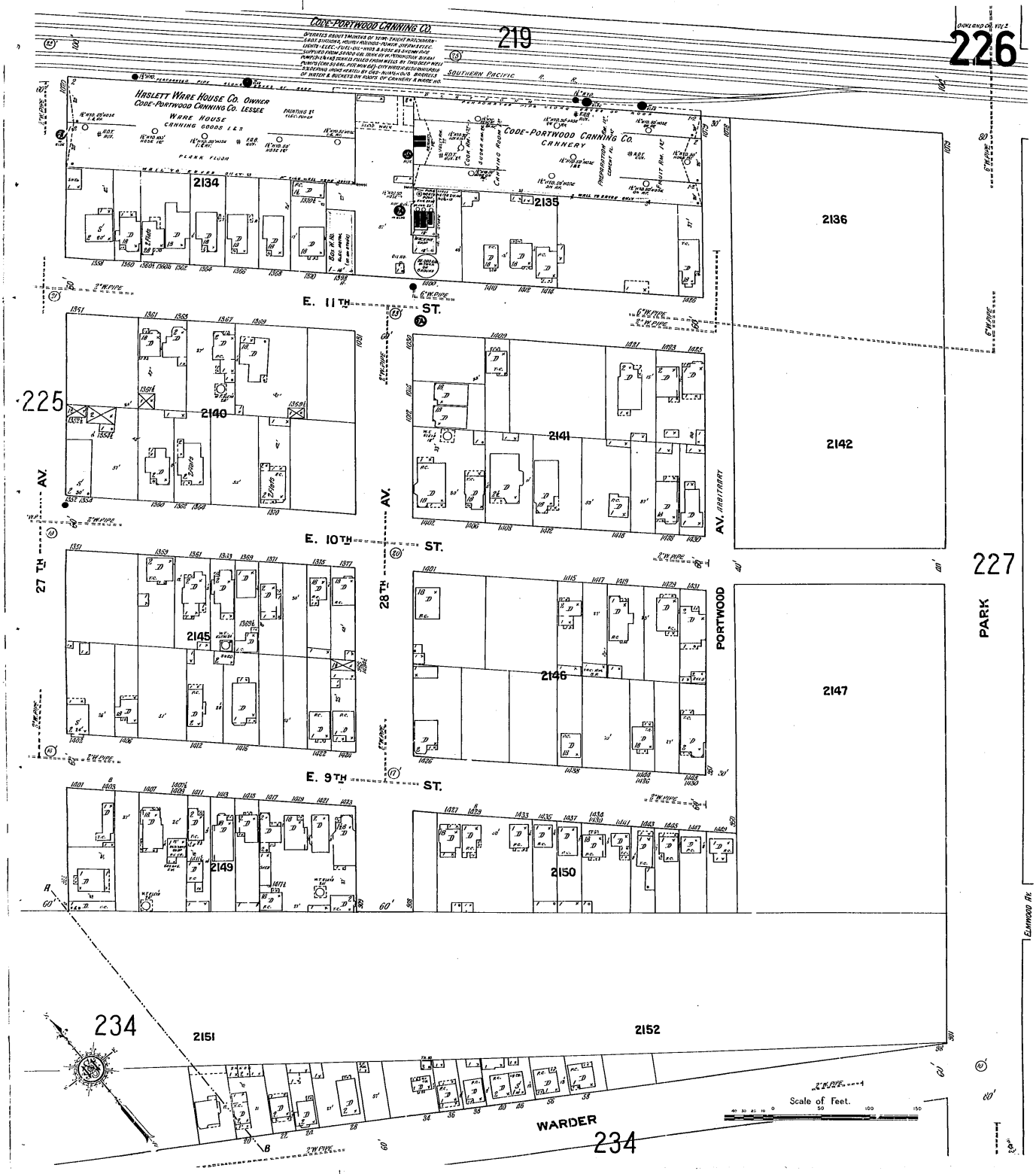

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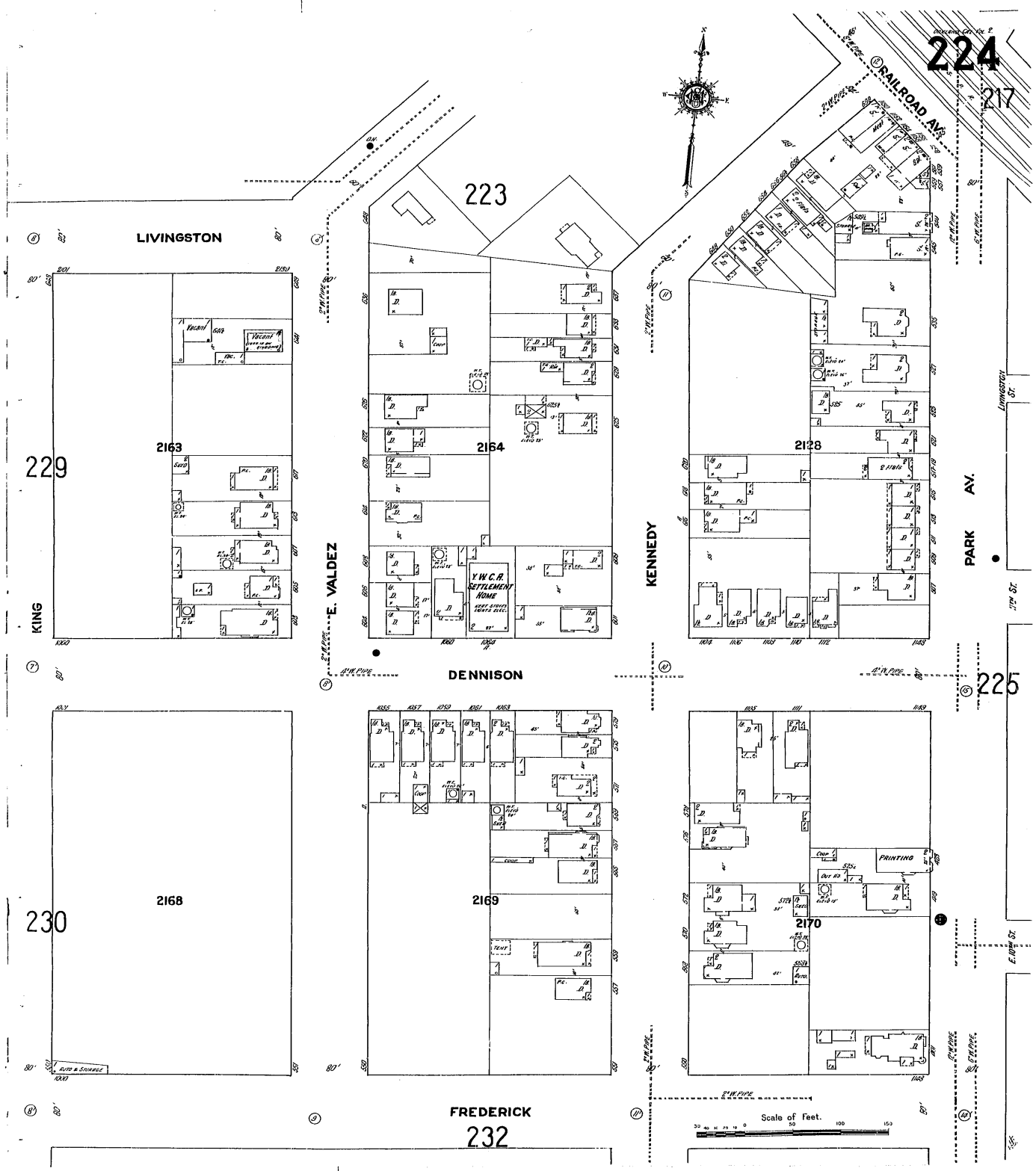

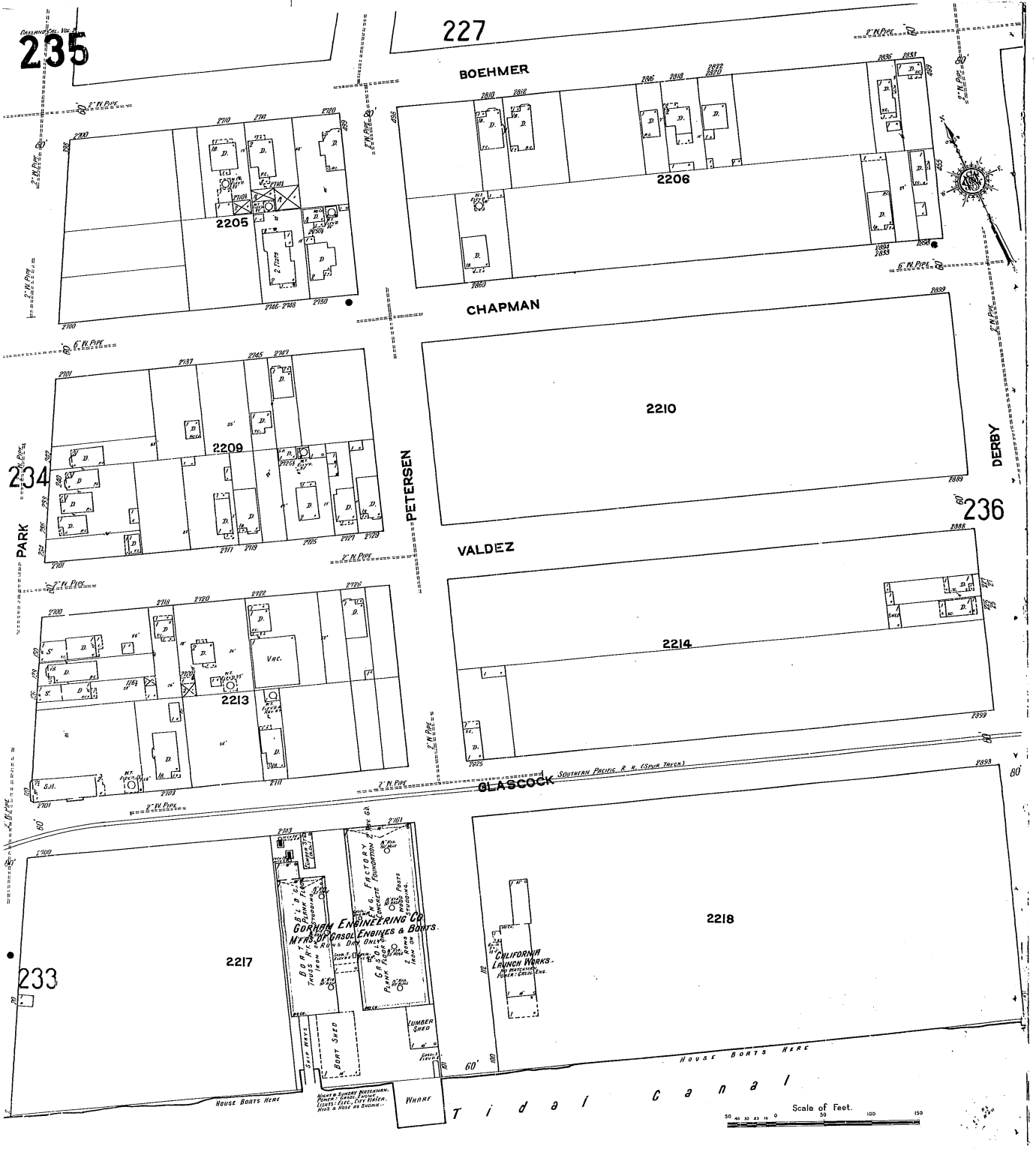

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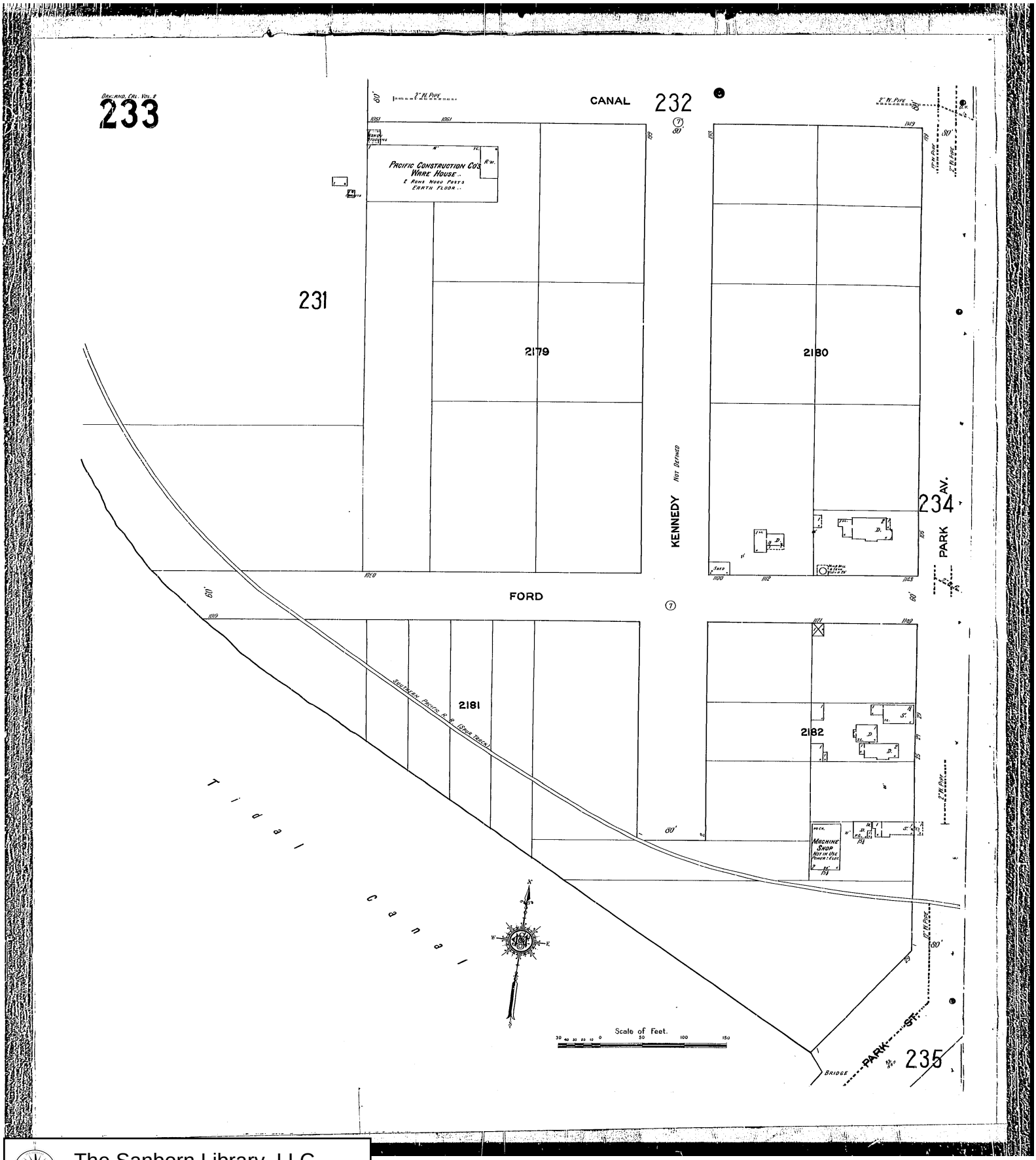

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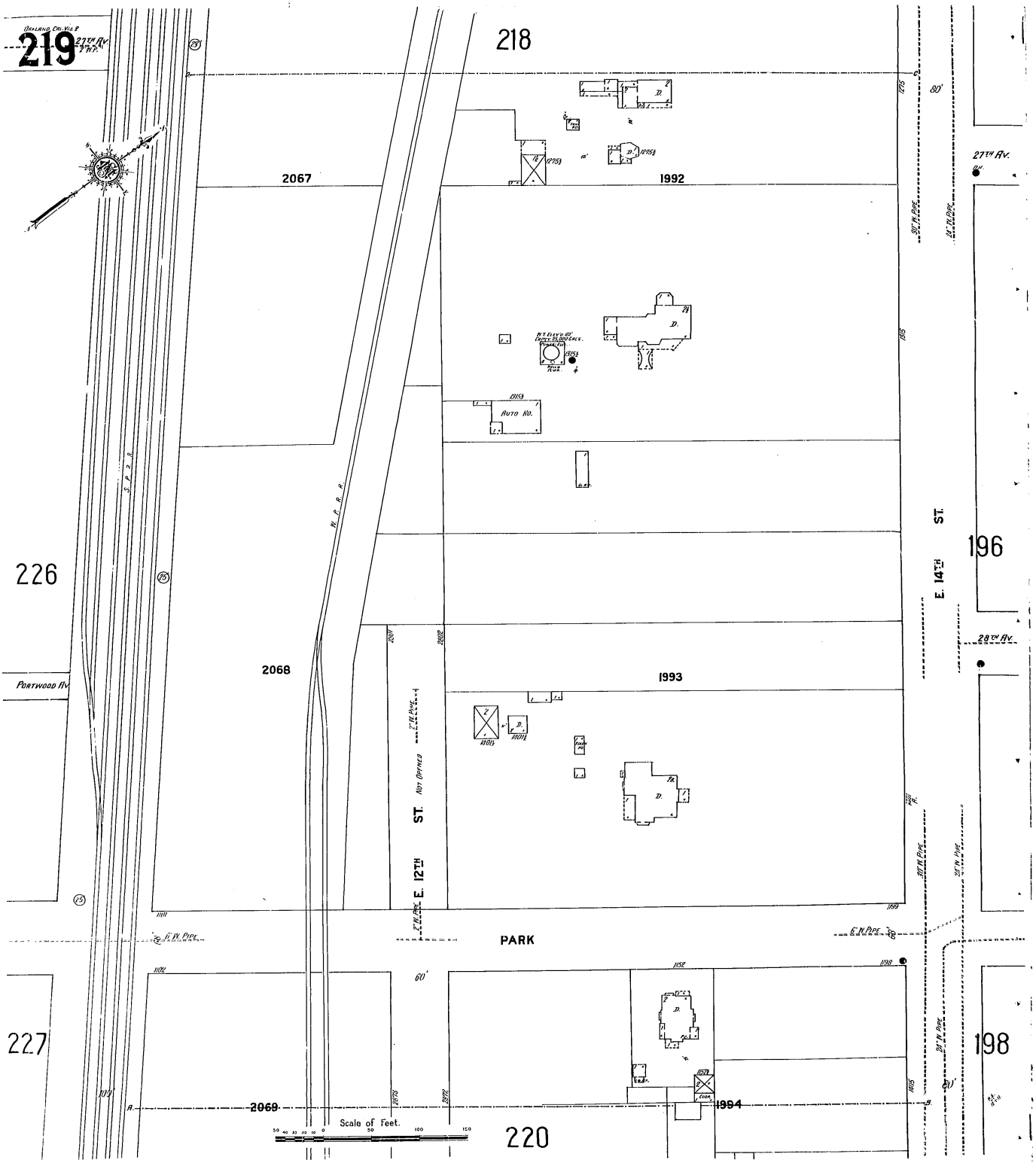

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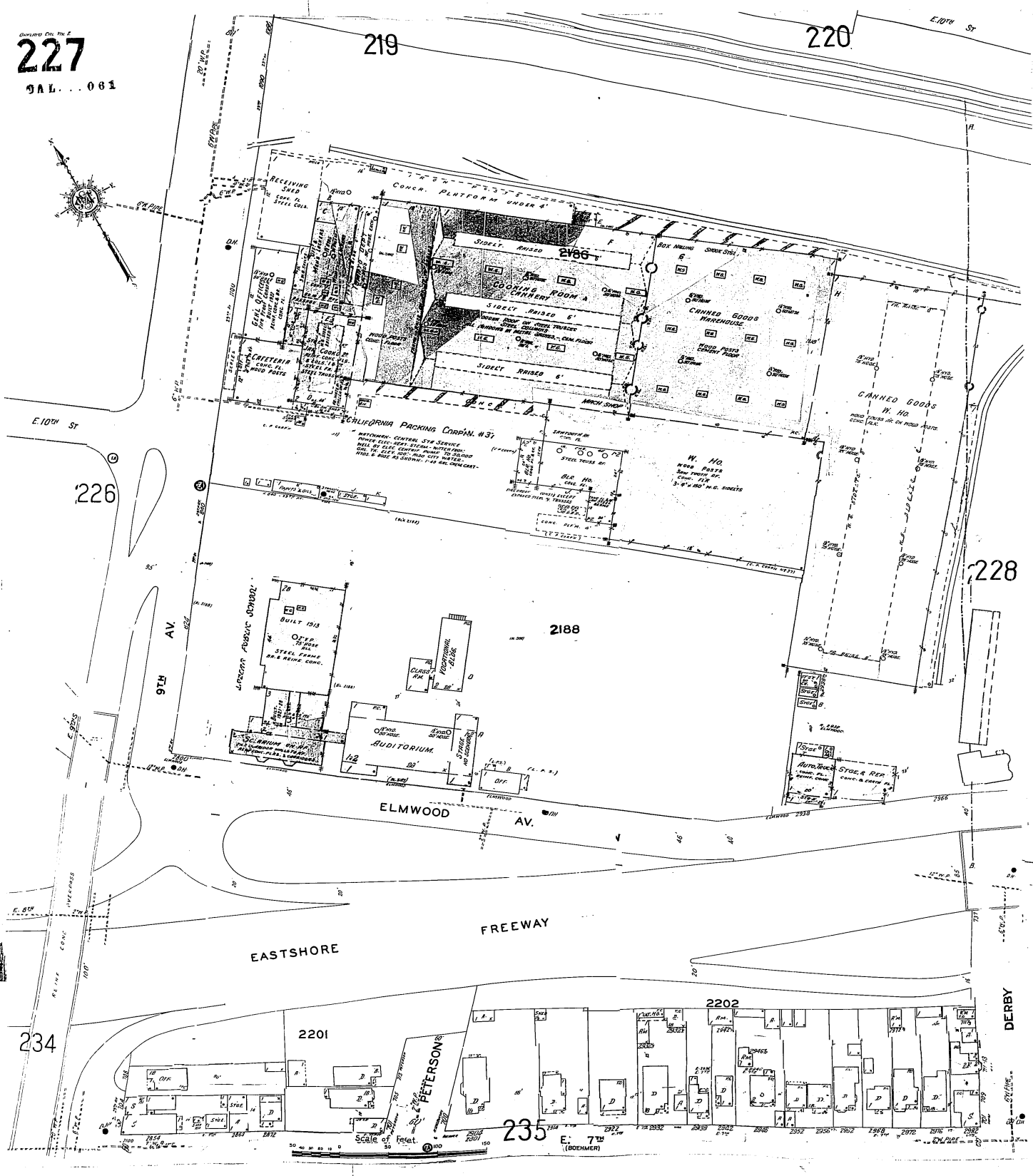

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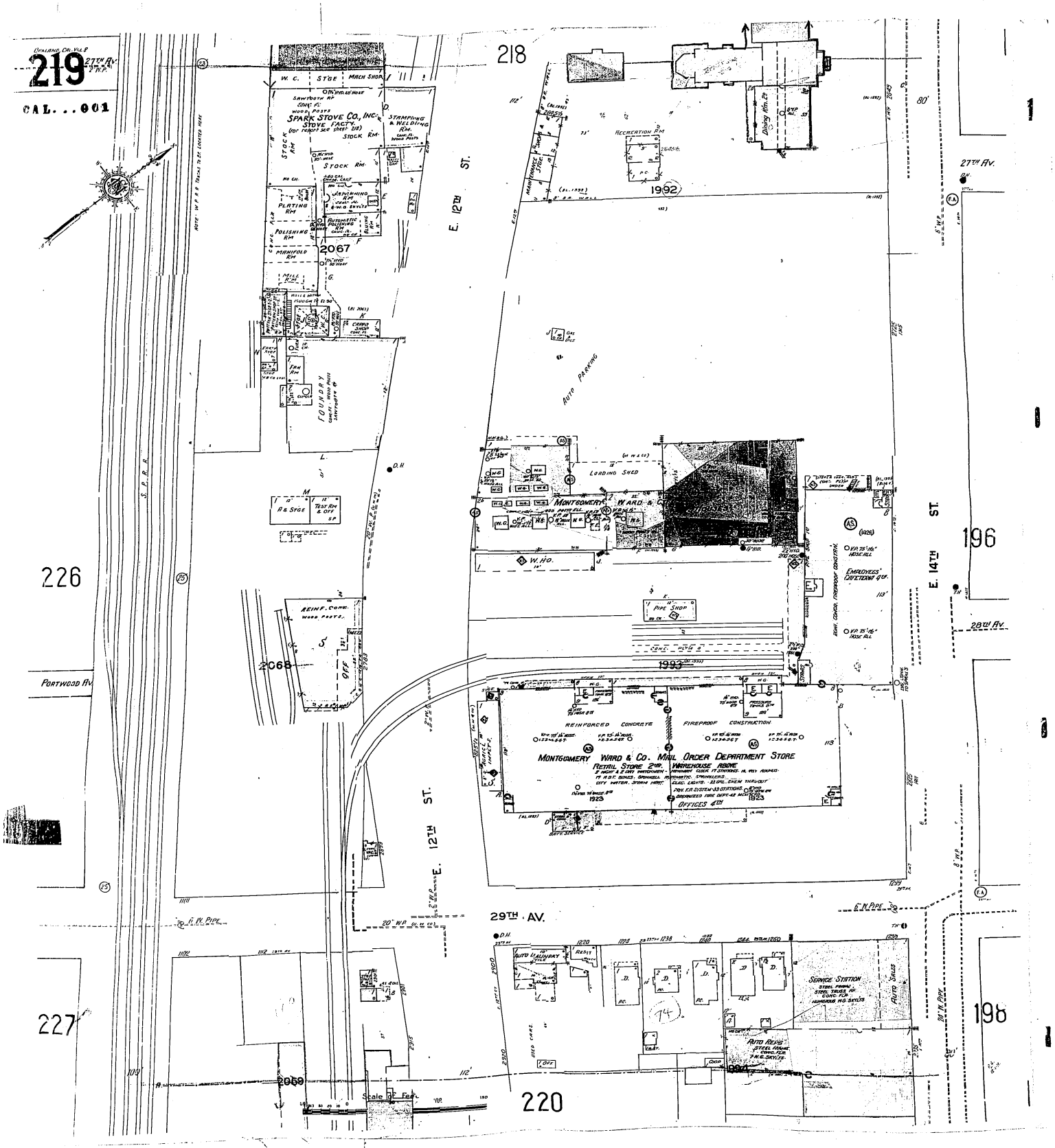

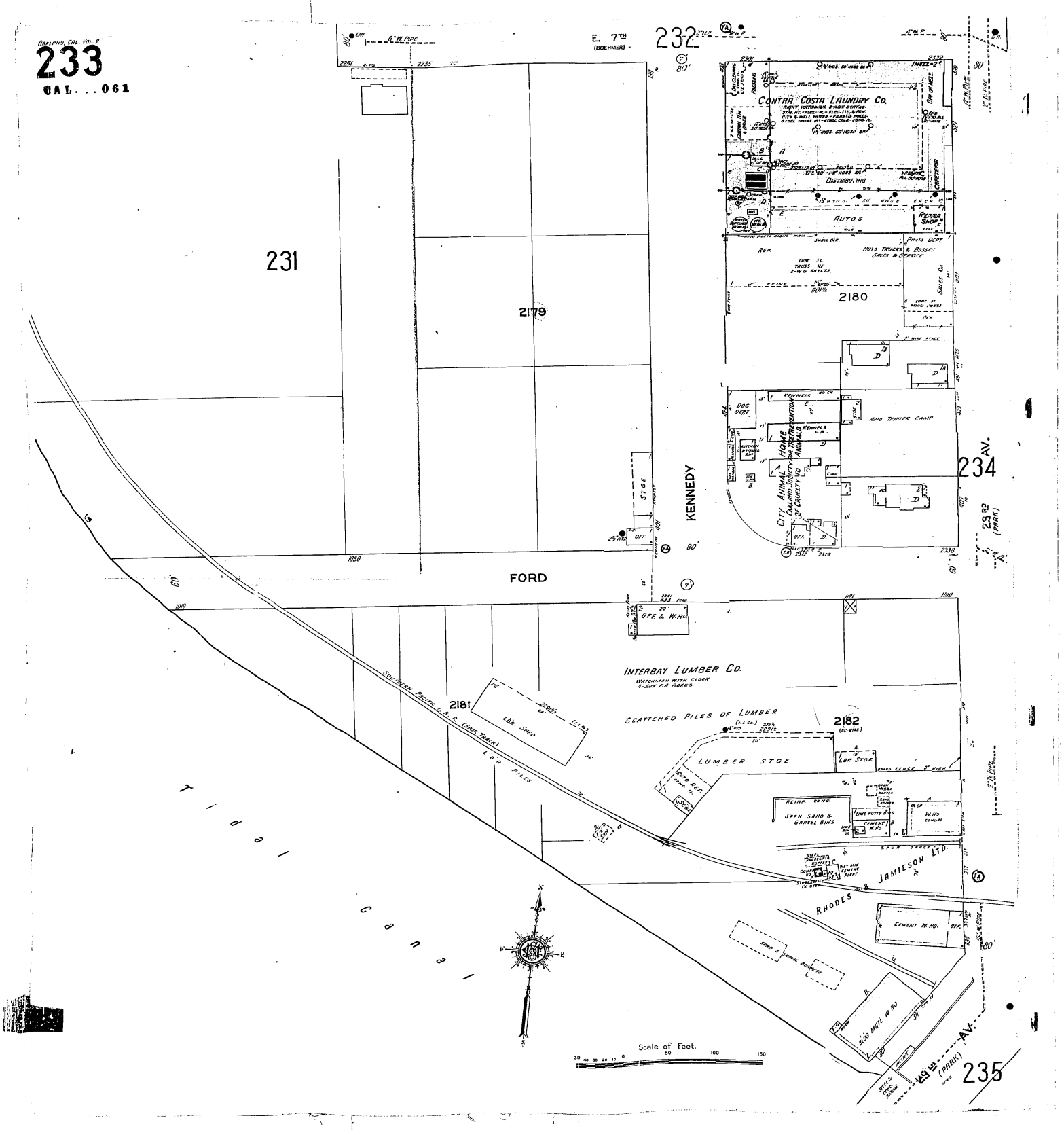

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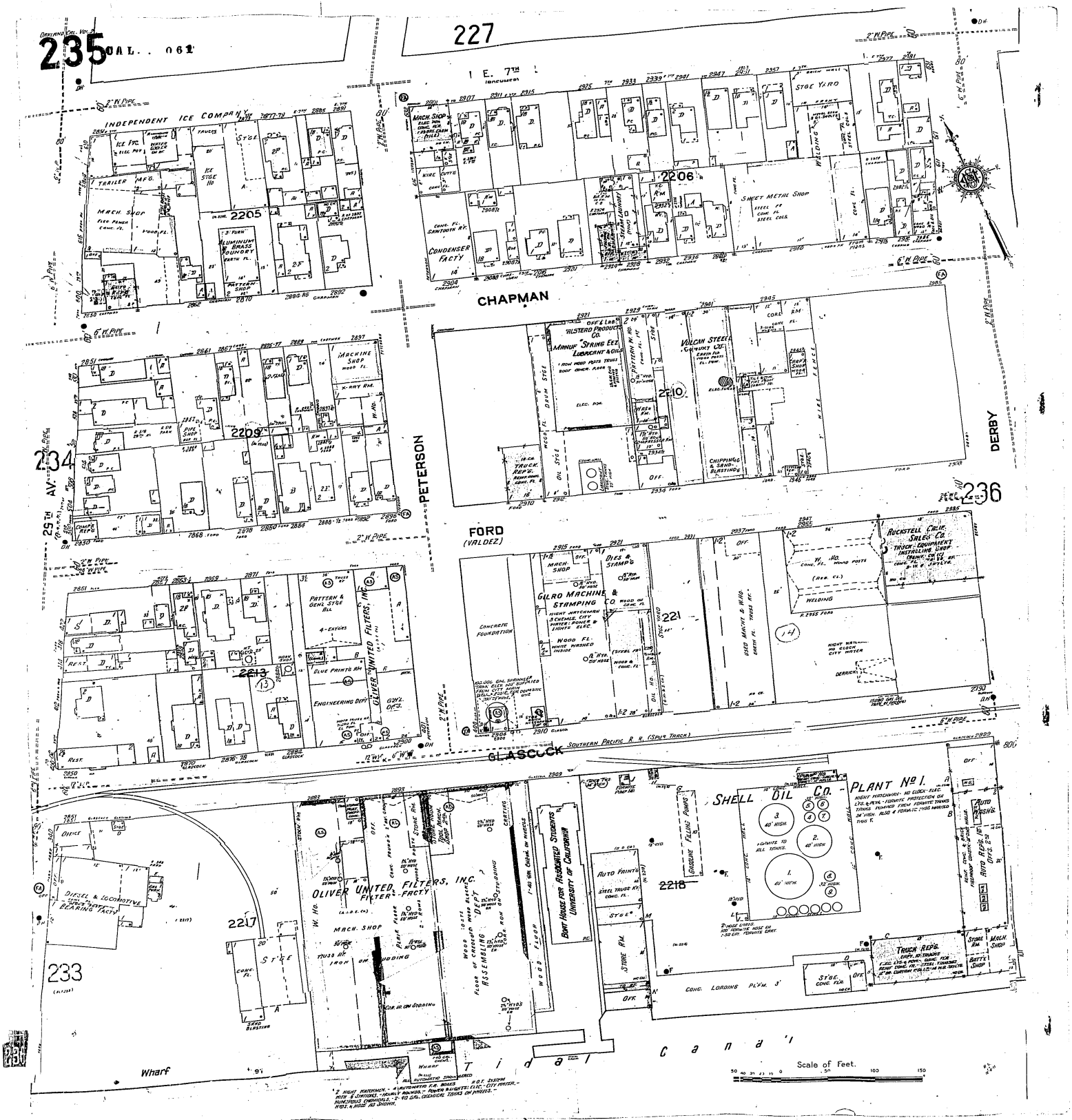

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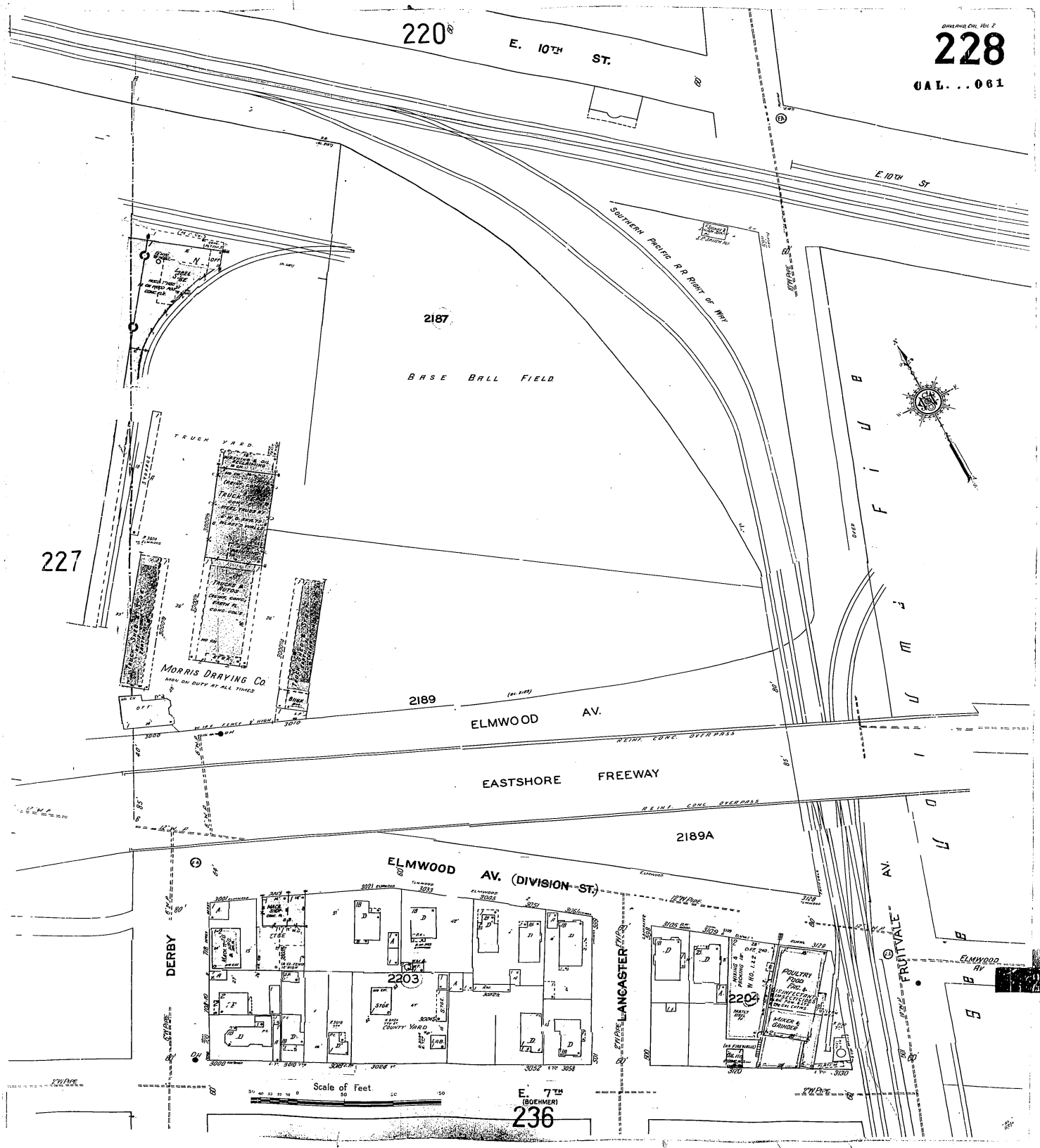

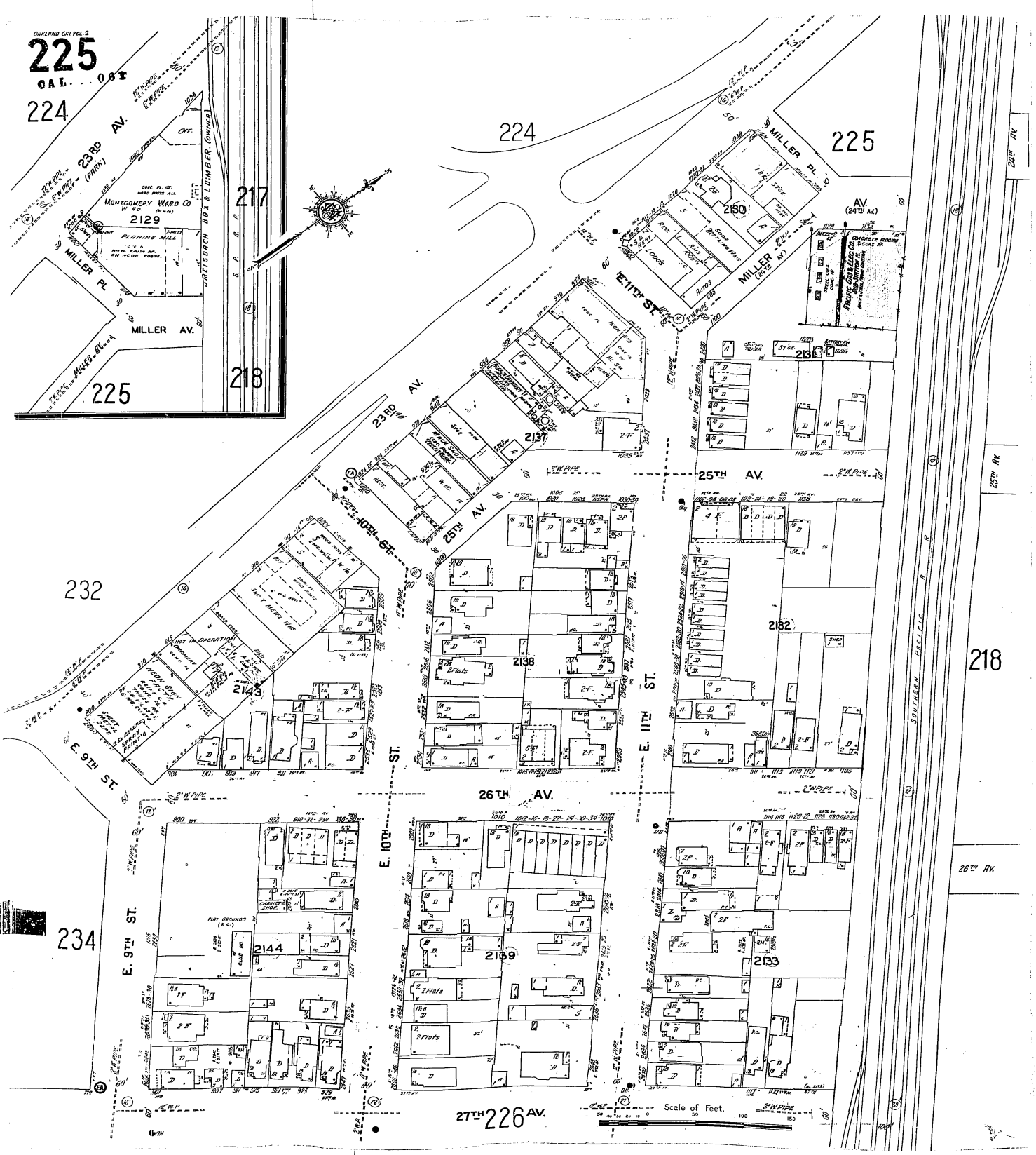

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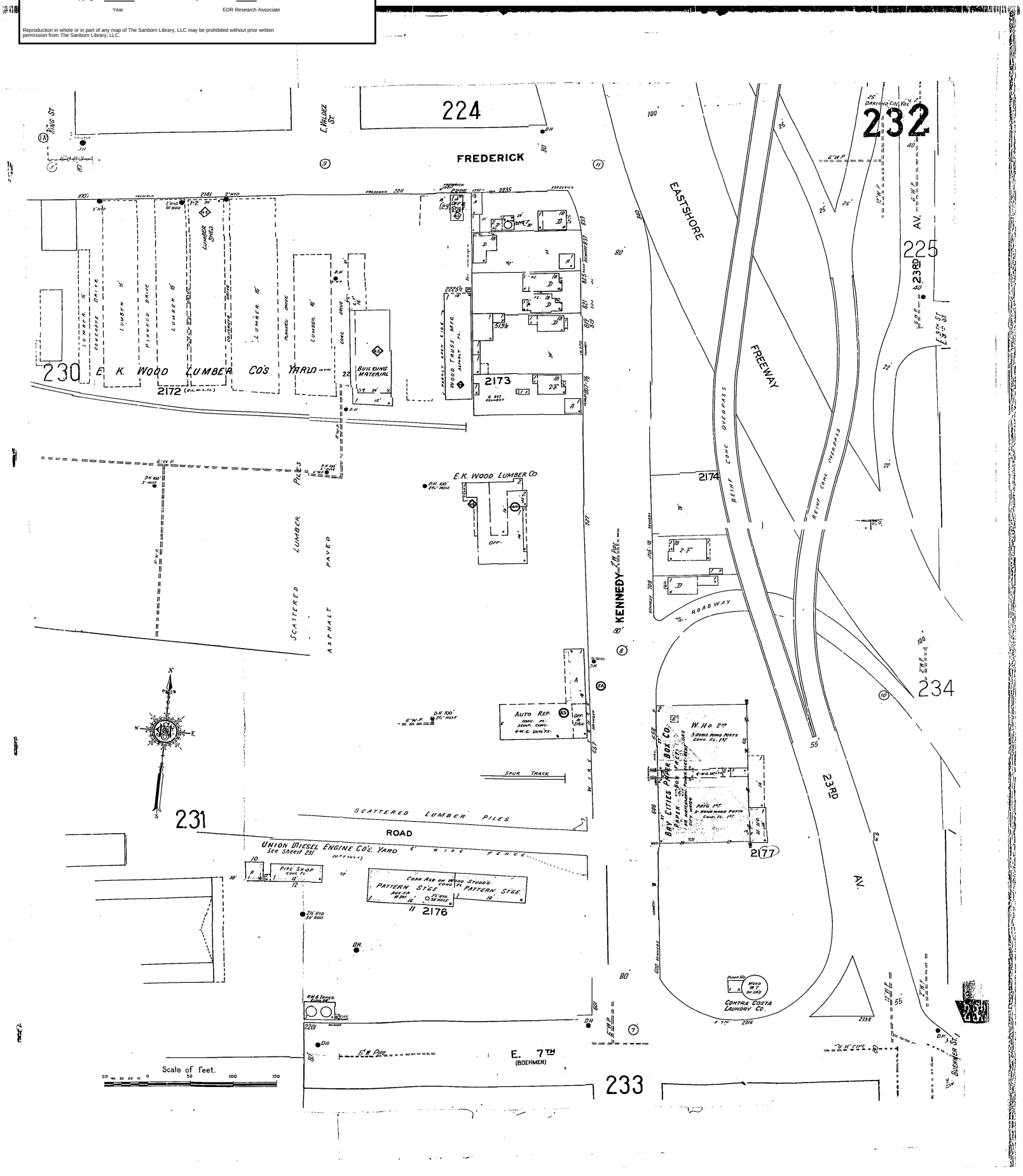

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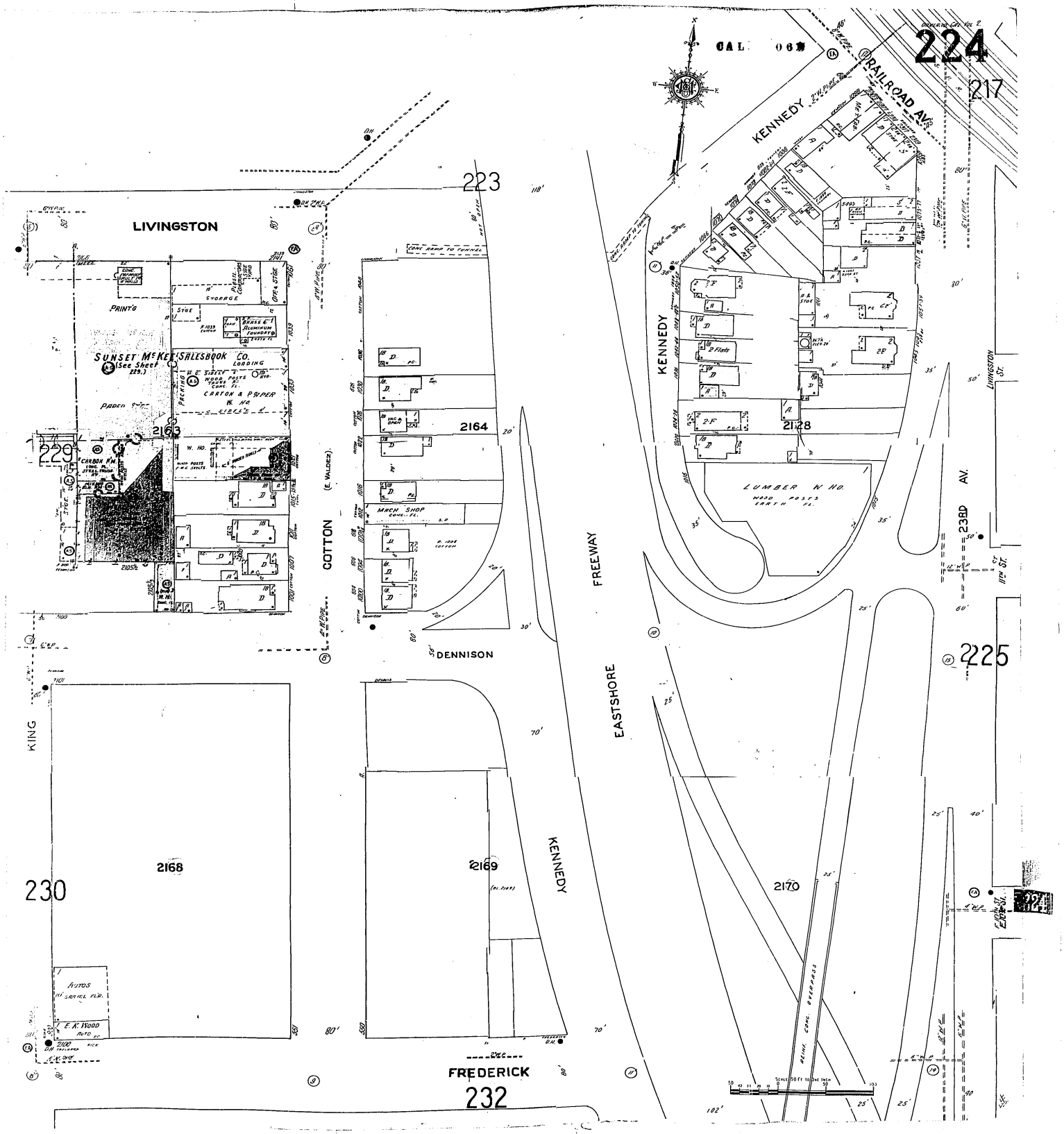

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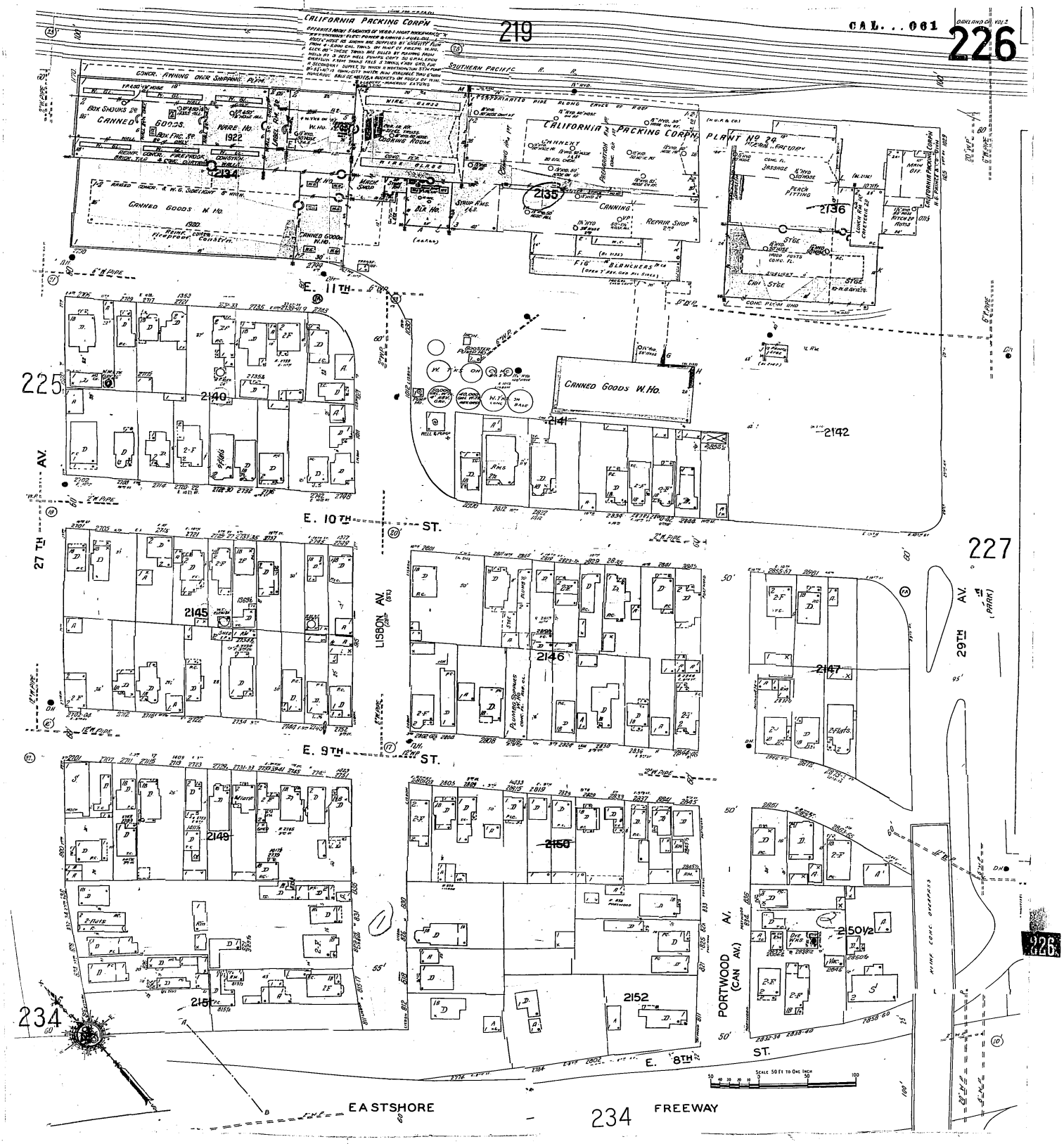

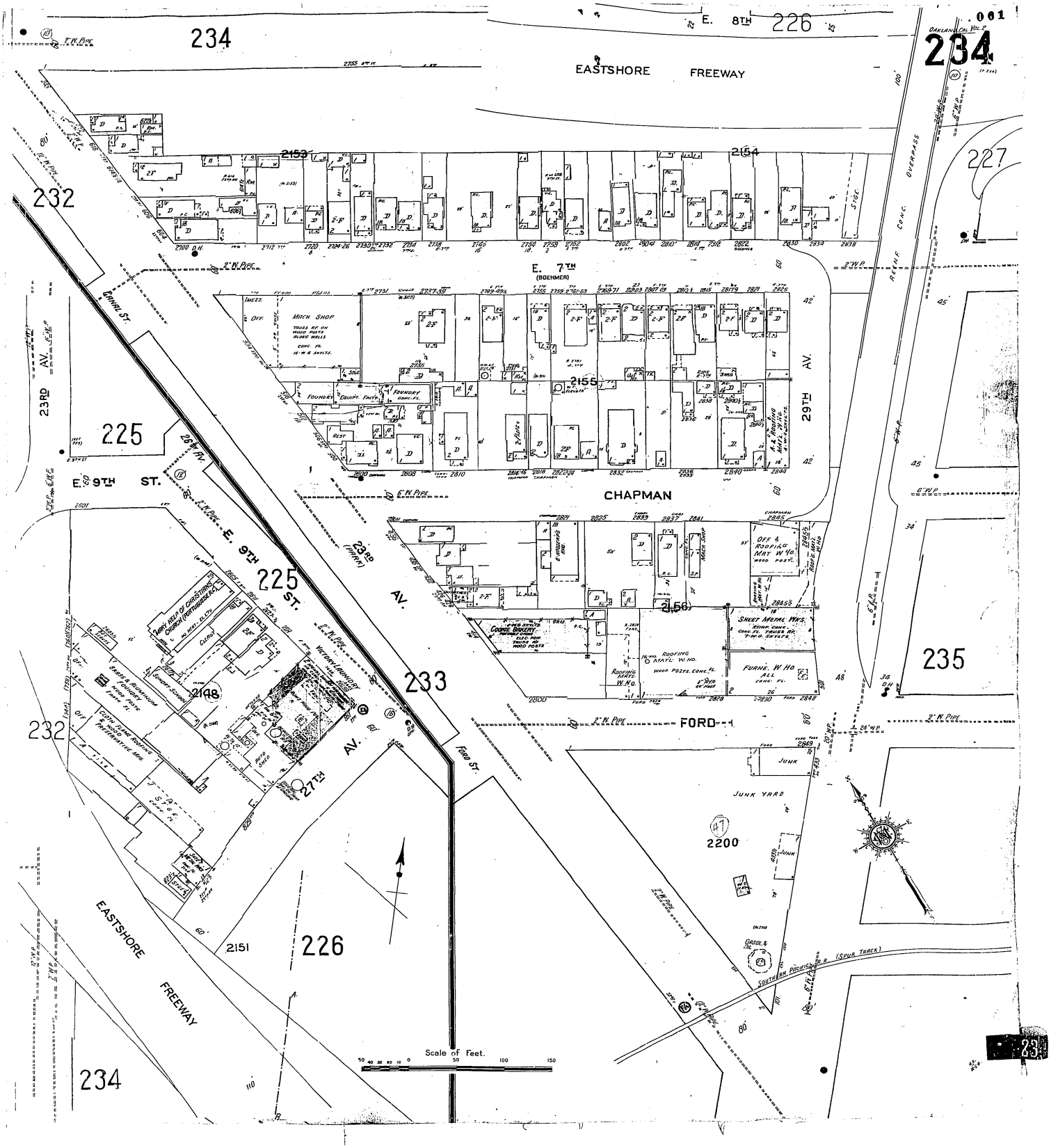

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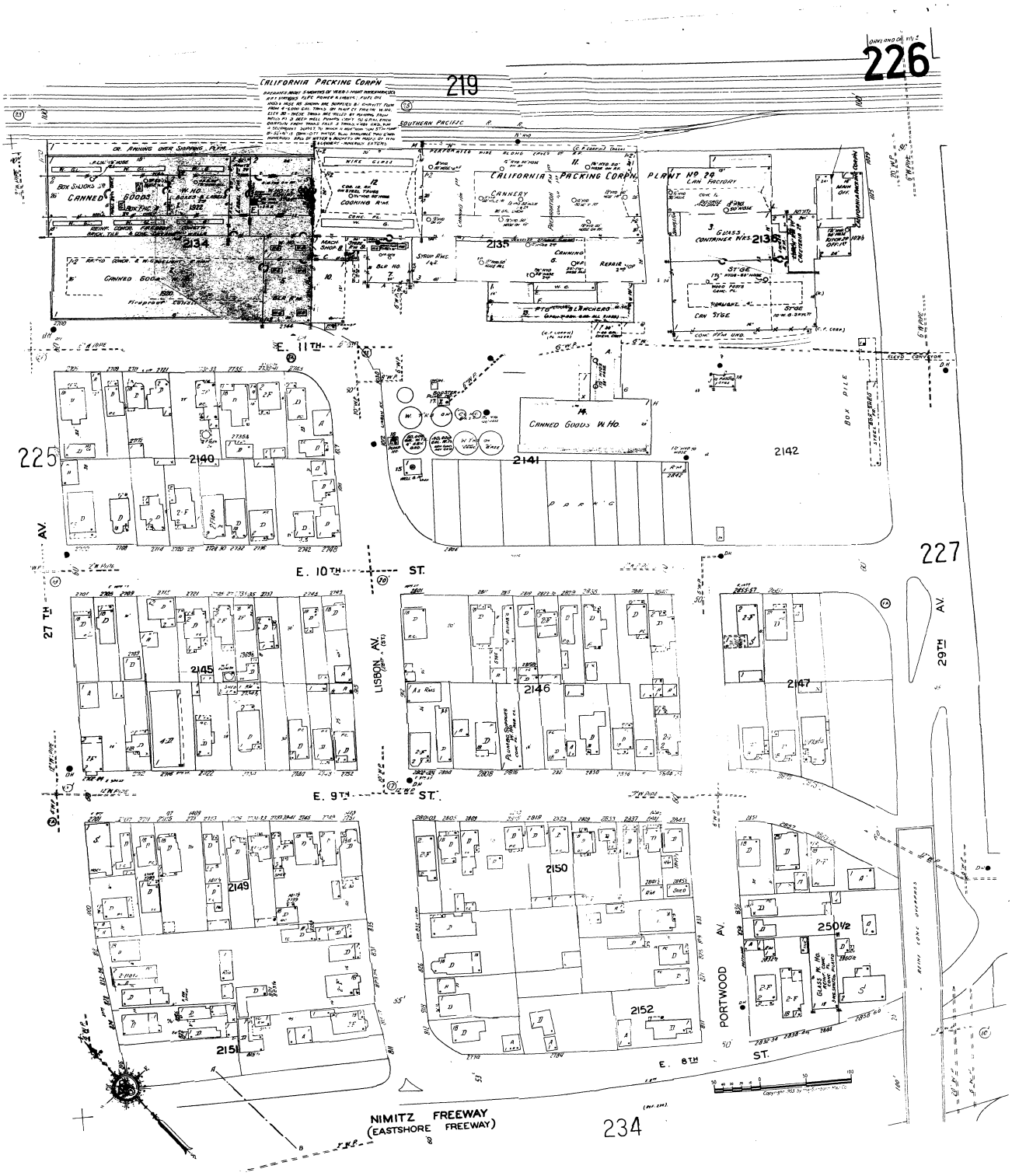

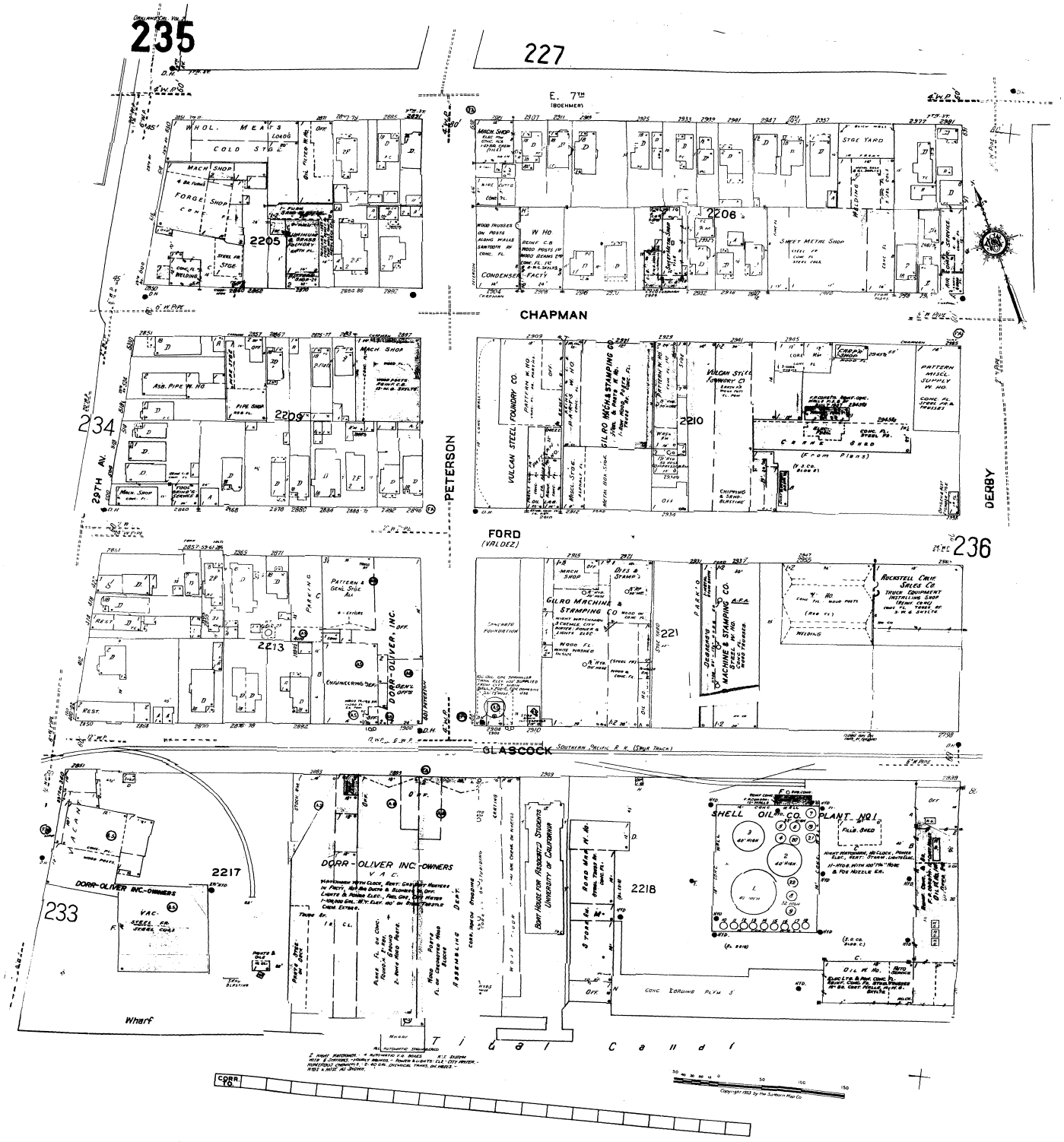

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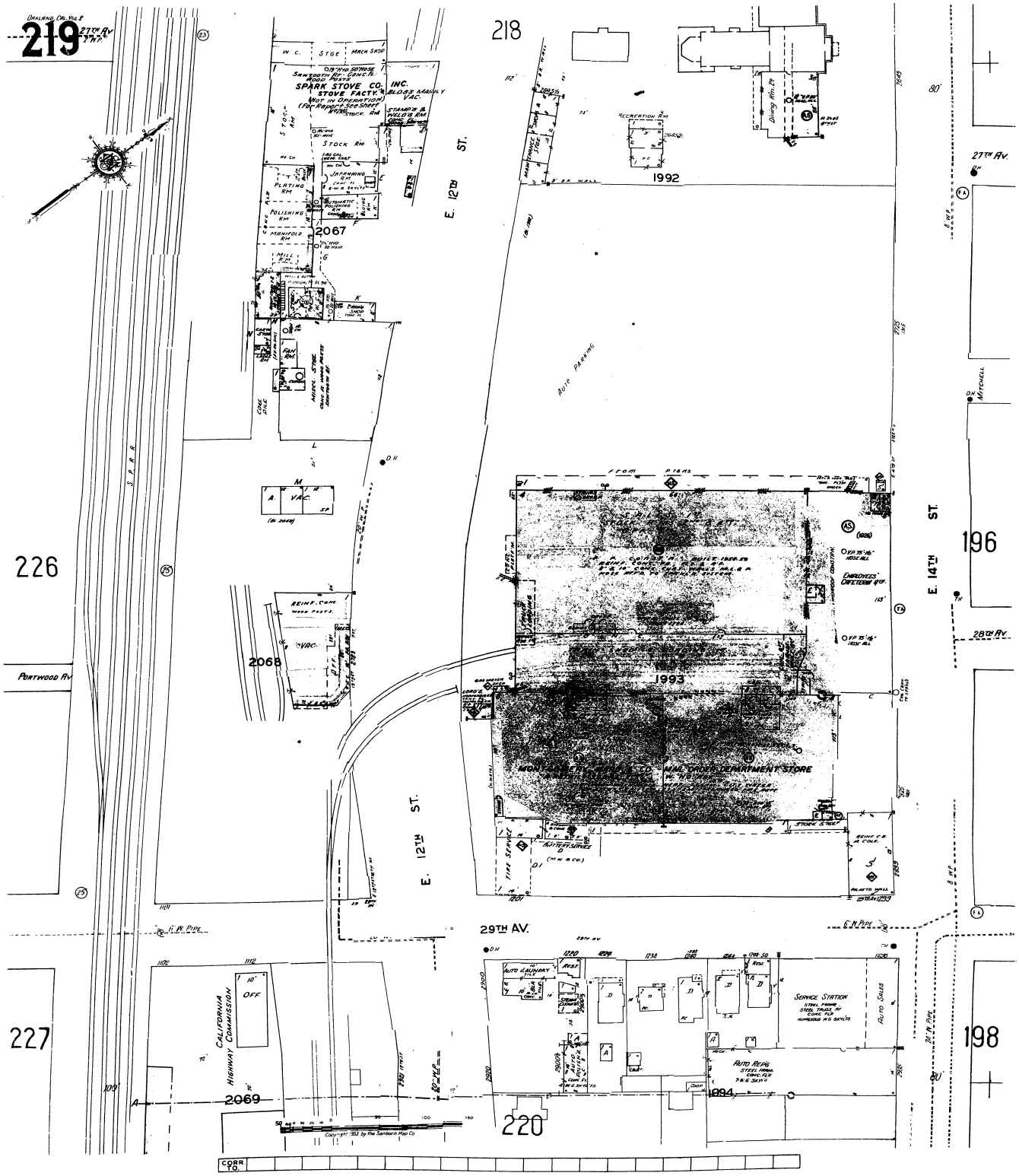

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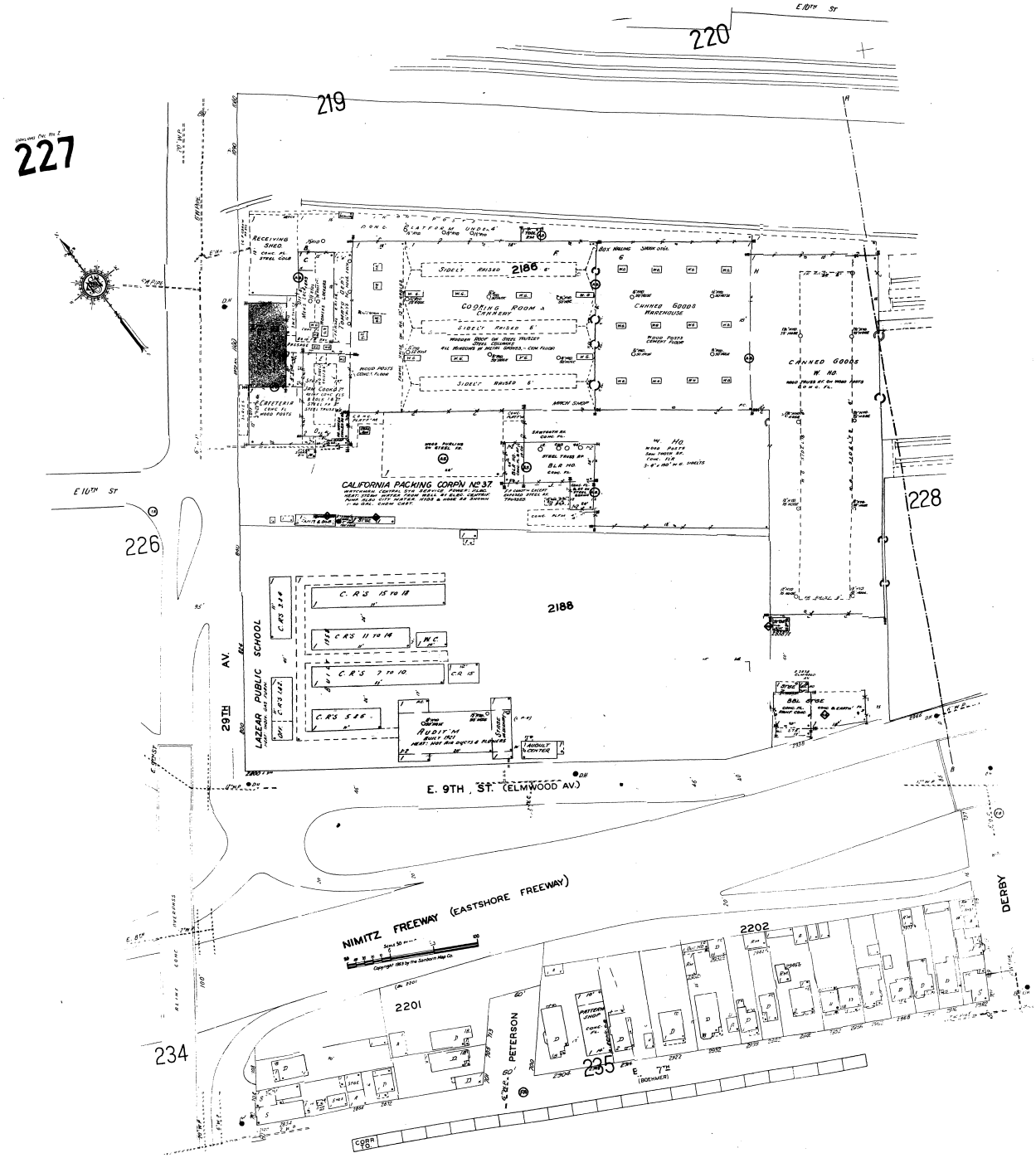

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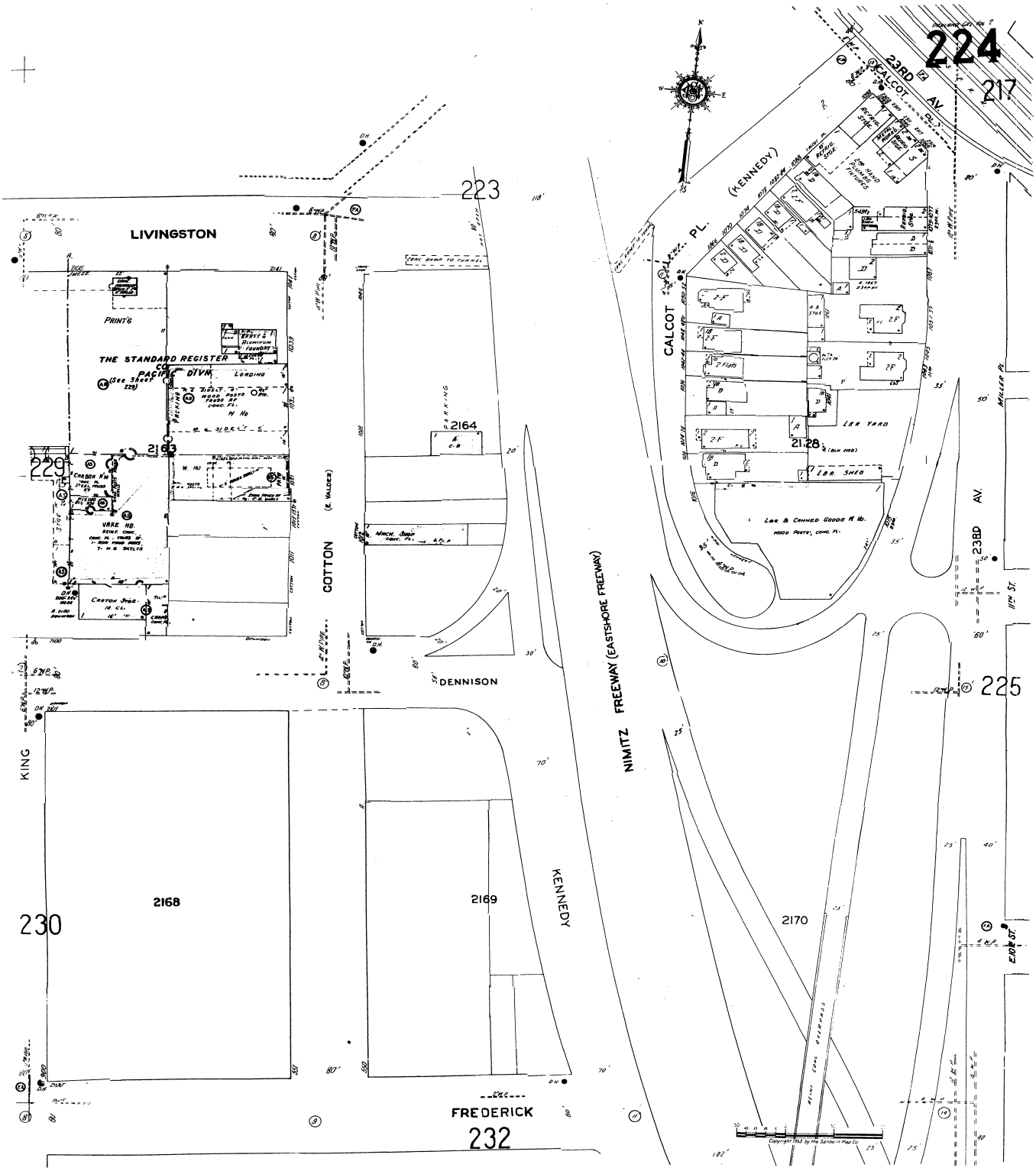

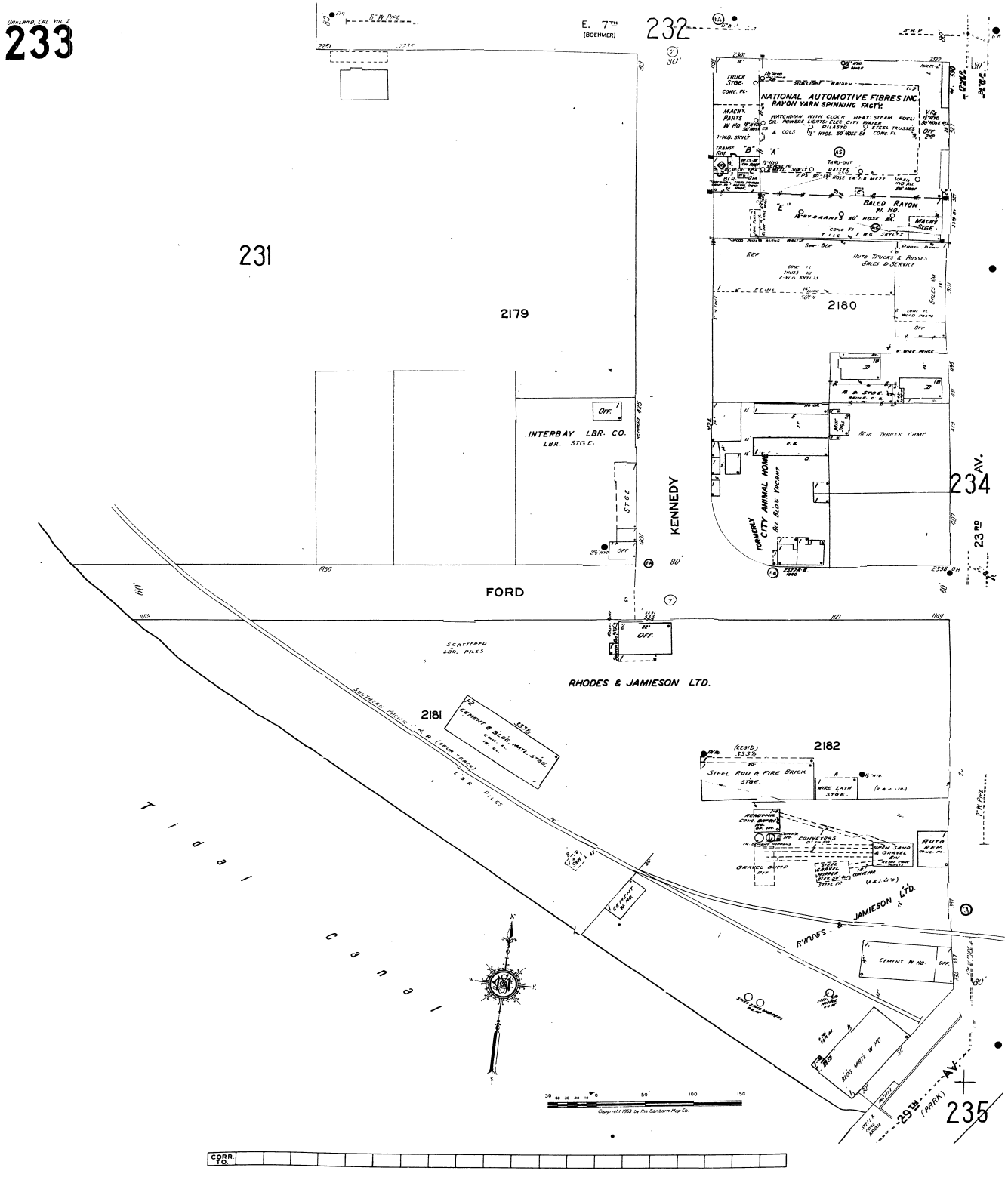

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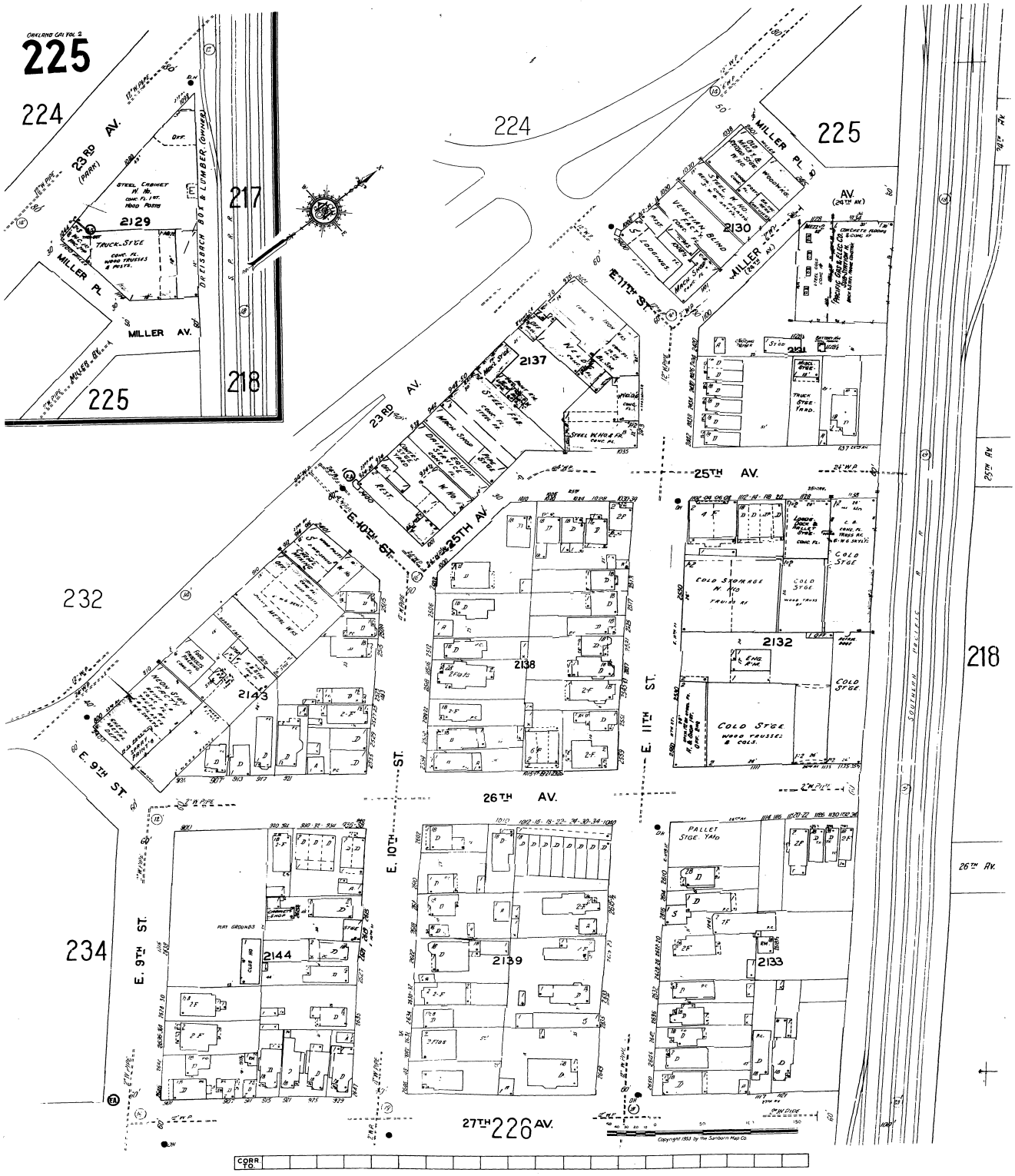

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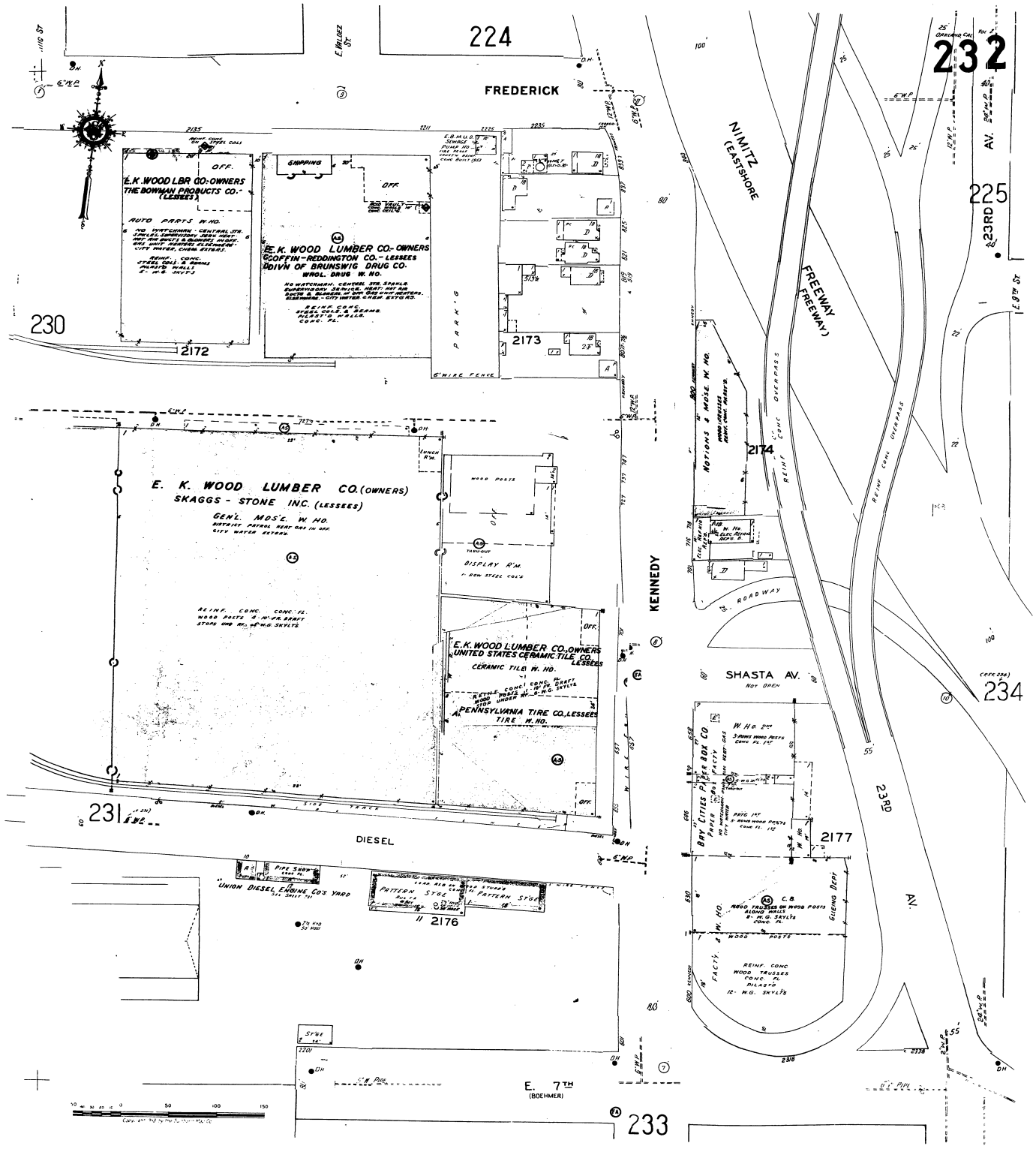

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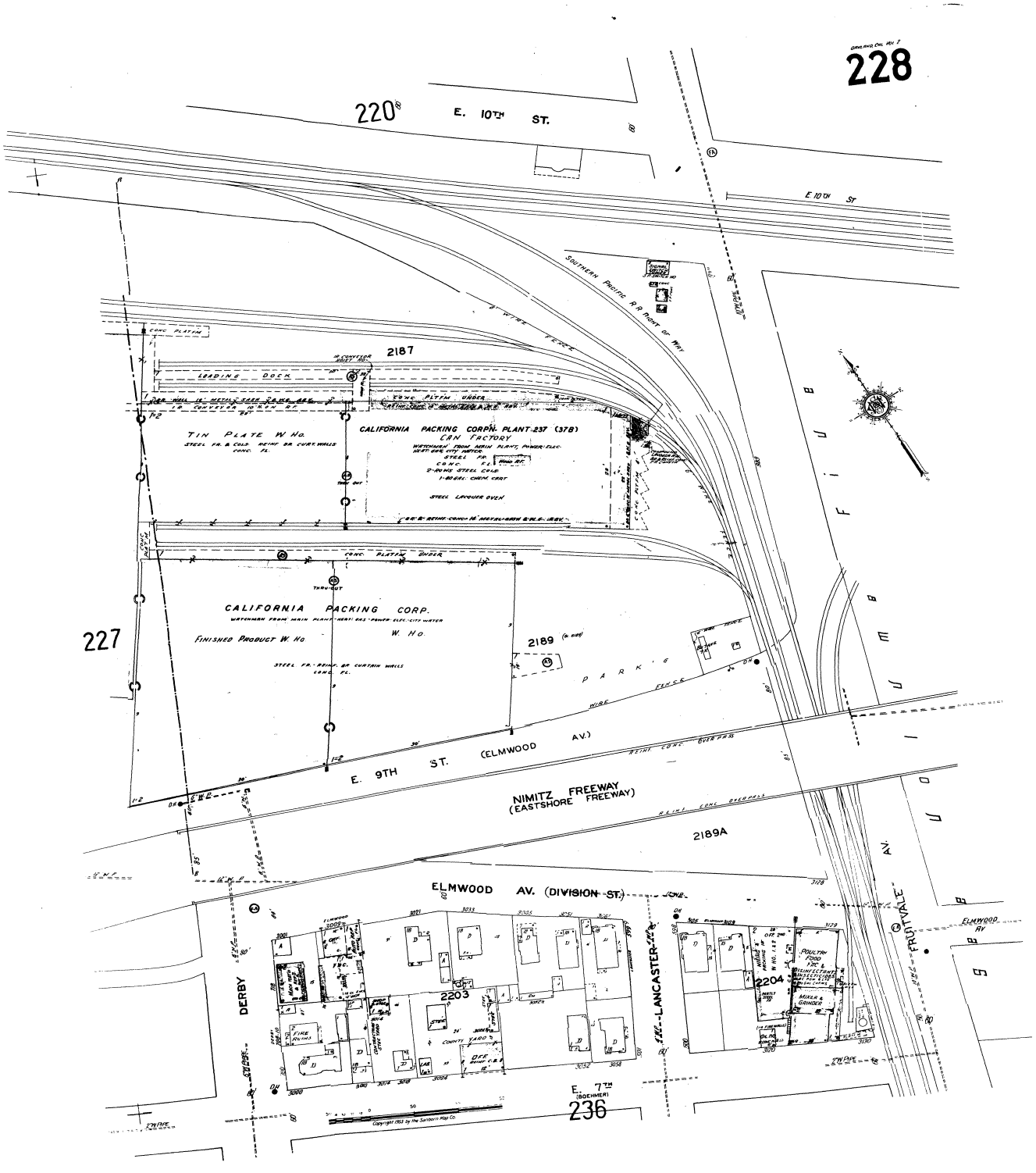

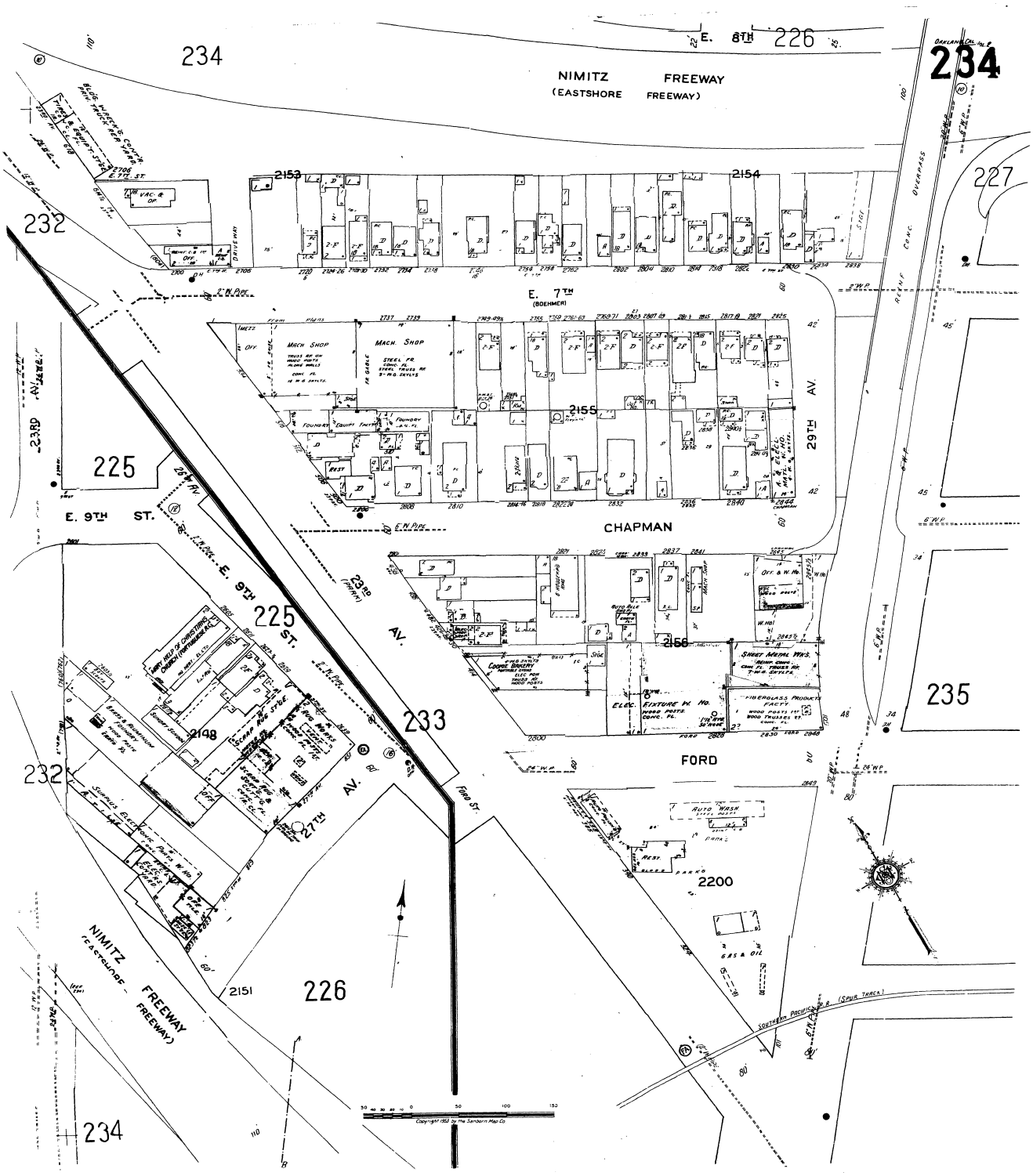

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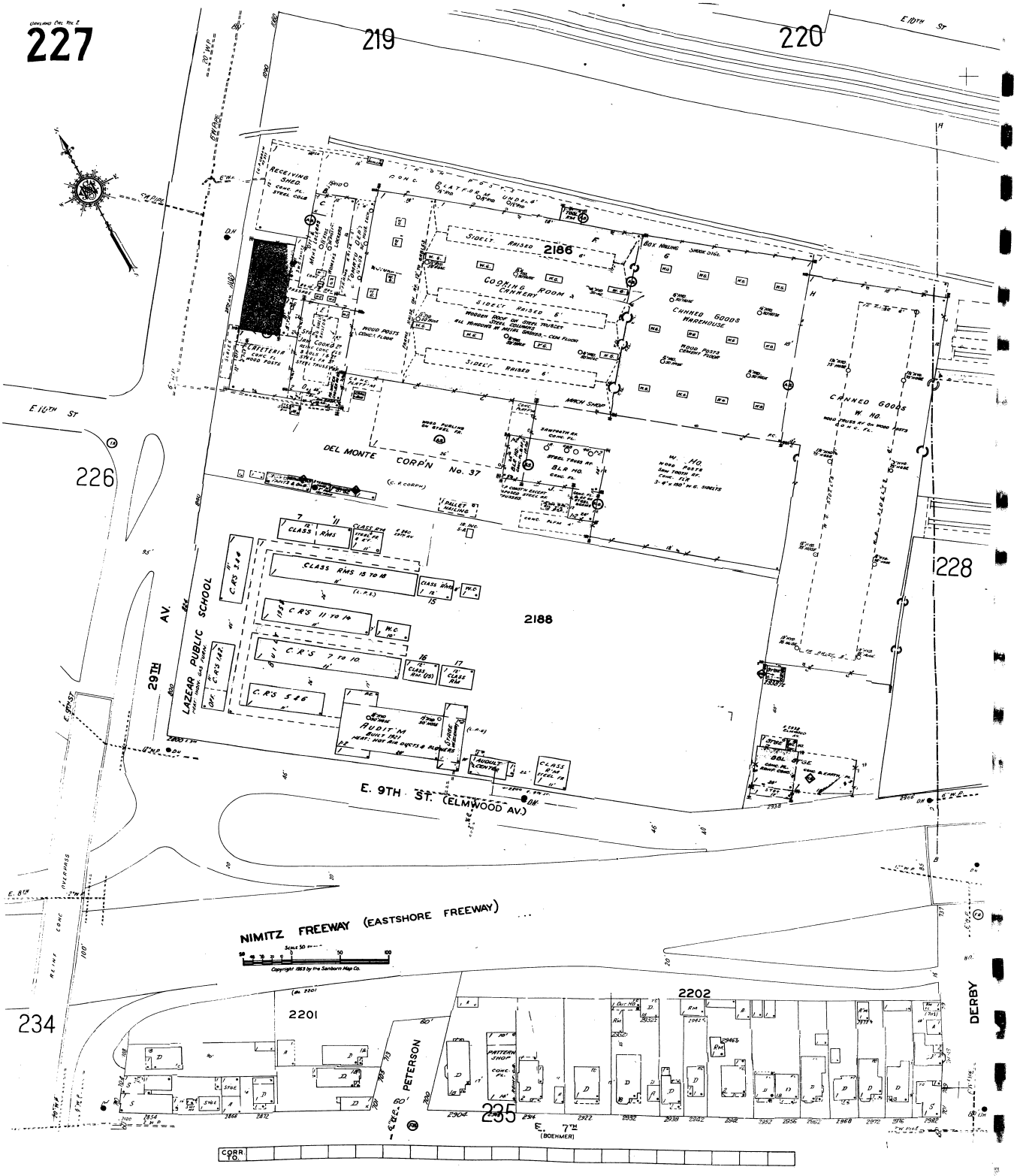

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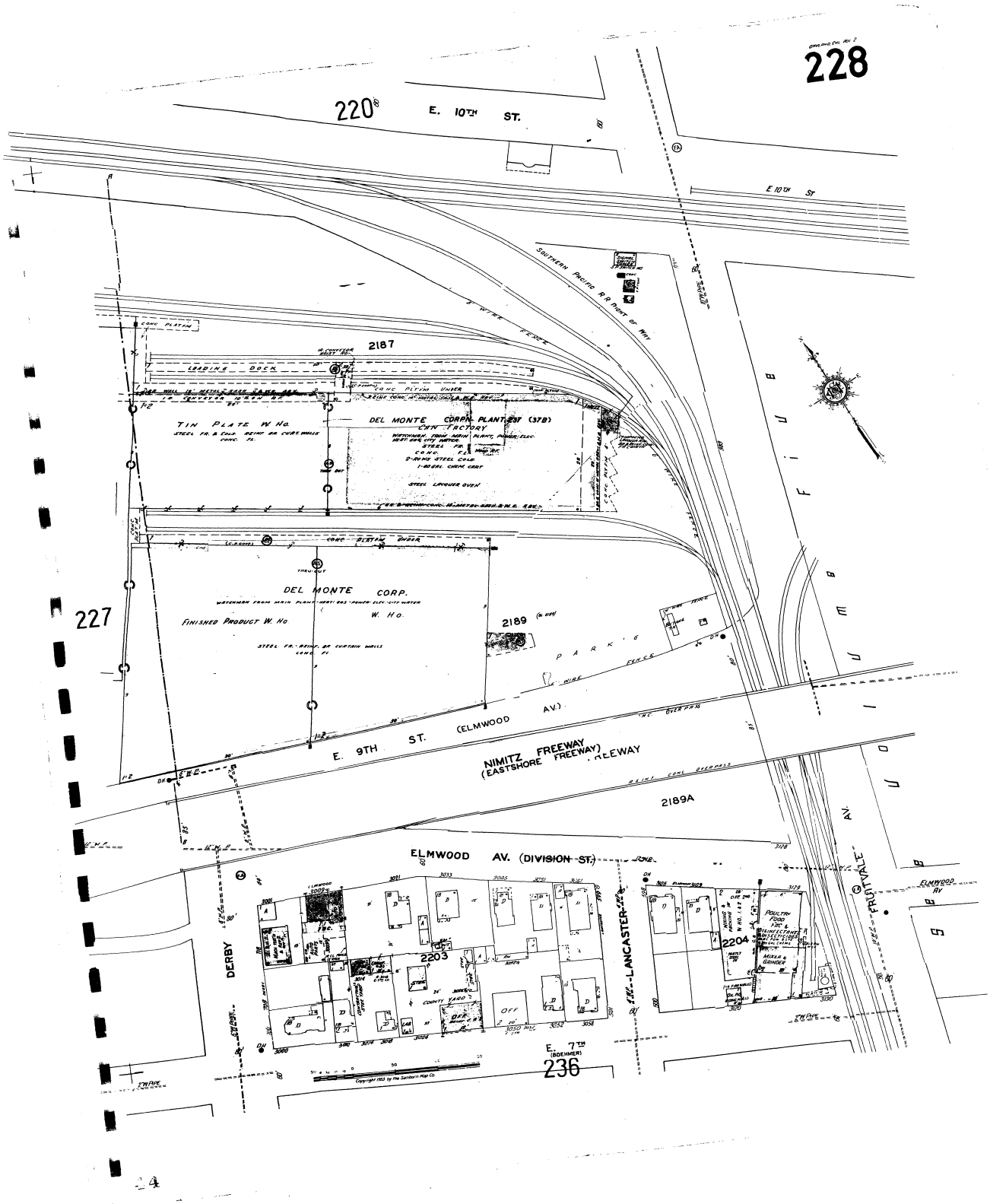

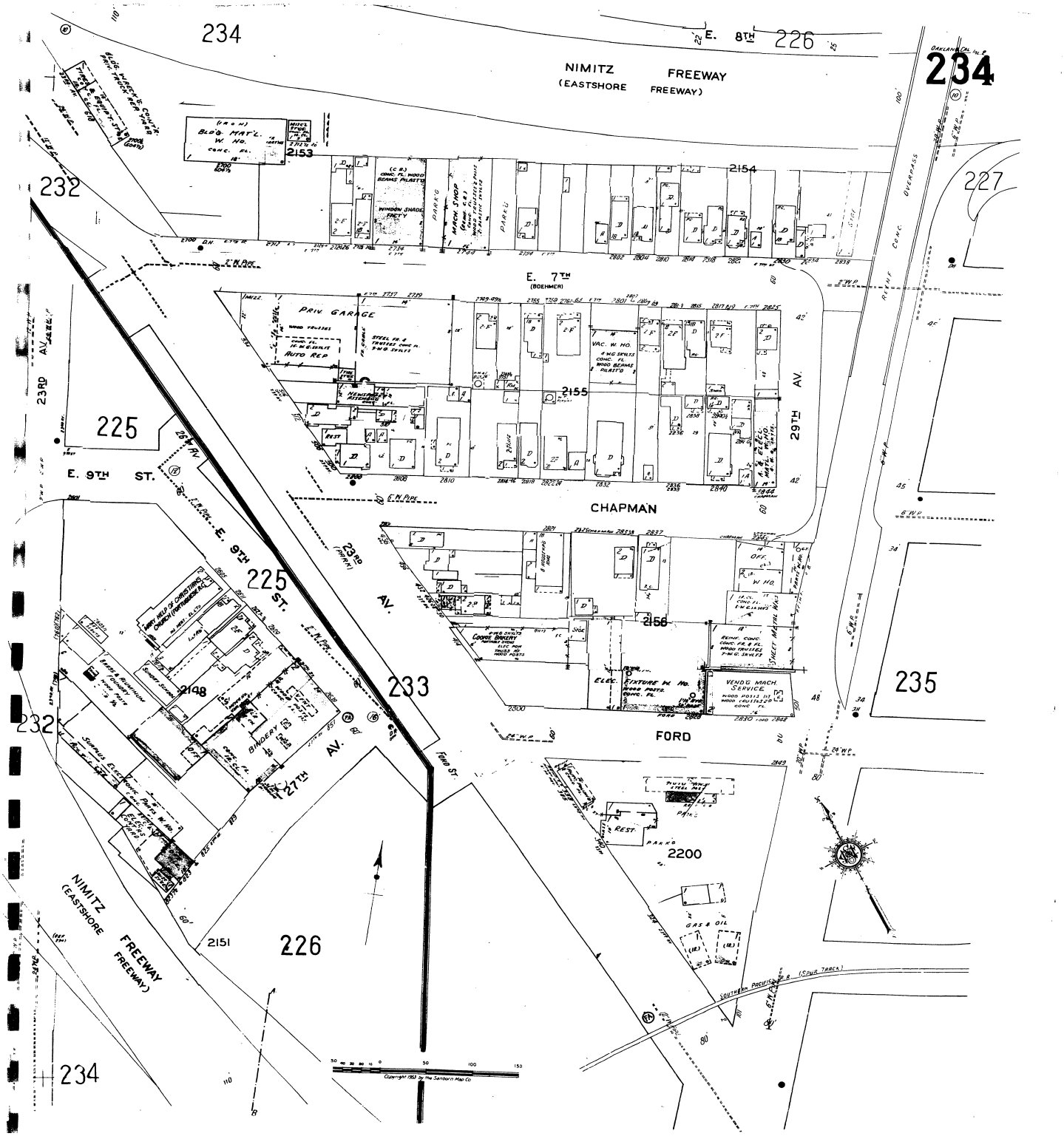

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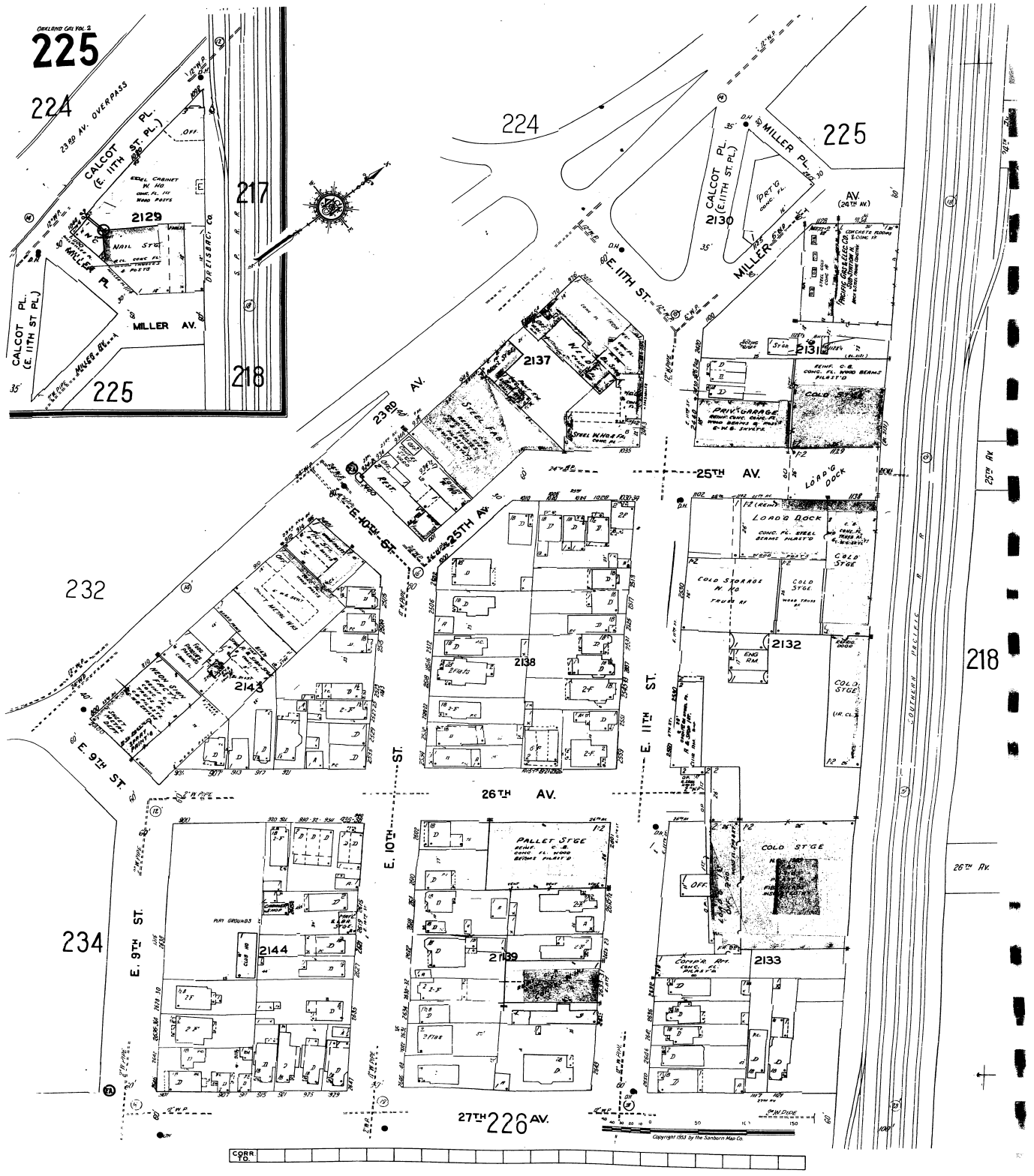

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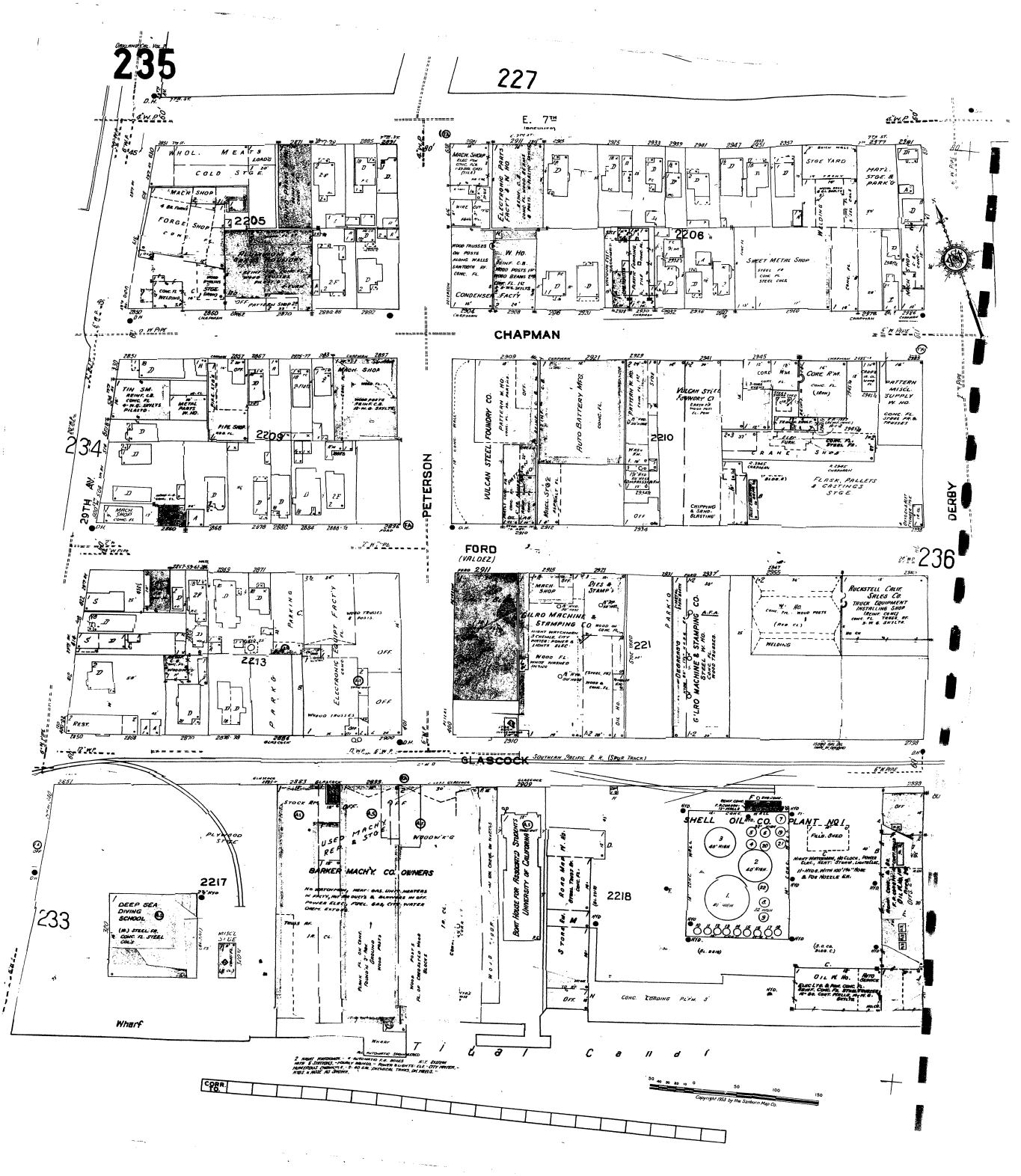

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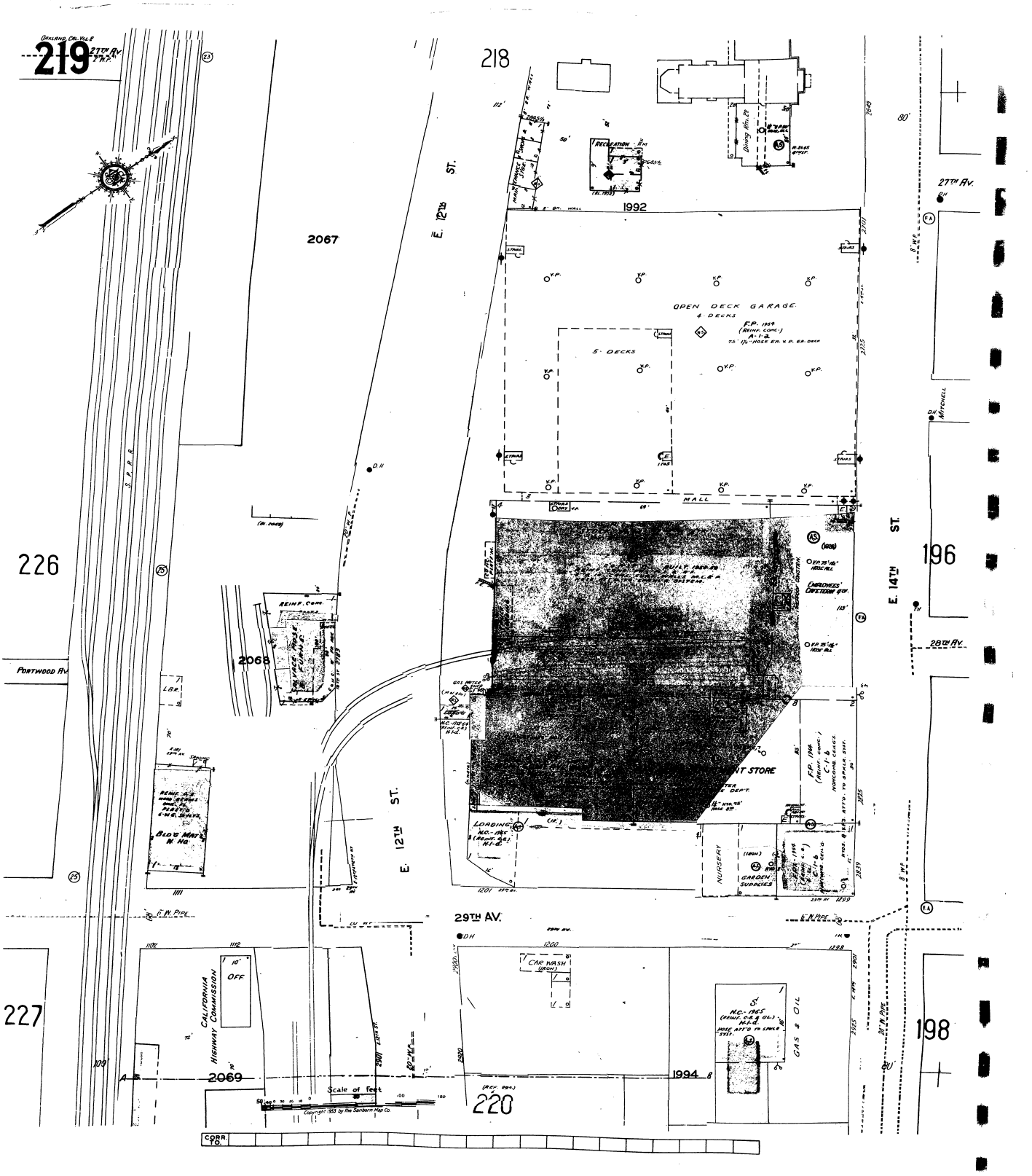

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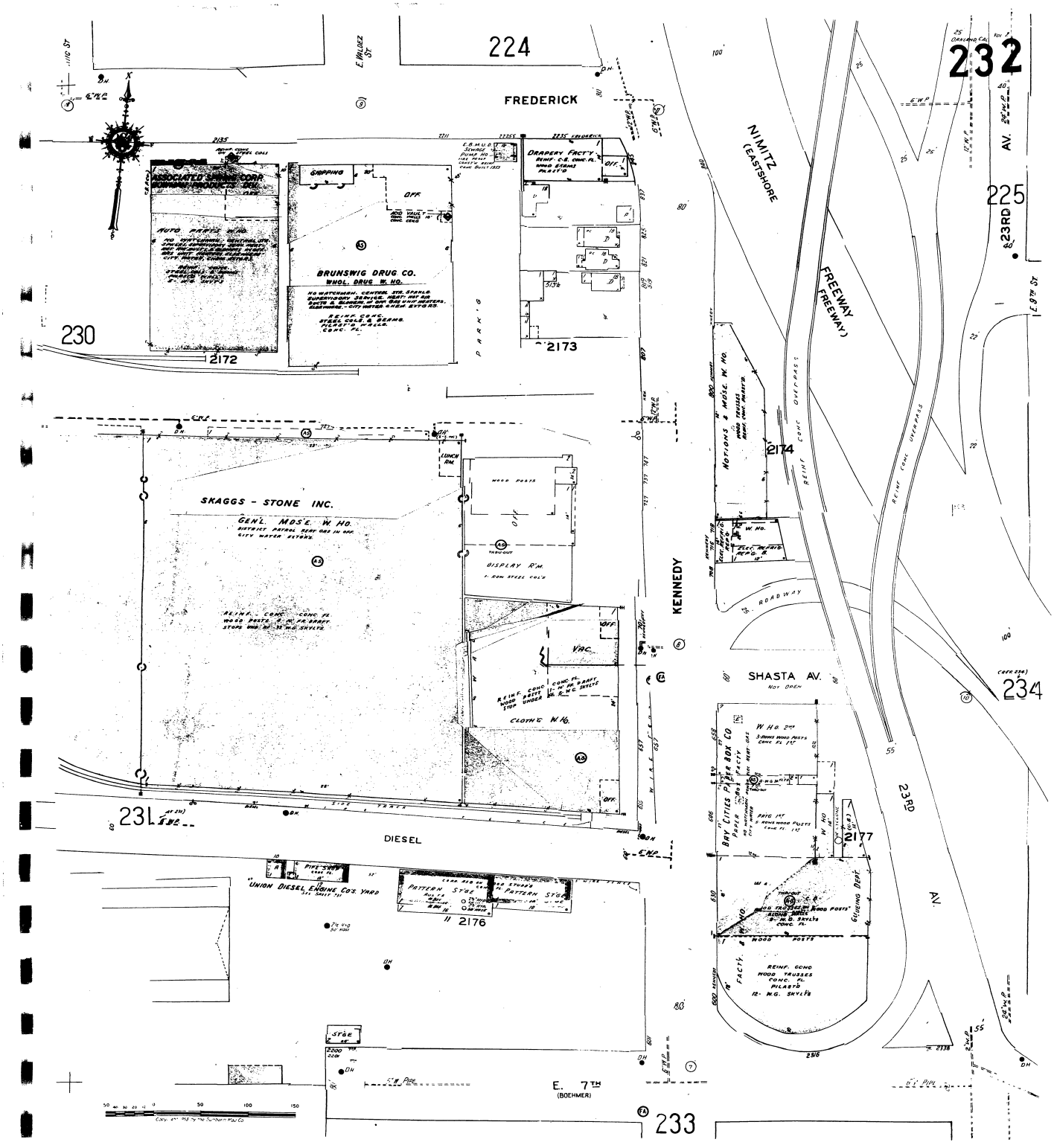

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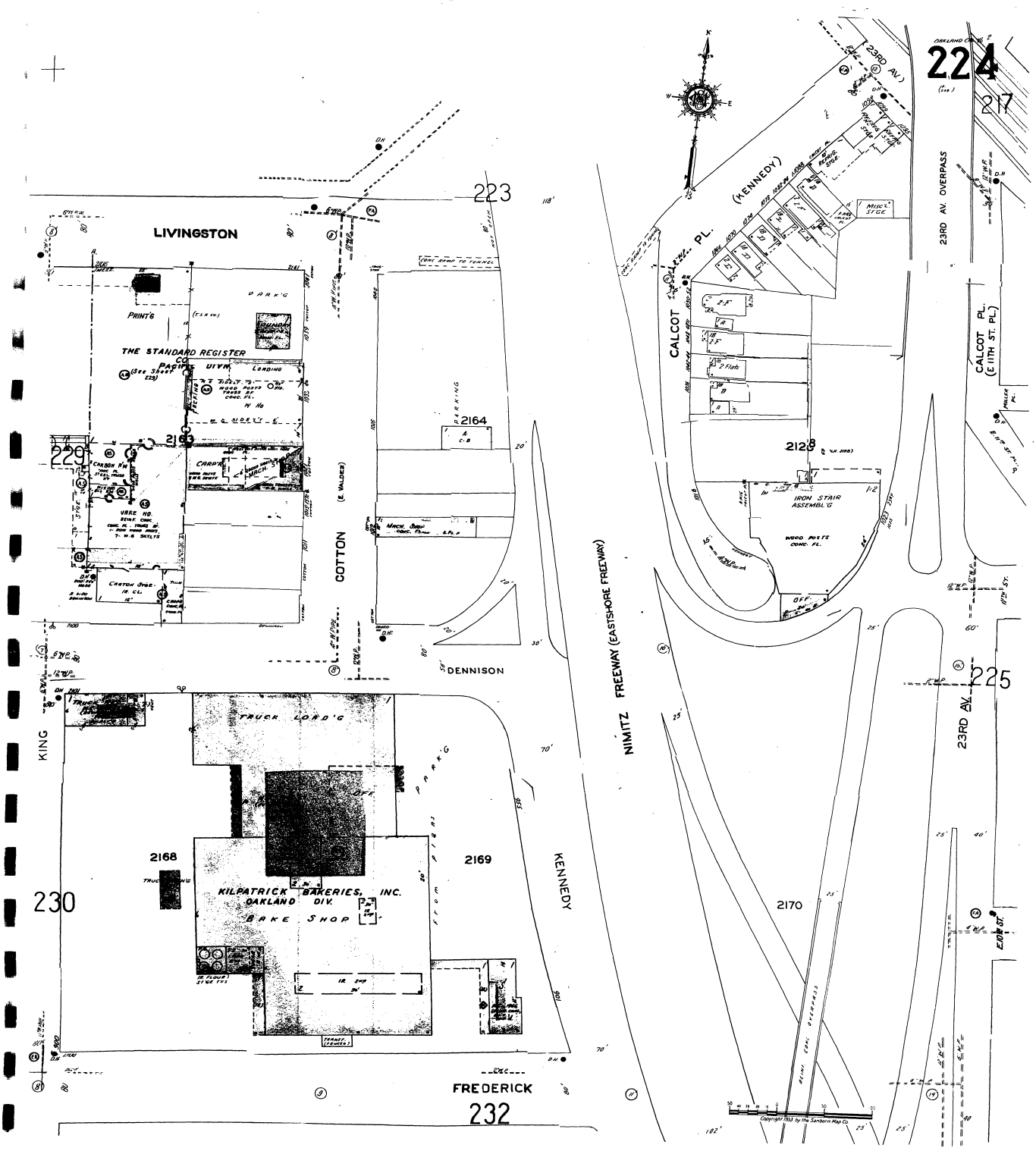

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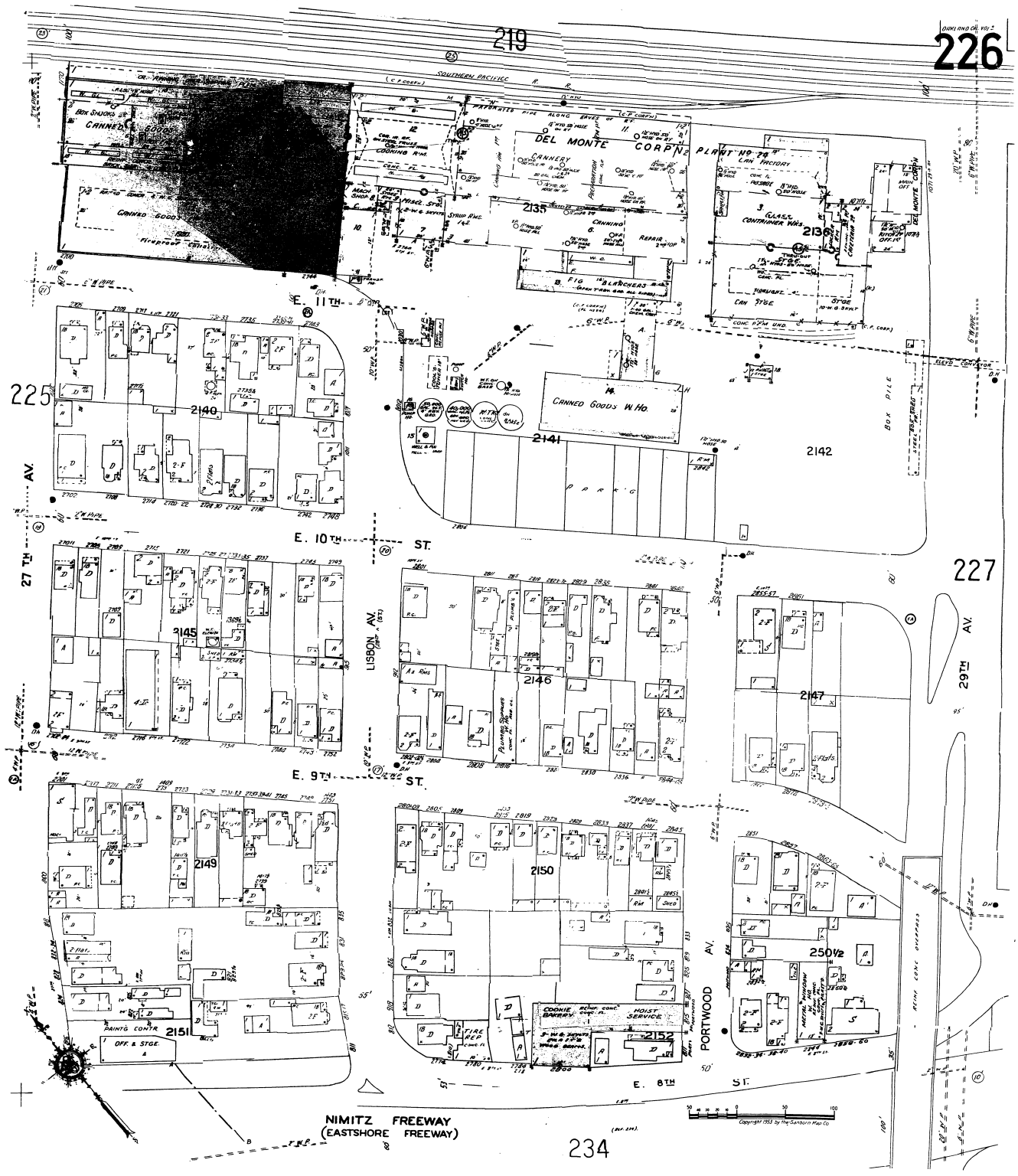

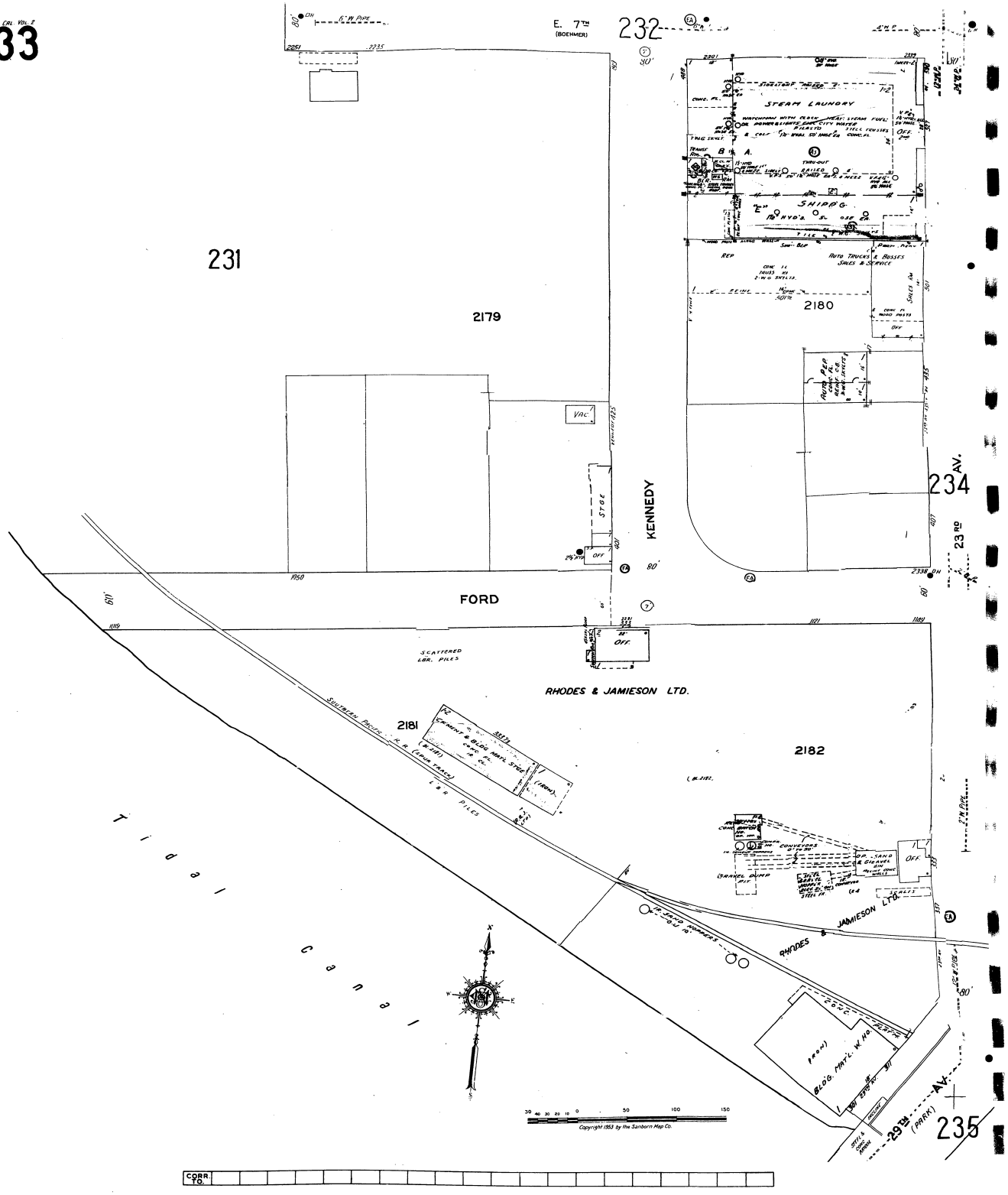

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Ninyo & Moore
1956 Webster Street
Oakland, CA 94612

Order Date: 8/4/2005 **Completion Date:** 8/5/2005
Inquiry #: 1481670.1S
P.O. #: na
Site Name: I-880 and 29th Ave ISA
Address: I-880 and 29th Ave ISA
City/State: Oakland, CA 94601
Cross Streets:

Customer Project: na
1033871VLA 510-633-5640

Based on client-supplied information, fire insurance maps for the following years were identified

1903 - 1 Map
1911 - 2 Maps
1950 - 2 Maps
1952 - 2 Maps
1957 - 2 Maps
1960 - 2 Maps
1965 - 2 Maps
1969 - 2 Maps

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USER'S GUIDE

This User's Guide provides guidelines for accessing Sanborn Map® images and for transferring them to your Word Processor.

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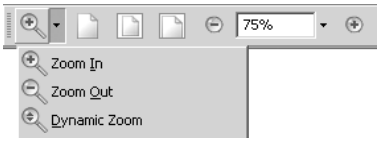
- Sanborn Maps document historical property use by displaying property information through words, abbreviations, and map symbols. The Sanborn Map Key provides information to help interpret the symbols and abbreviations used on Sanborn Maps. The Key is available from EDR's Web Site at: http://www.edrnet.com/reports/samples/key.pdf

Organization of Electronic Sanborn Image File

- Sanborn Map Report, listing years of coverage
- User's Guide
- Oldest Sanborn Map Image
- Most recent Sanborn Map Image

Navigating the Electronic Sanborn Image File

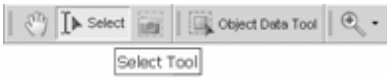


1. Open file on screen.
2. Identify TP (Target Property) on the most recent map.
3. Find TP on older printed images.
4. Using Acrobat® Reader®, zoom to 250% in order to view more clearly. (200-250% is the approximate equivalent scale of hardcopy Sanborn Maps.)
   A. On the menu bar, click "View" and then "Zoom to..."
   B. Or, use the magnifying tool and drag a box around the TP

Printing a Sanborn Map From the Electonic File

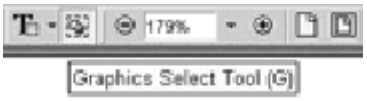
- EDR recommends printing images at 300 dpi (300 dpi prints faster than 600 dpi)
- To print only the TP area, cut and paste from Acrobat to your word processor application.

Acrobat Versions 6 and 7



1. Go to the menu bar
2. Click the "Select Tool"
3. Draw a box around the area selected
4. "Right click" on your mouse
5. Select "Copy Image to Clipboard"
6. Go to Word Processor such as Microsoft Word, paste and print.

Acrobat Version 5



1. Go to the menu bar
2. Click the "Graphics Select Tool"
3. Draw a box around the area selected
4. Go to "Menu"
5. Highlight "Edit"
6. Highlight "Copy"
7. Go to Word Processor such as Microsoft Word, paste and print.

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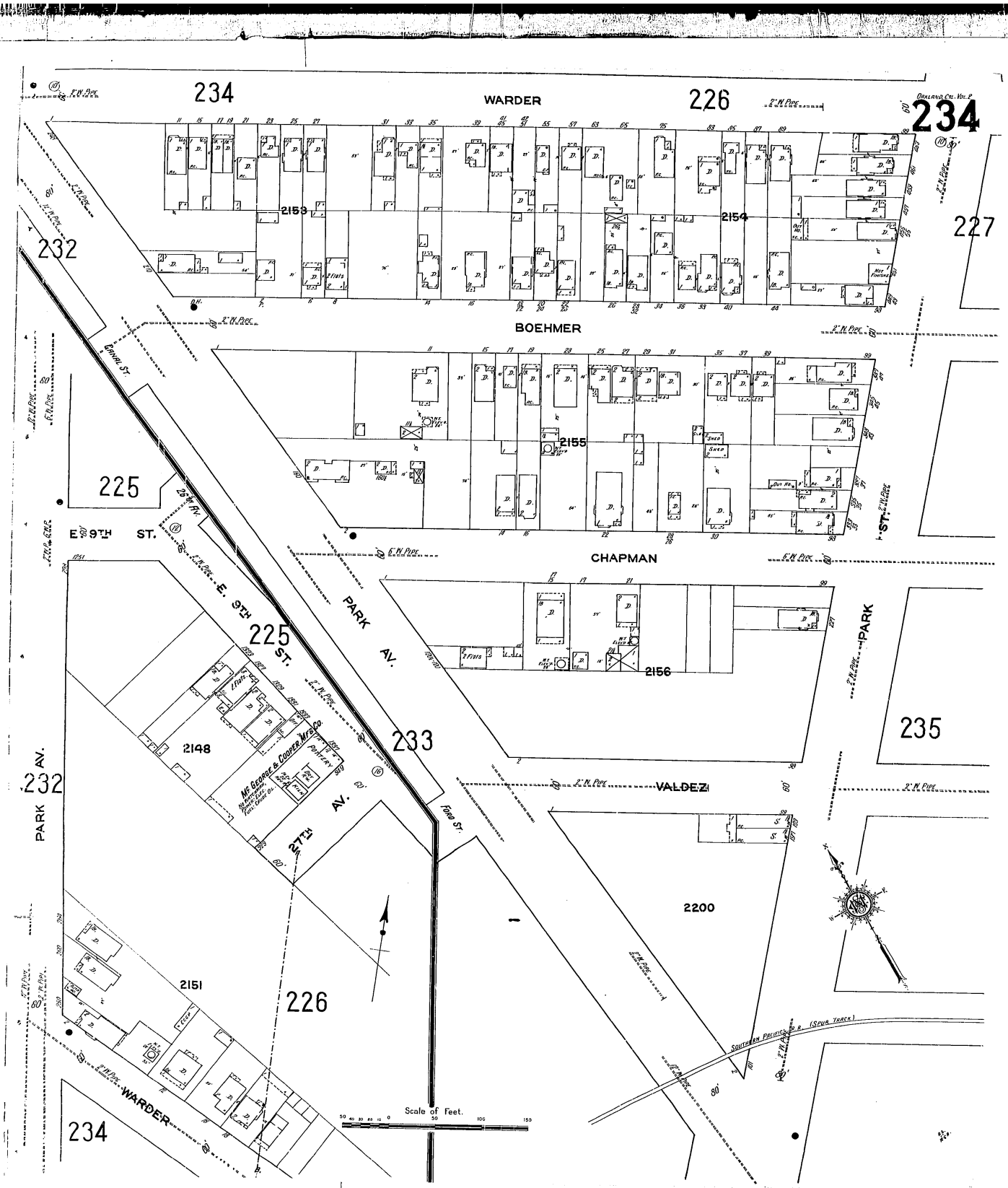

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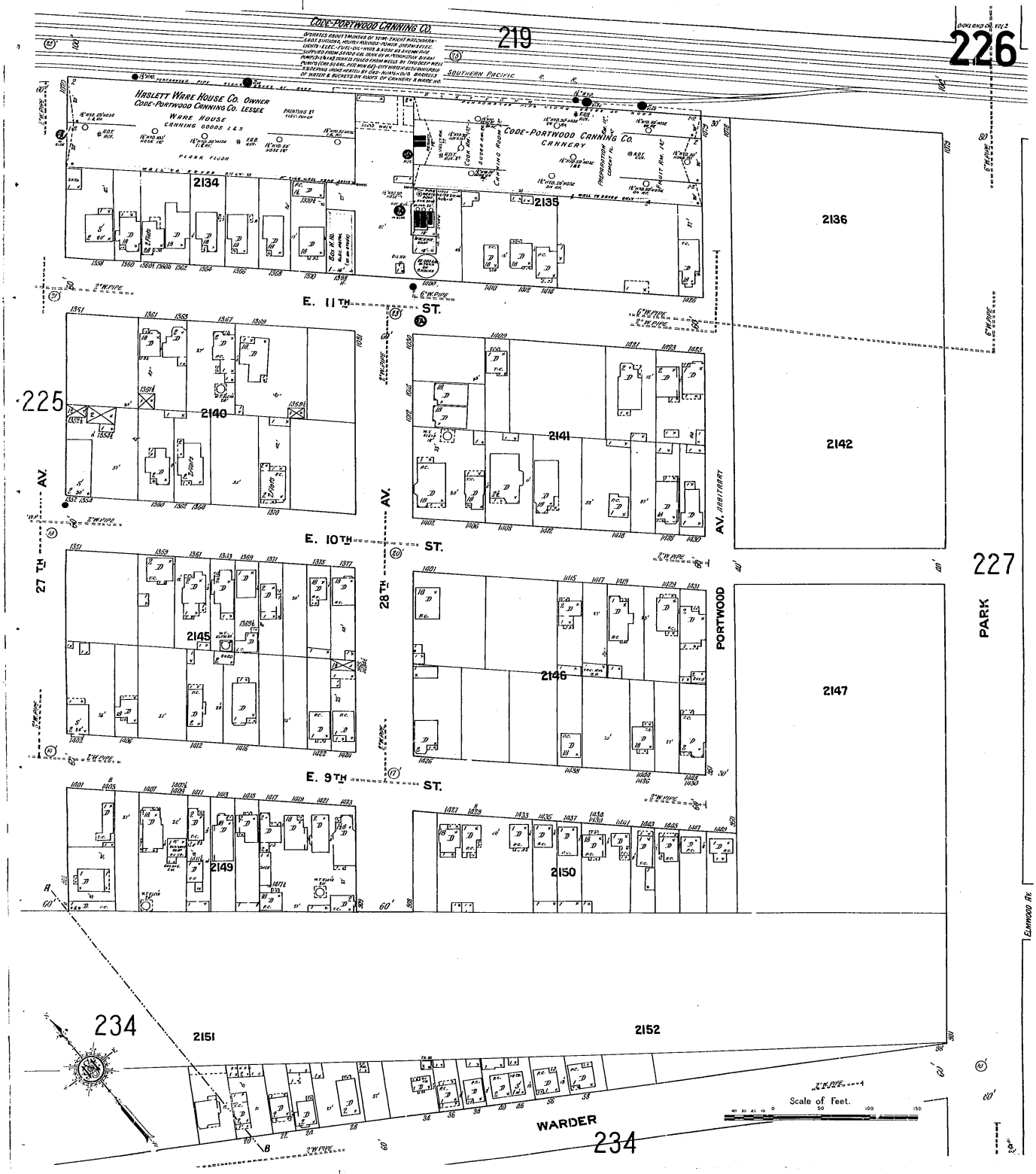

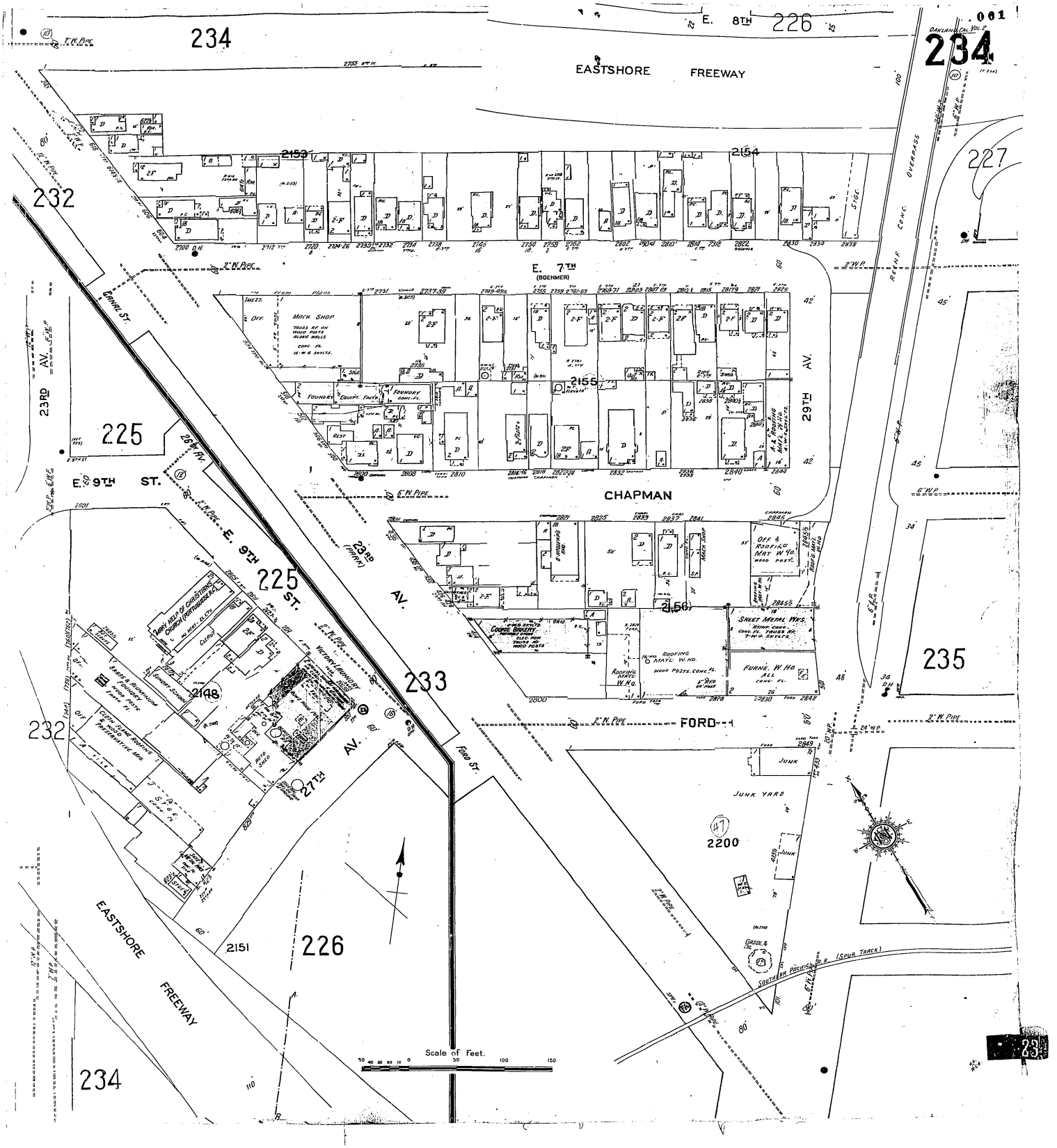

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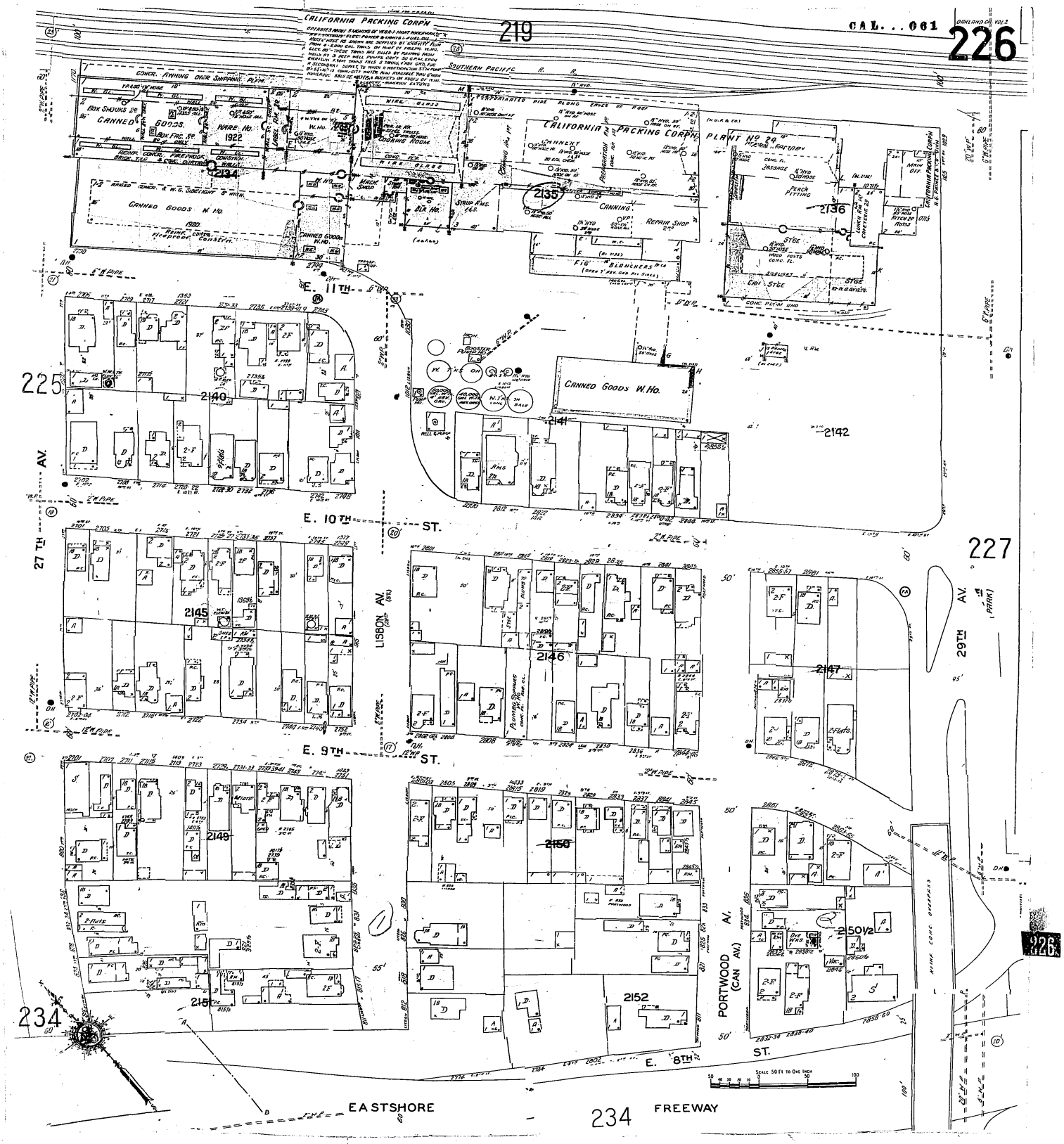

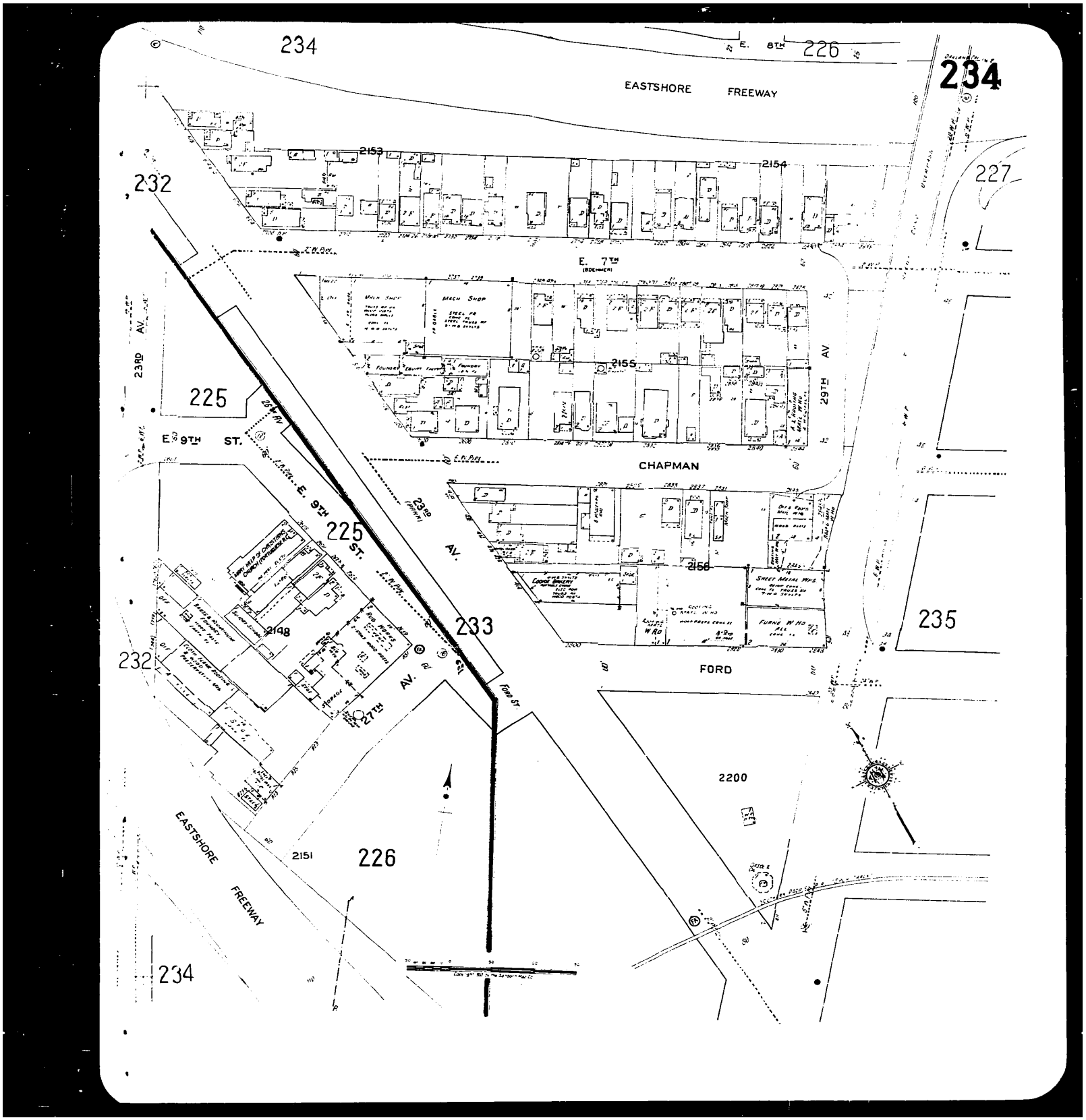

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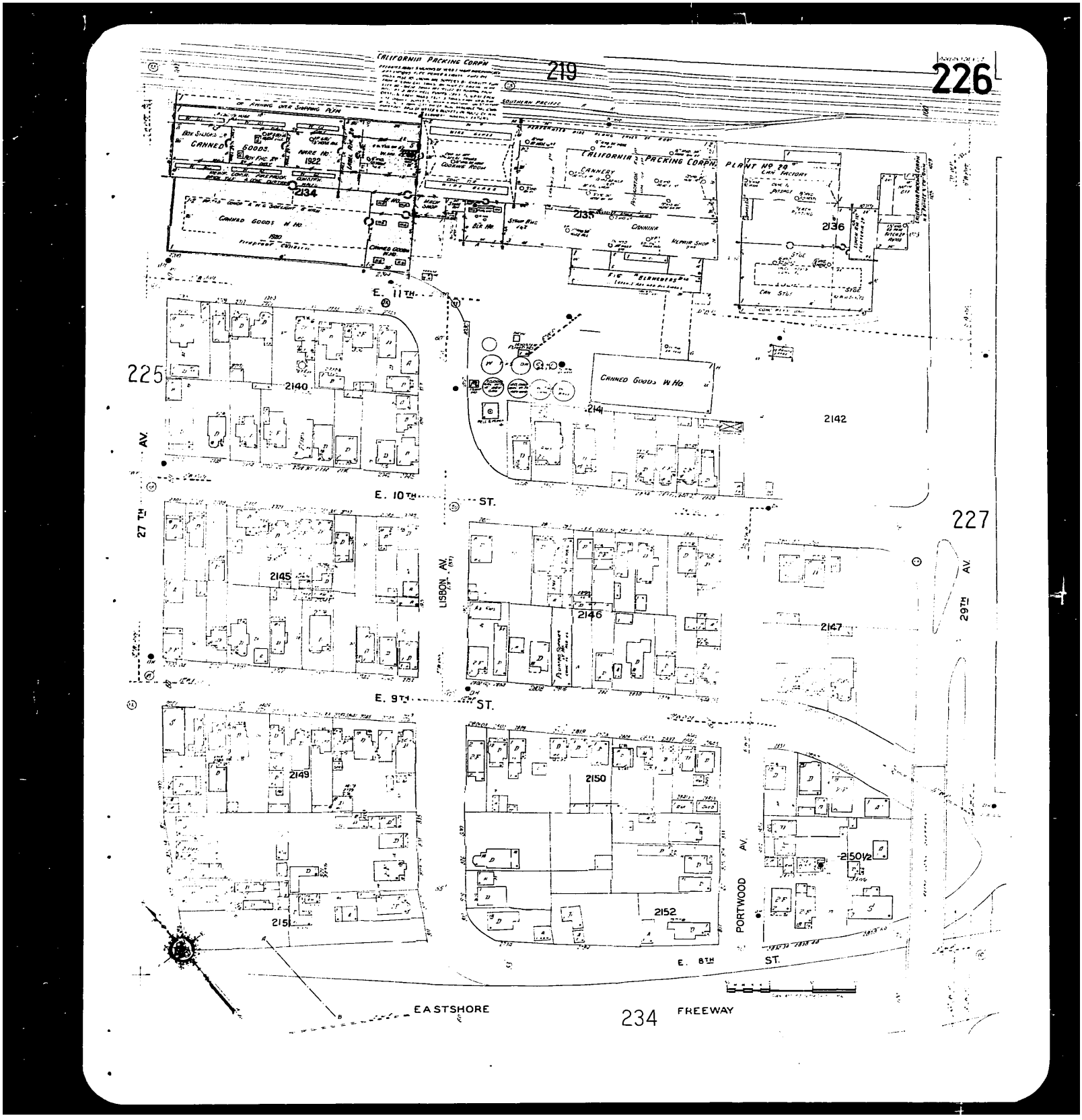

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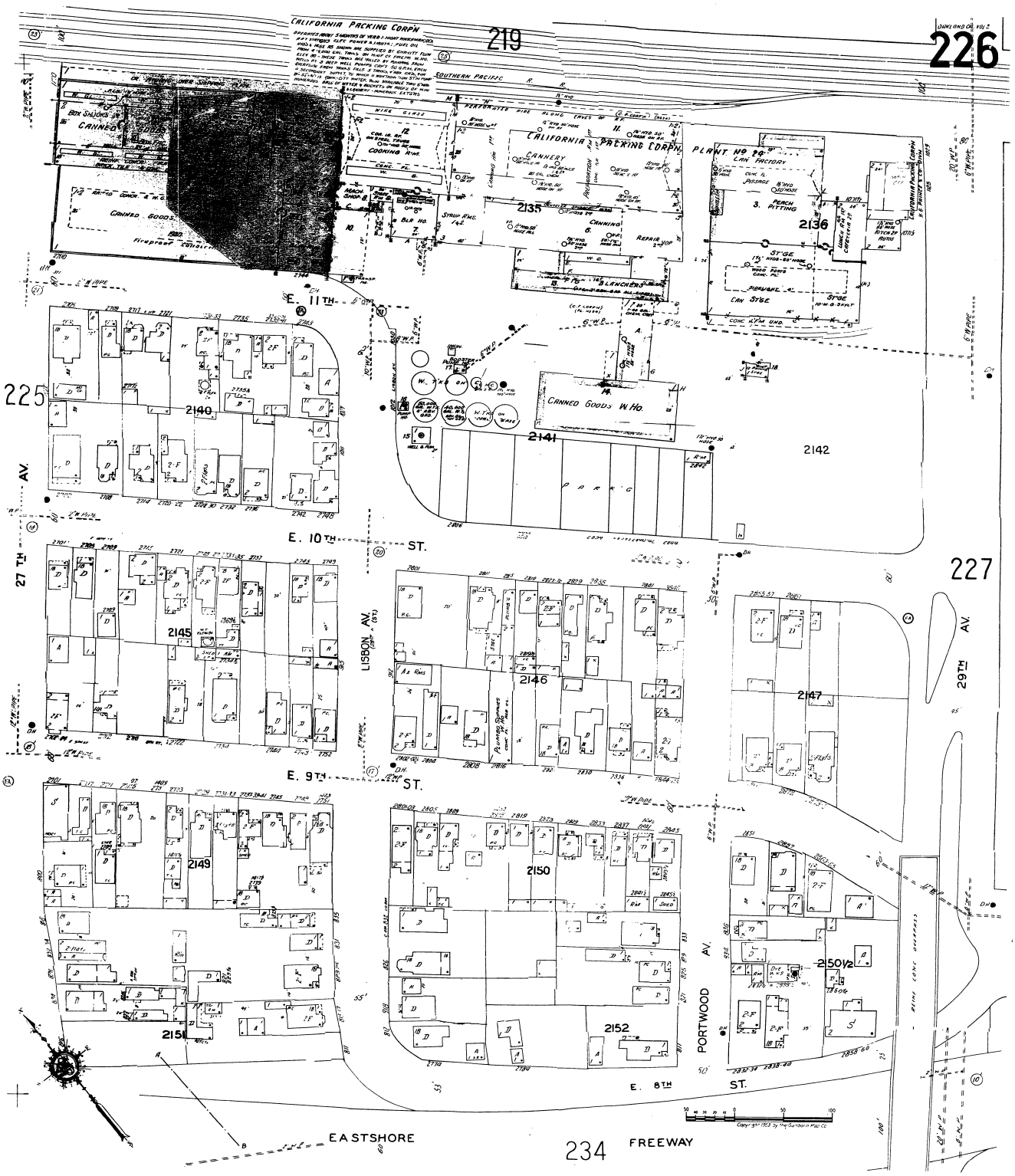

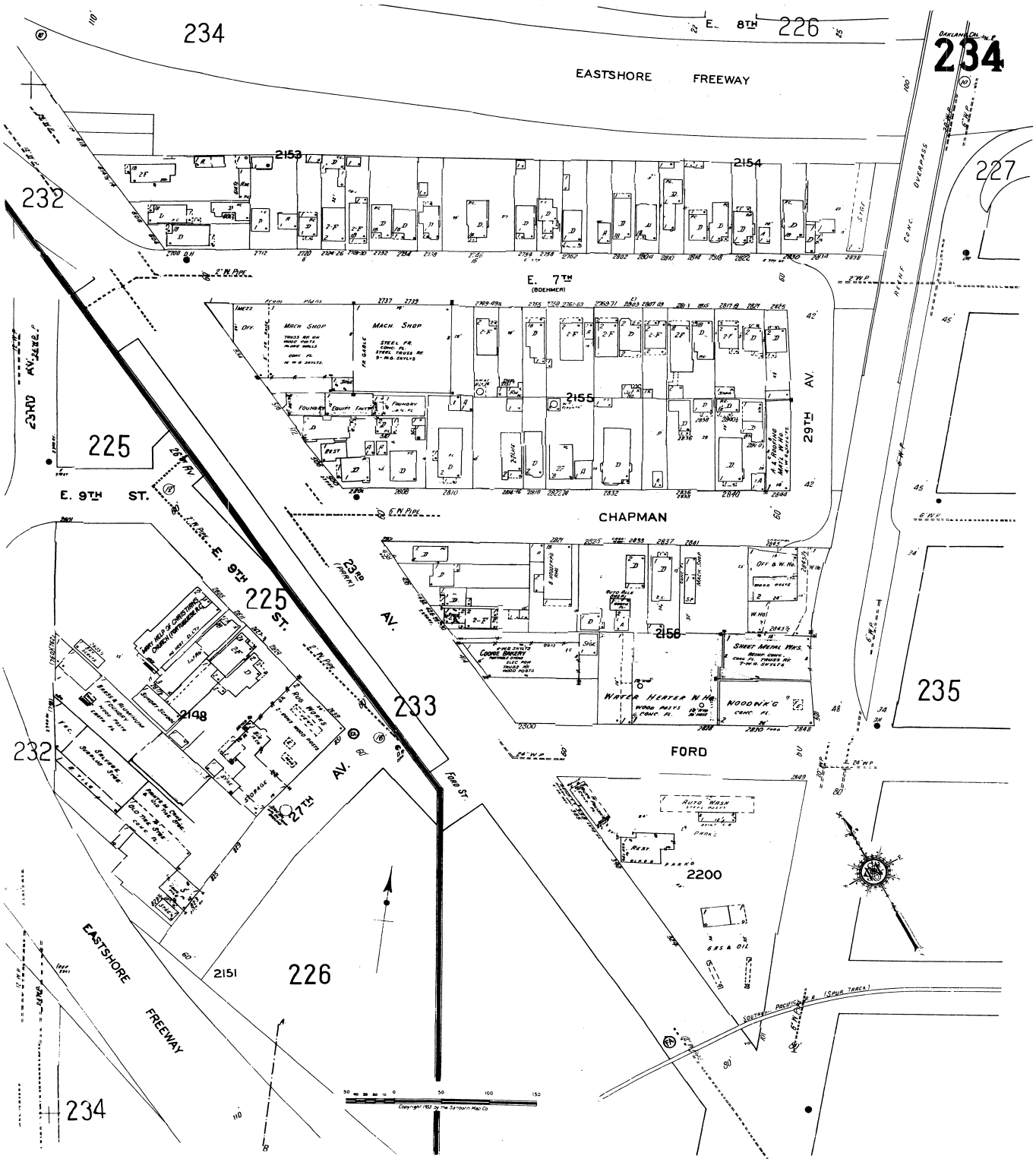

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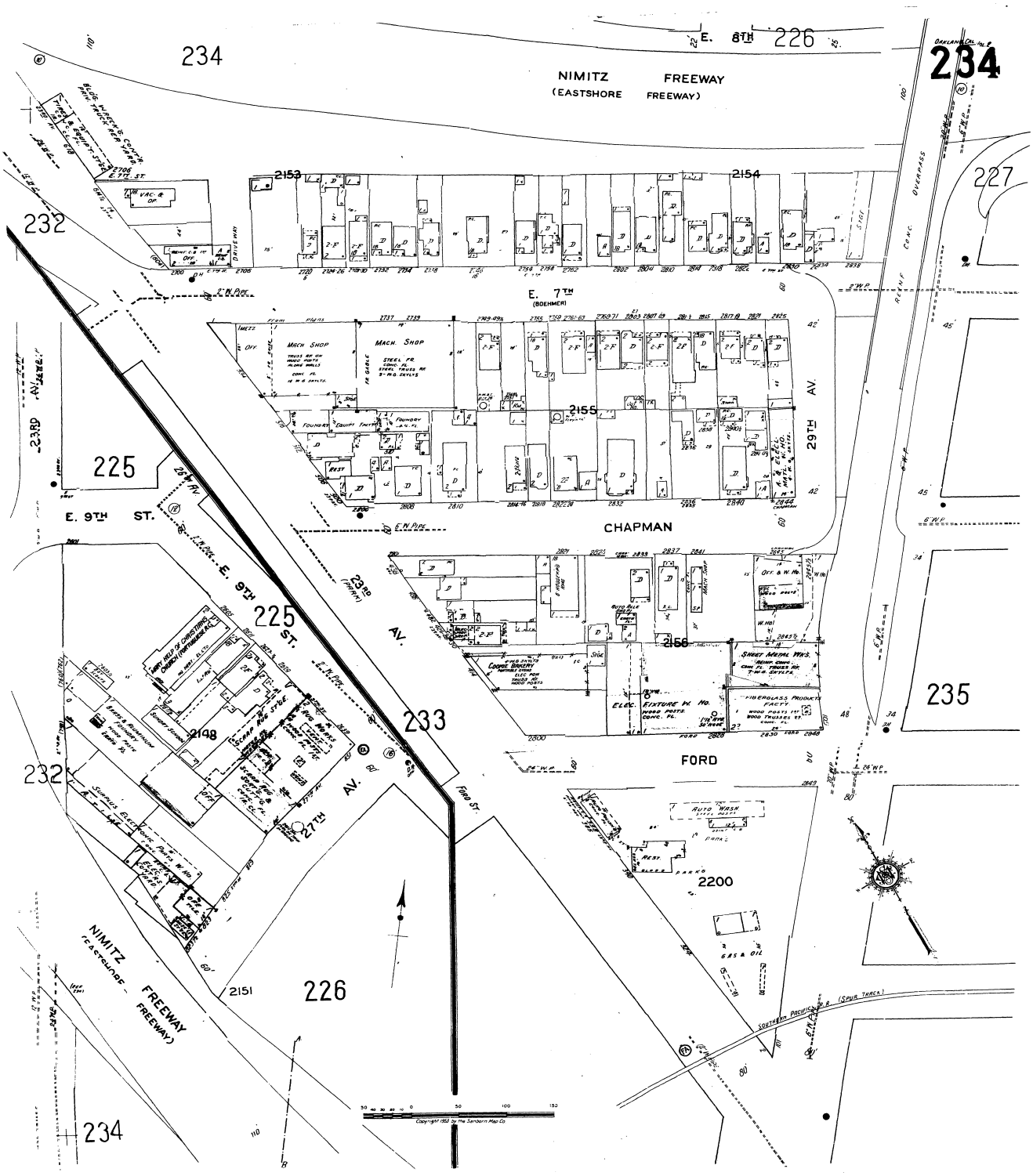

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Ninyo & Moore
1956 Webster Street
Oakland, CA 94612

Order Date: 8/9/2005 **Completion Date:** 8/10/2005
Inquiry #: 1484133.1S
P.O. #: na
Site Name: I-880 and 29th Ave ISA
Address: I-880 and 9th St
City/State: Oakland, CA 94601
Cross Streets:

Customer Project: na
1033871VLA 510-633-5640

Based on client-supplied information, fire insurance maps for the following years were identified

1911 - 1 Map
1950 - 1 Map
1952 - 1 Map
1953 - 1 Map
1957 - 1 Map
1959 - 1 Map
1960 - 1 Map
1964 - 1 Map
1965 - 1 Map
1967 - 1 Map
1969 - 1 Map

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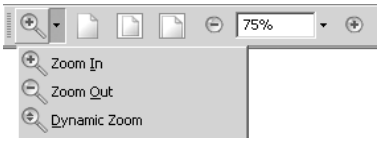
Organization of Electronic Sanborn Image File

- Sanborn Map Report, listing years of coverage
- User's Guide
- Oldest Sanborn Map Image
- Most recent Sanborn Map Image

Navigating the Electronic Sanborn Image File



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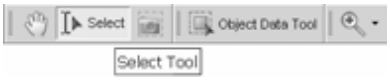
Acrobat Versions 6 and 7



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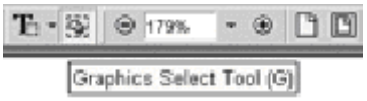
6. Go to Word Processor such as Microsoft Word, paste and print.

Acrobat Version 5



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6. Highlight "Copy"
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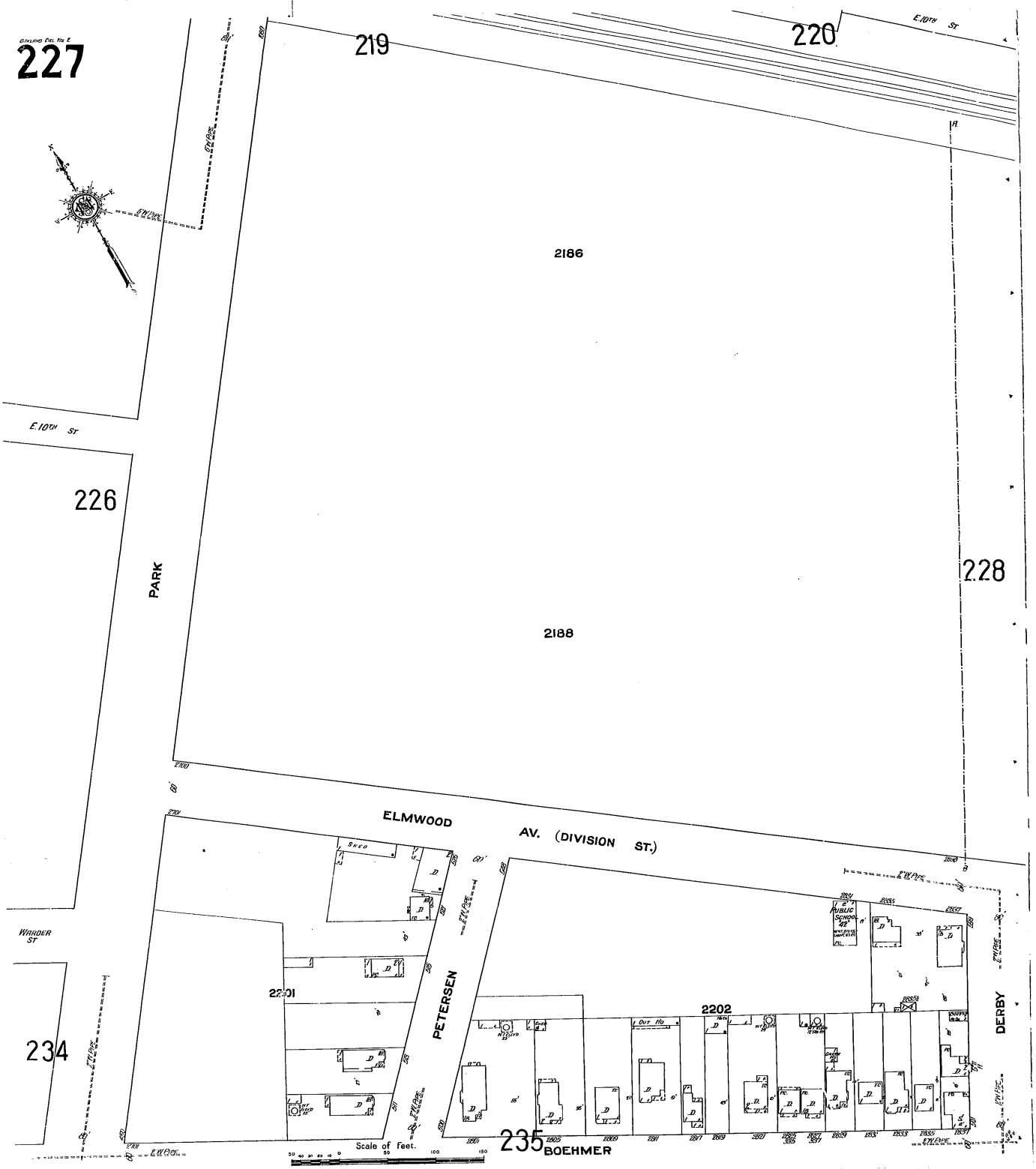

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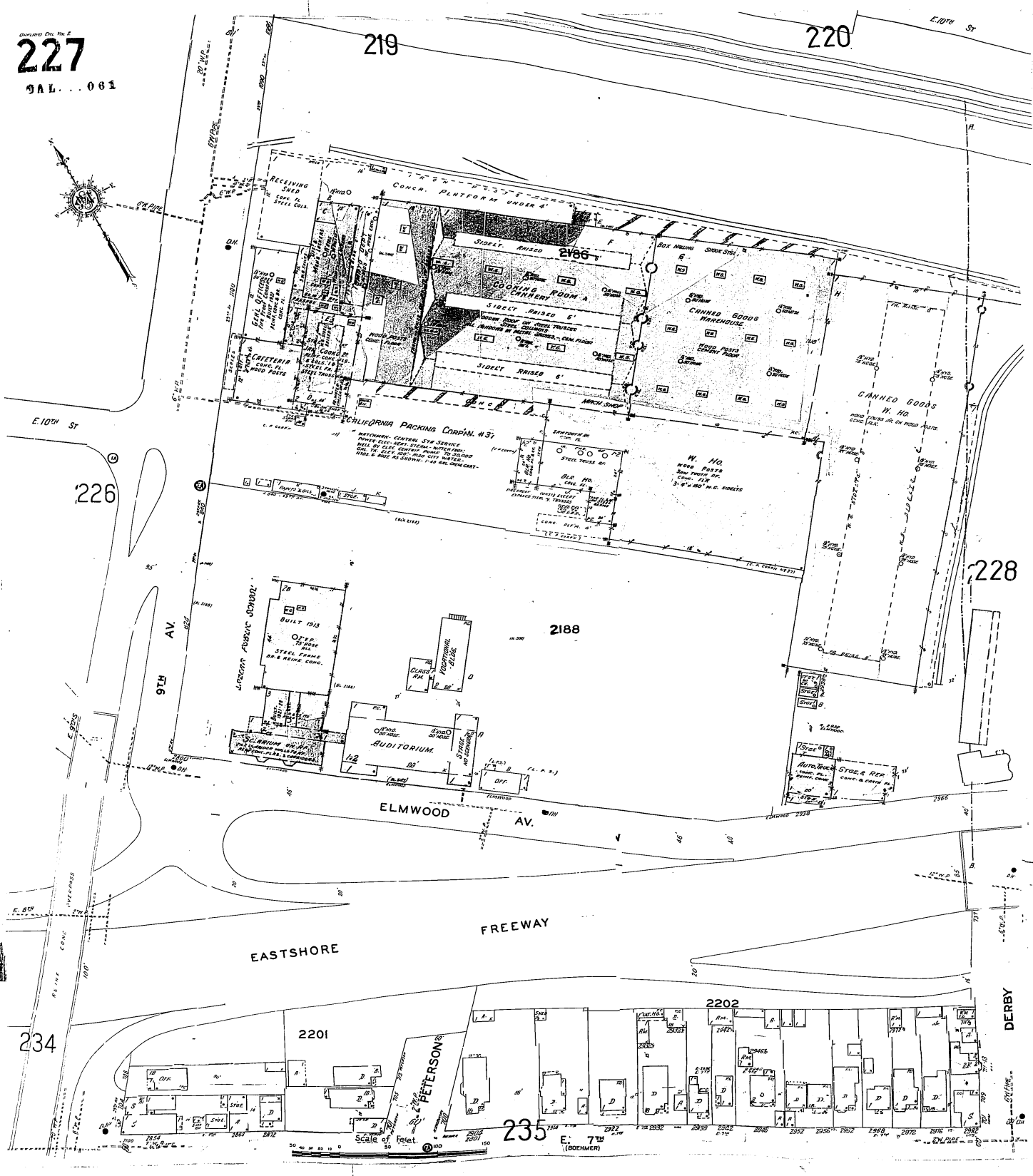

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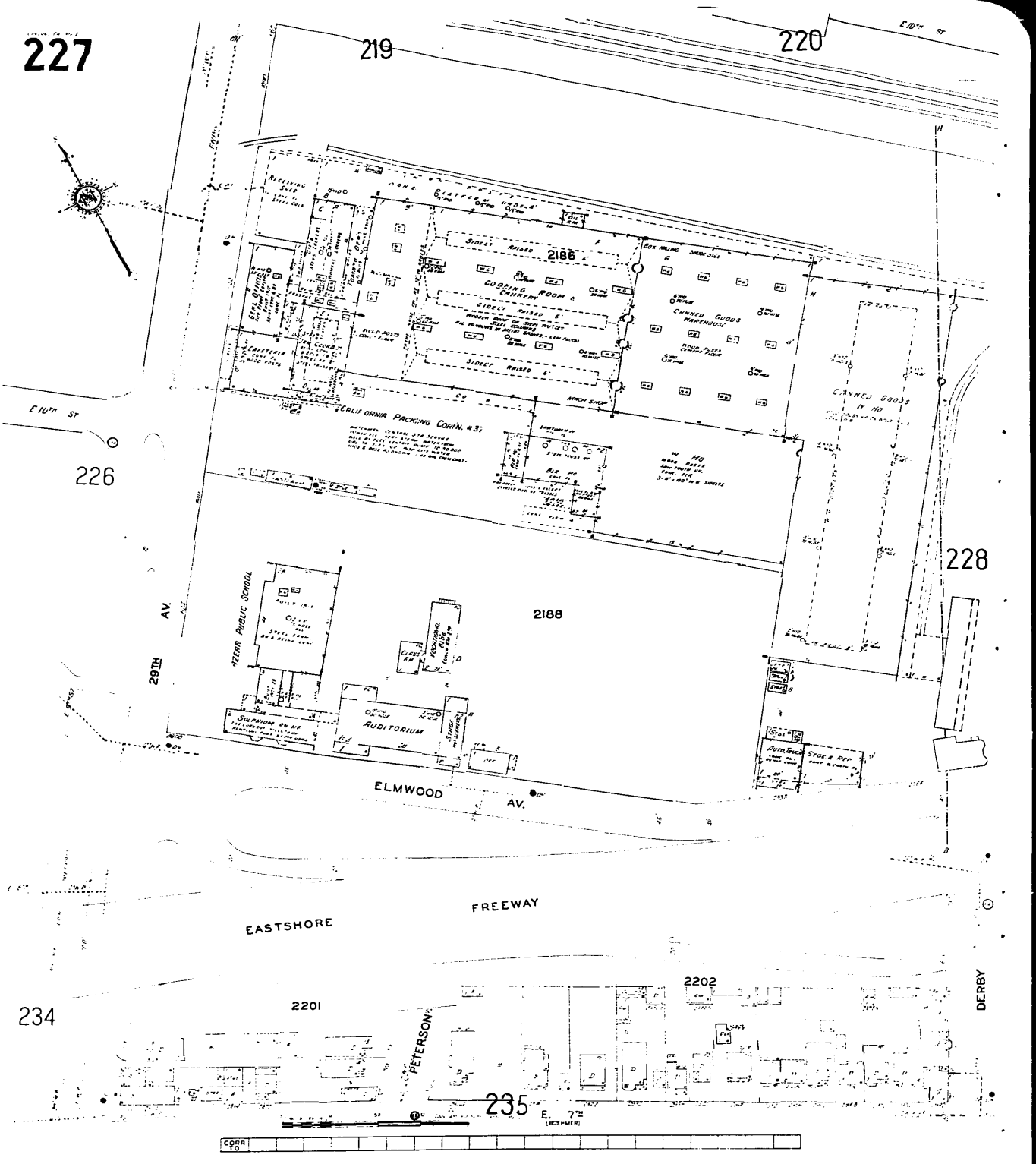

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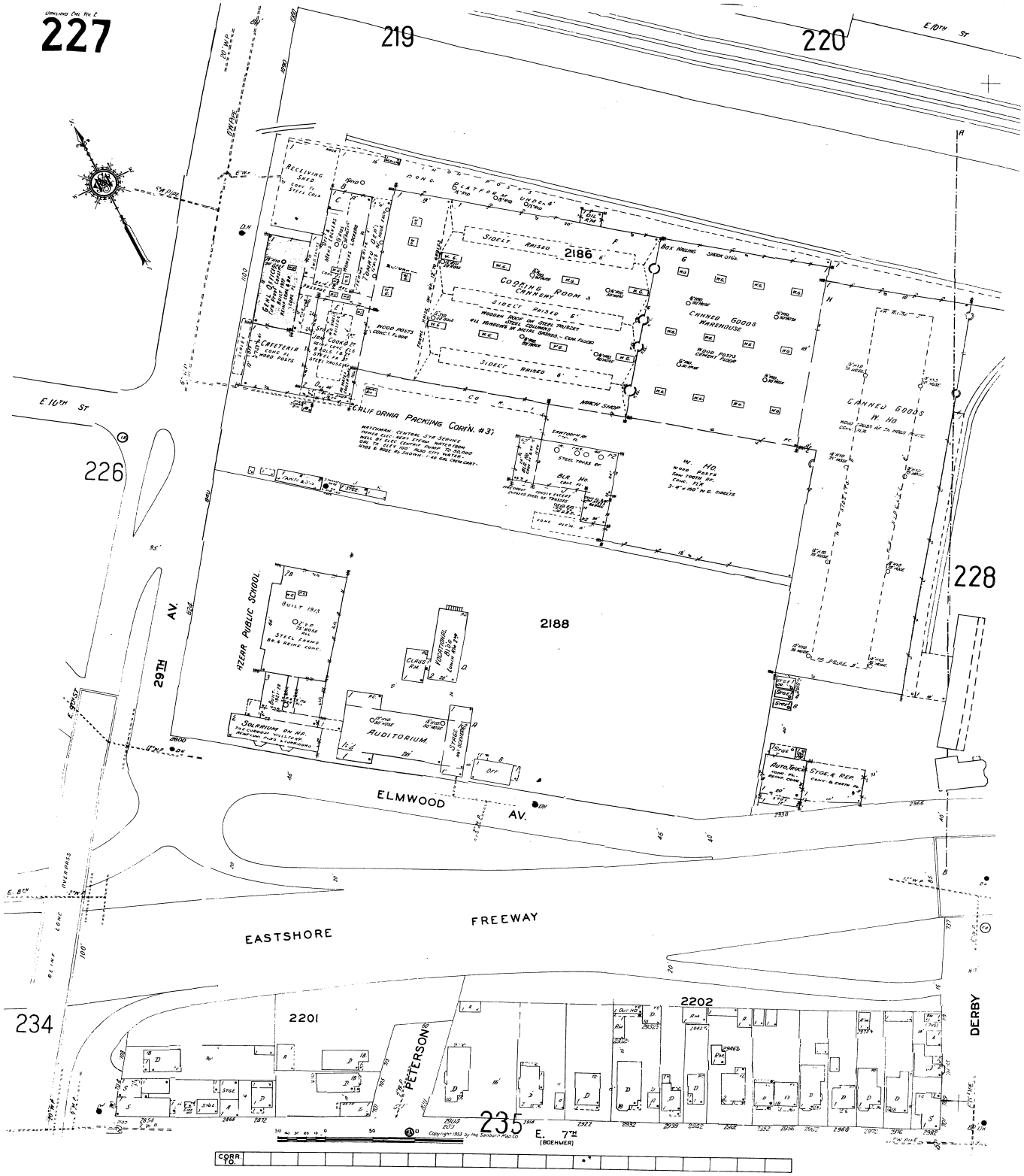

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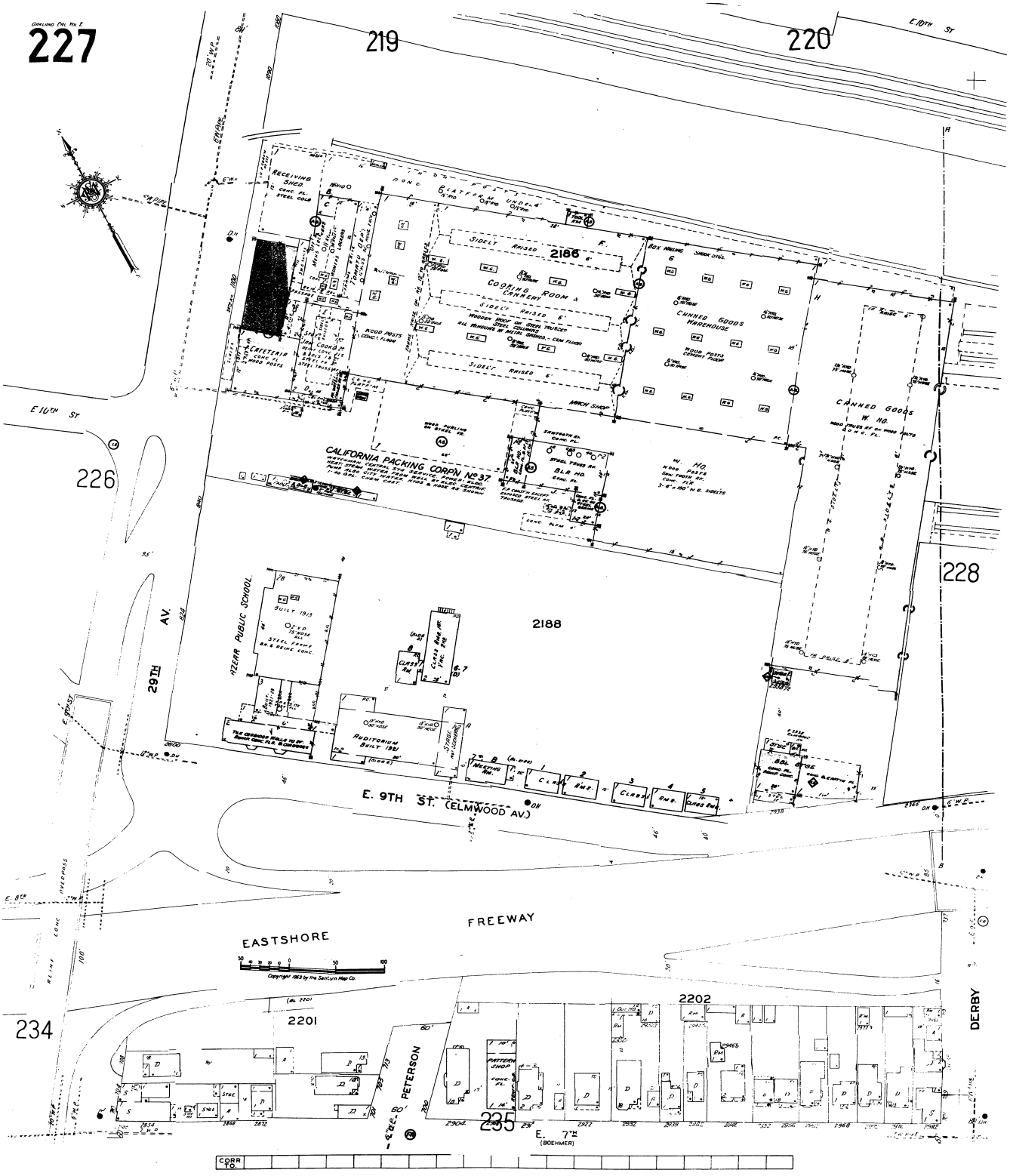

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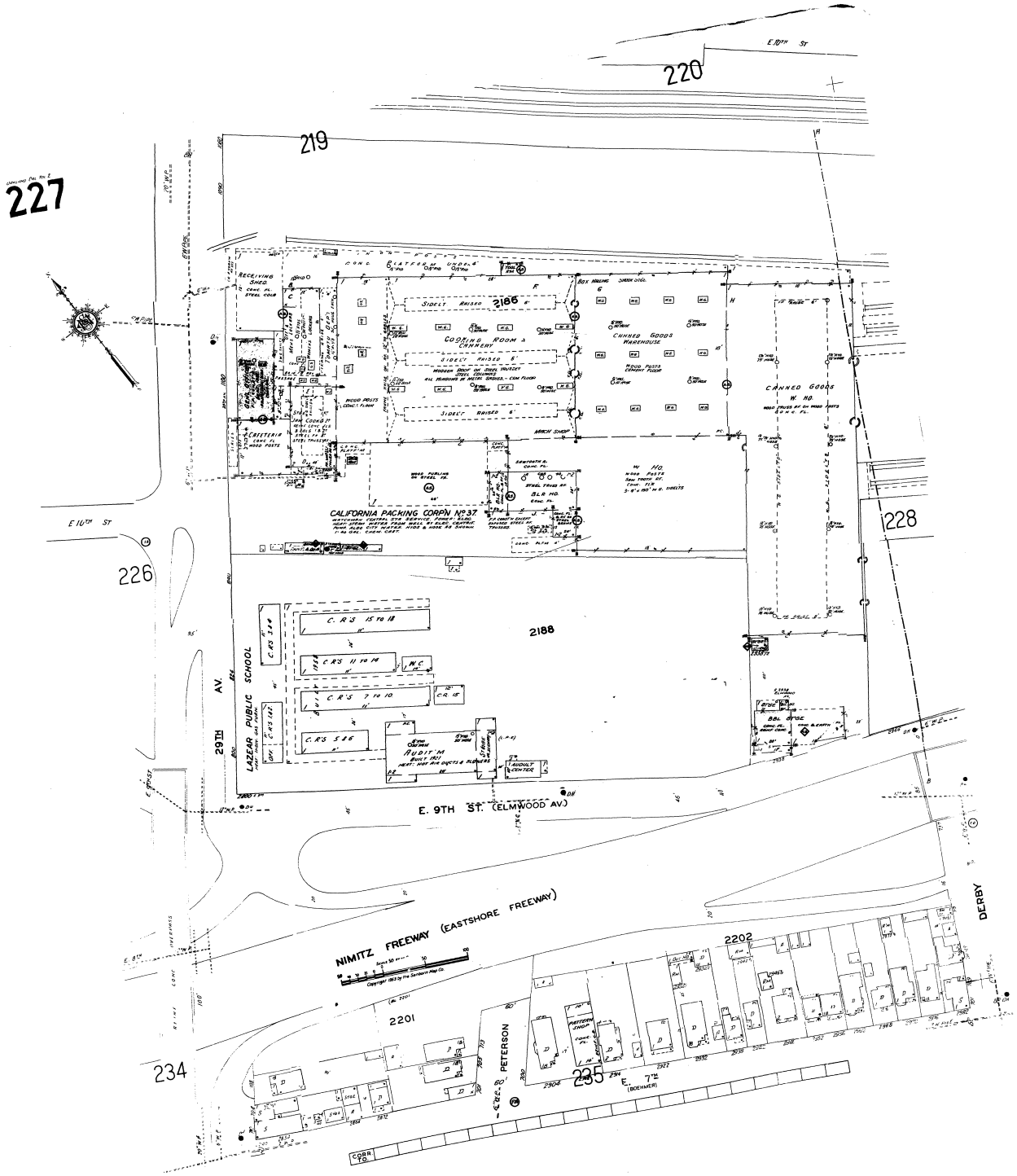

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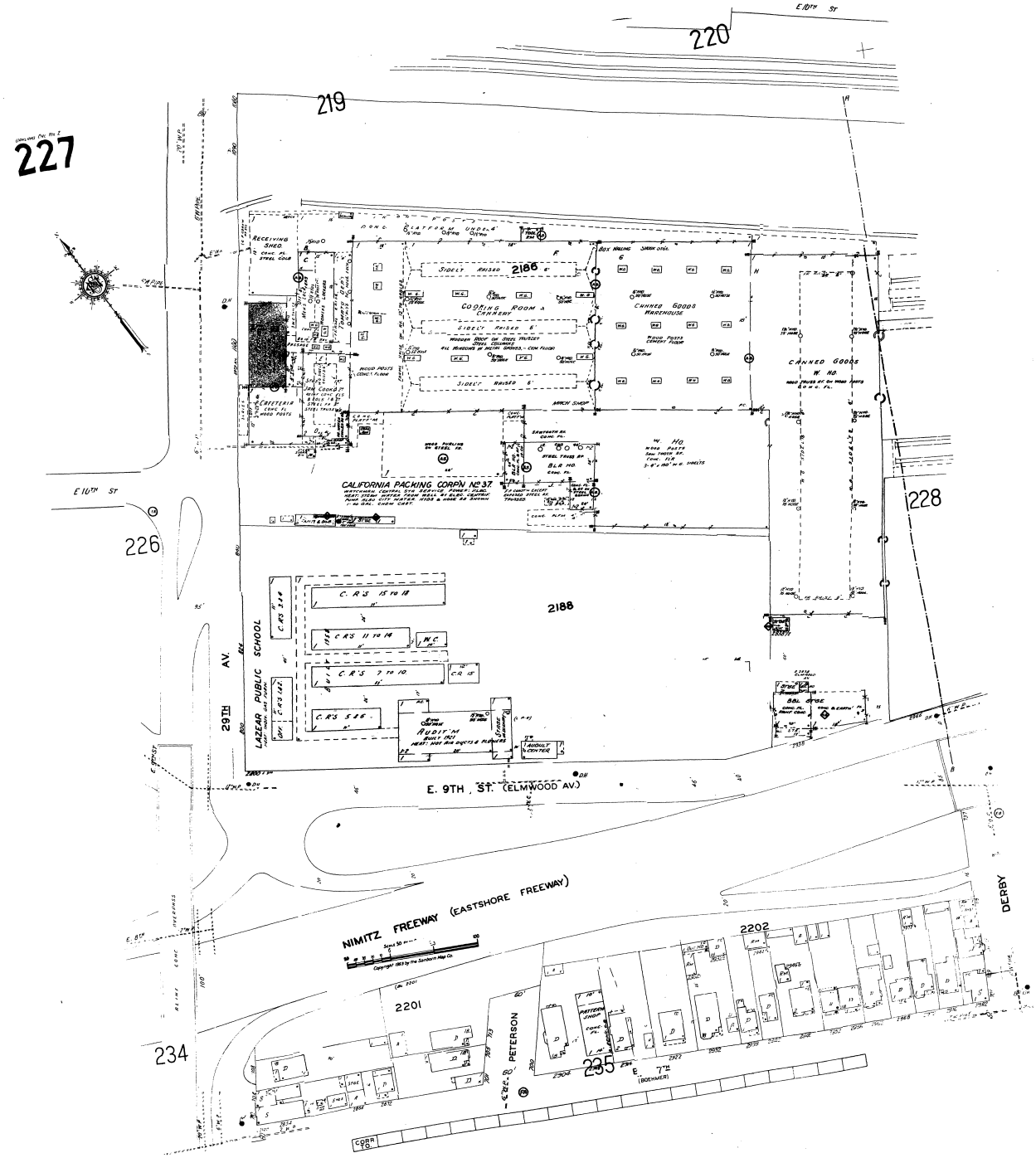

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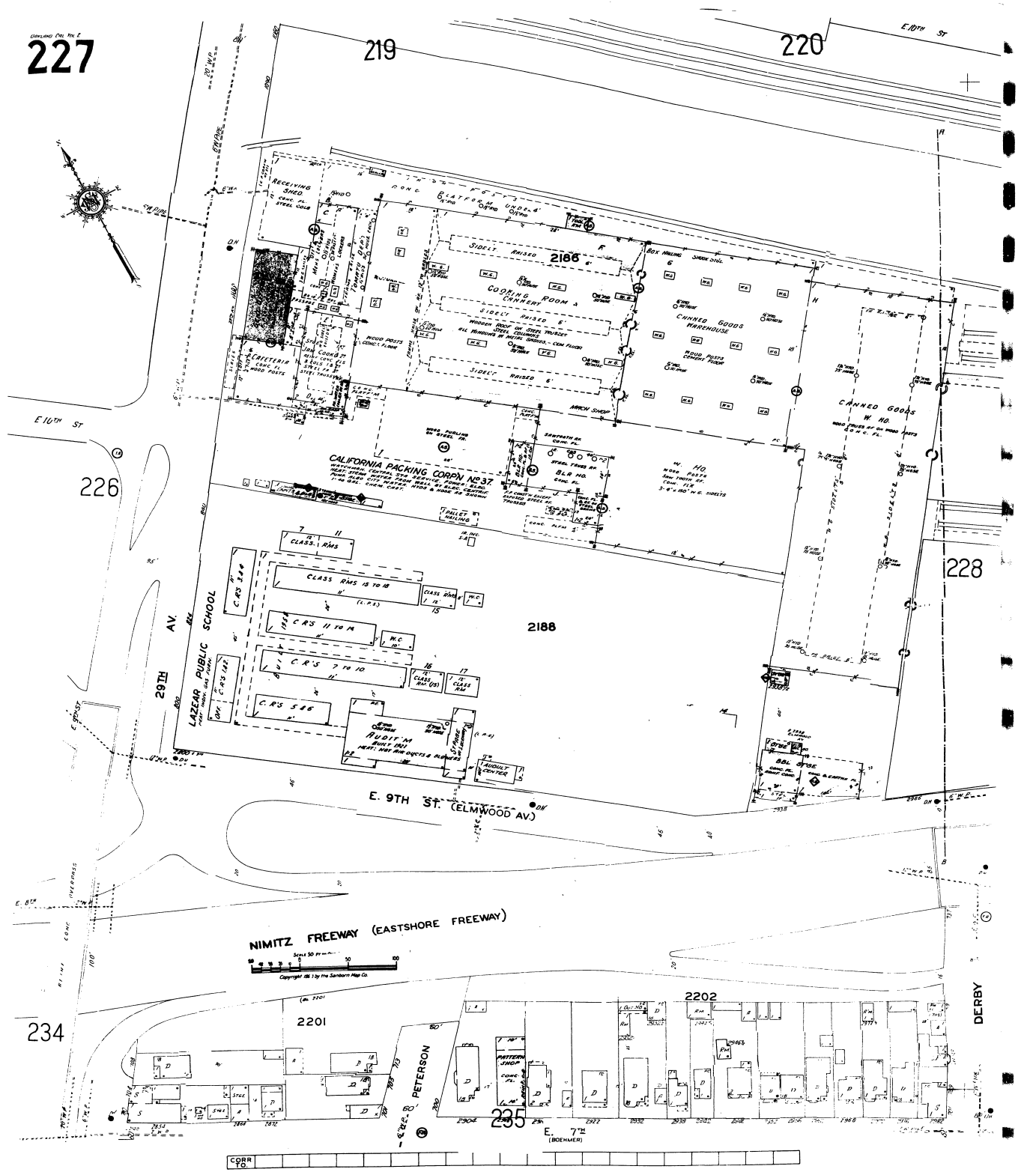

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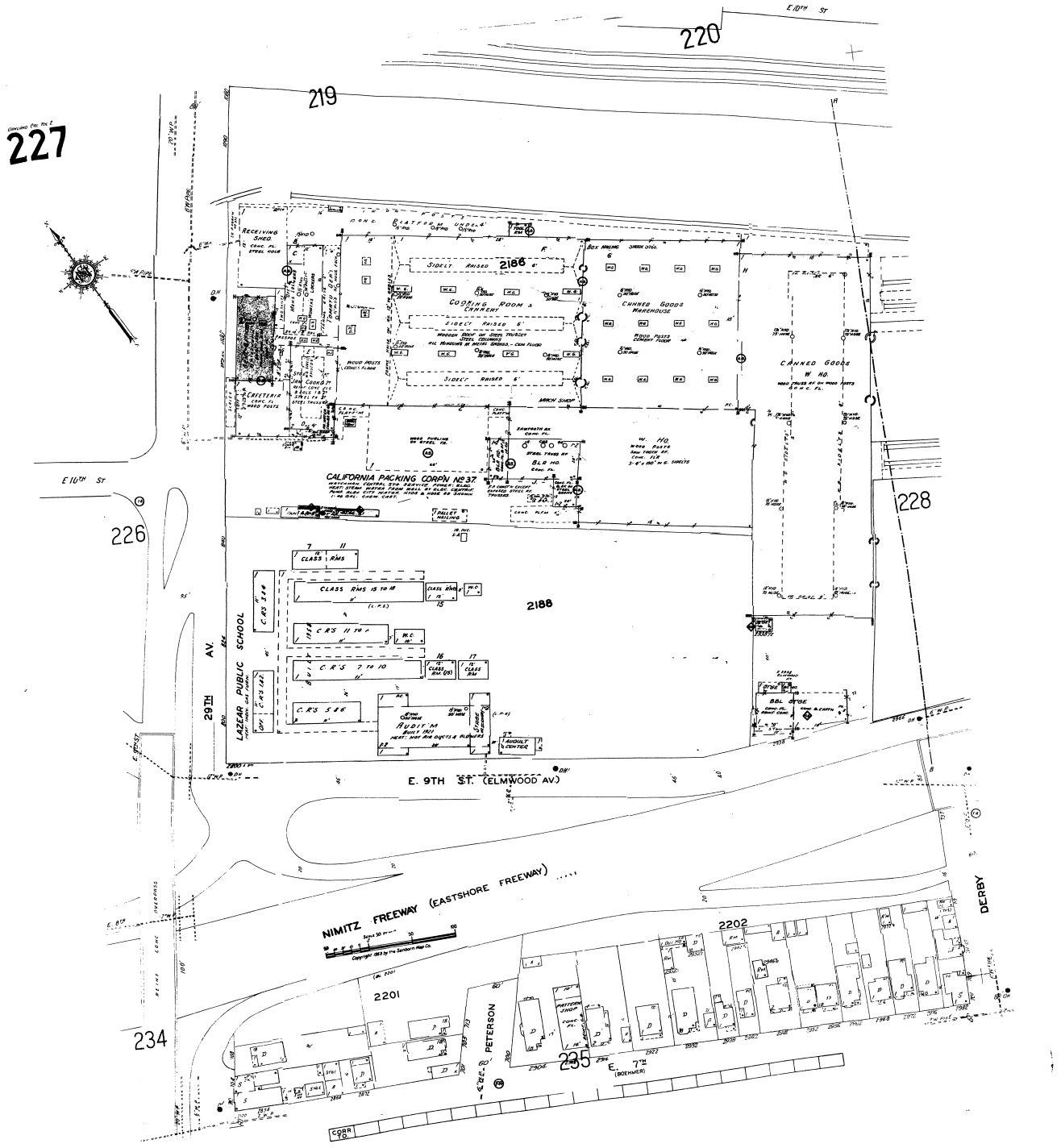

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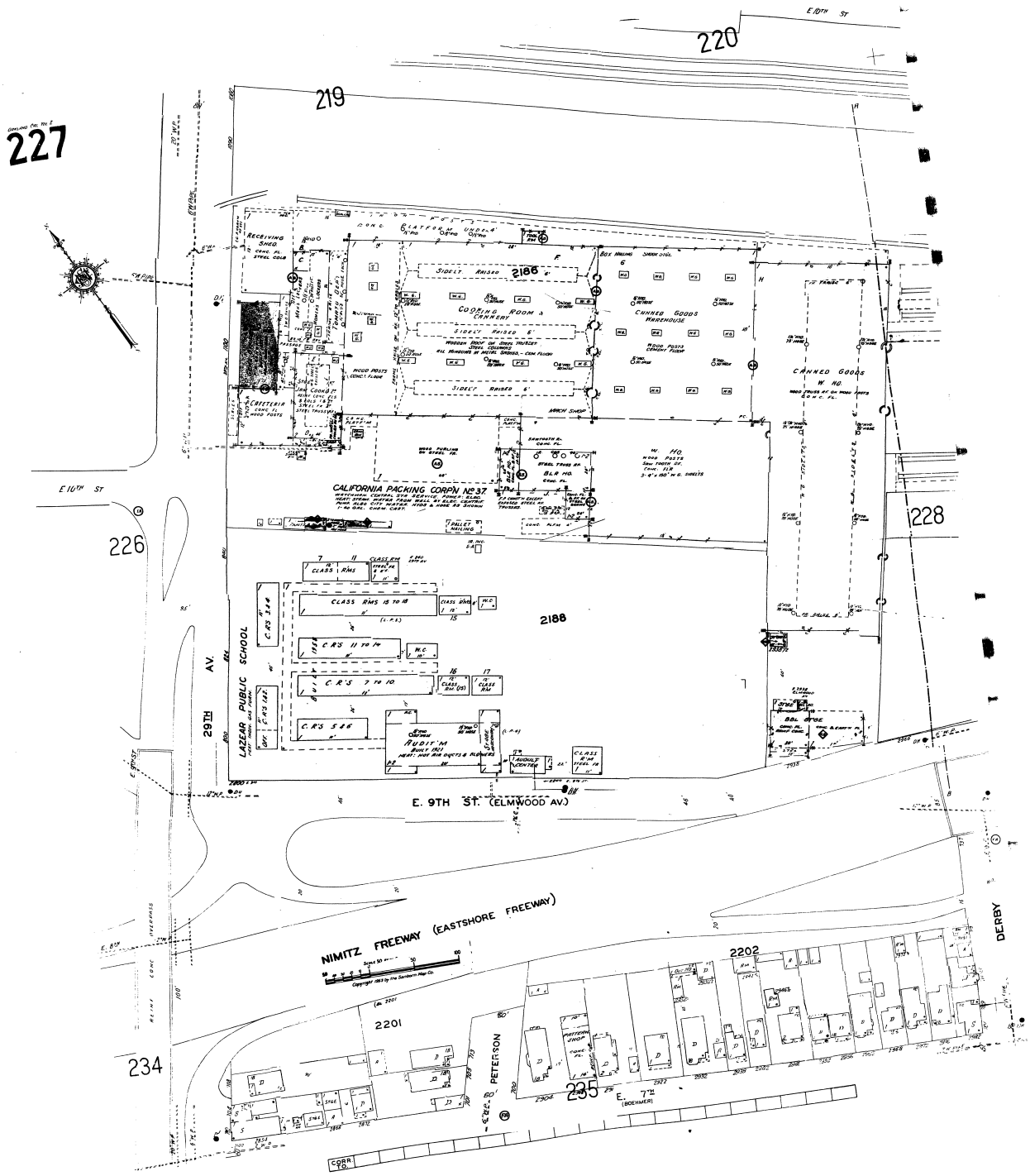

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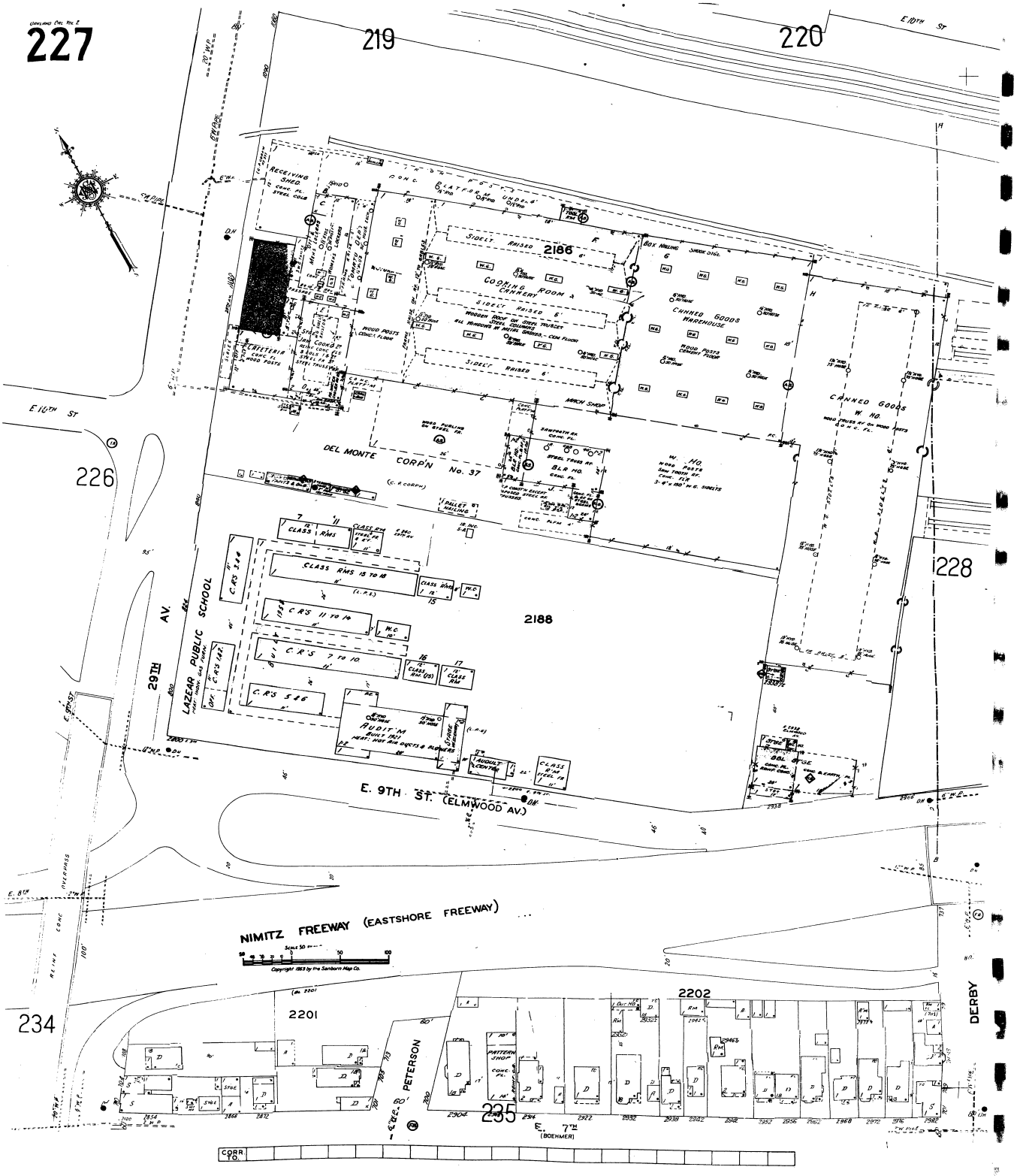

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P.O. #: na
Site Name: I-880 and 29th Ave ISA
Address: I-880 and 23rd Ave
City/State: Oakland, CA 94601
Cross Streets:

Customer Project: na
1033871VLA 510-633-5640

Based on client-supplied information, fire insurance maps for the following years were identified

1903 - 1 Map
1911 - 3 Maps
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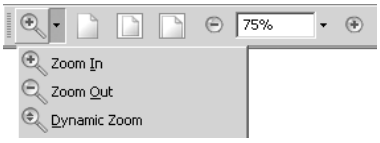

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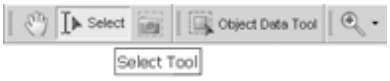

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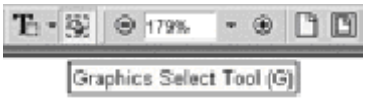

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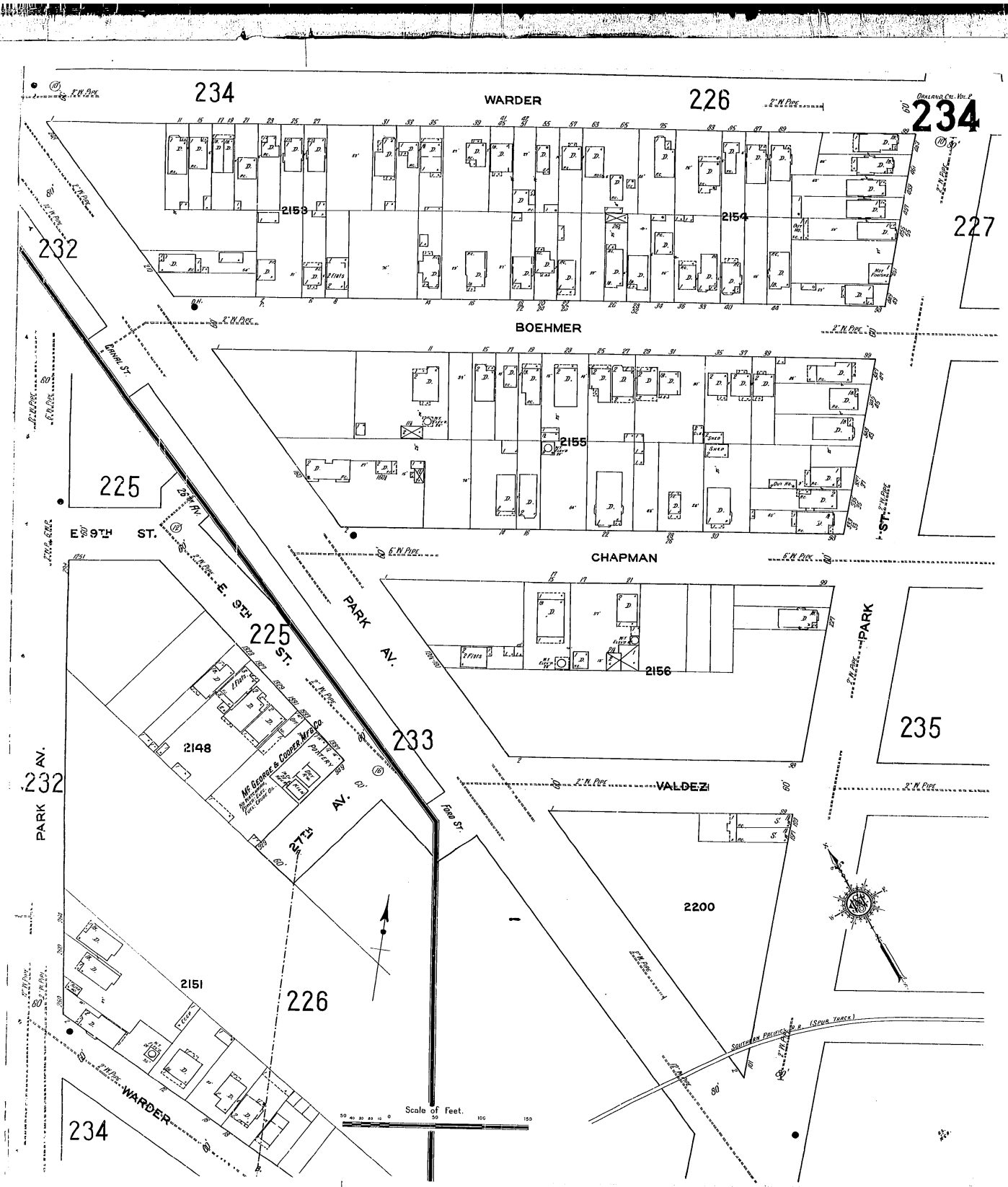

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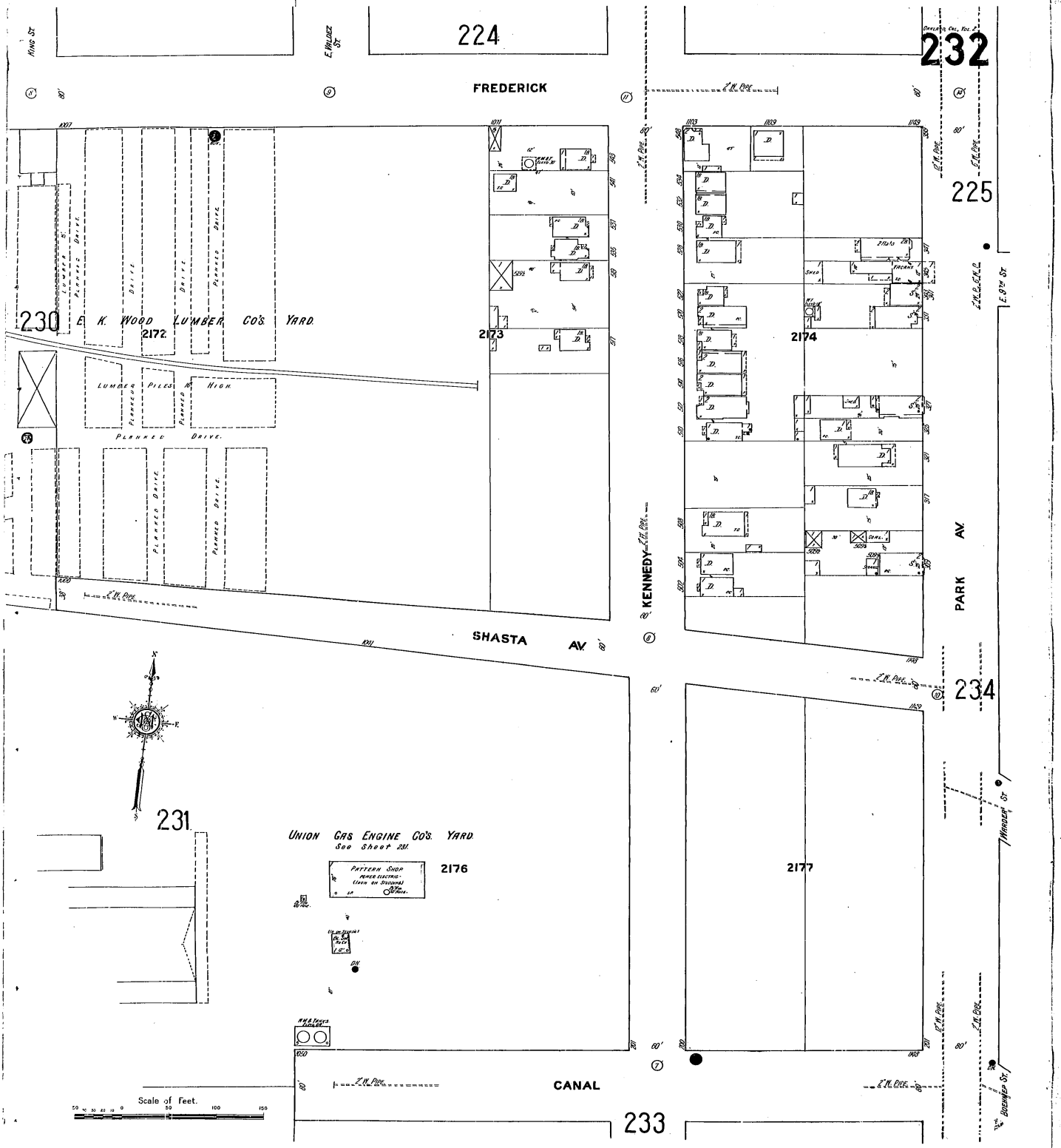

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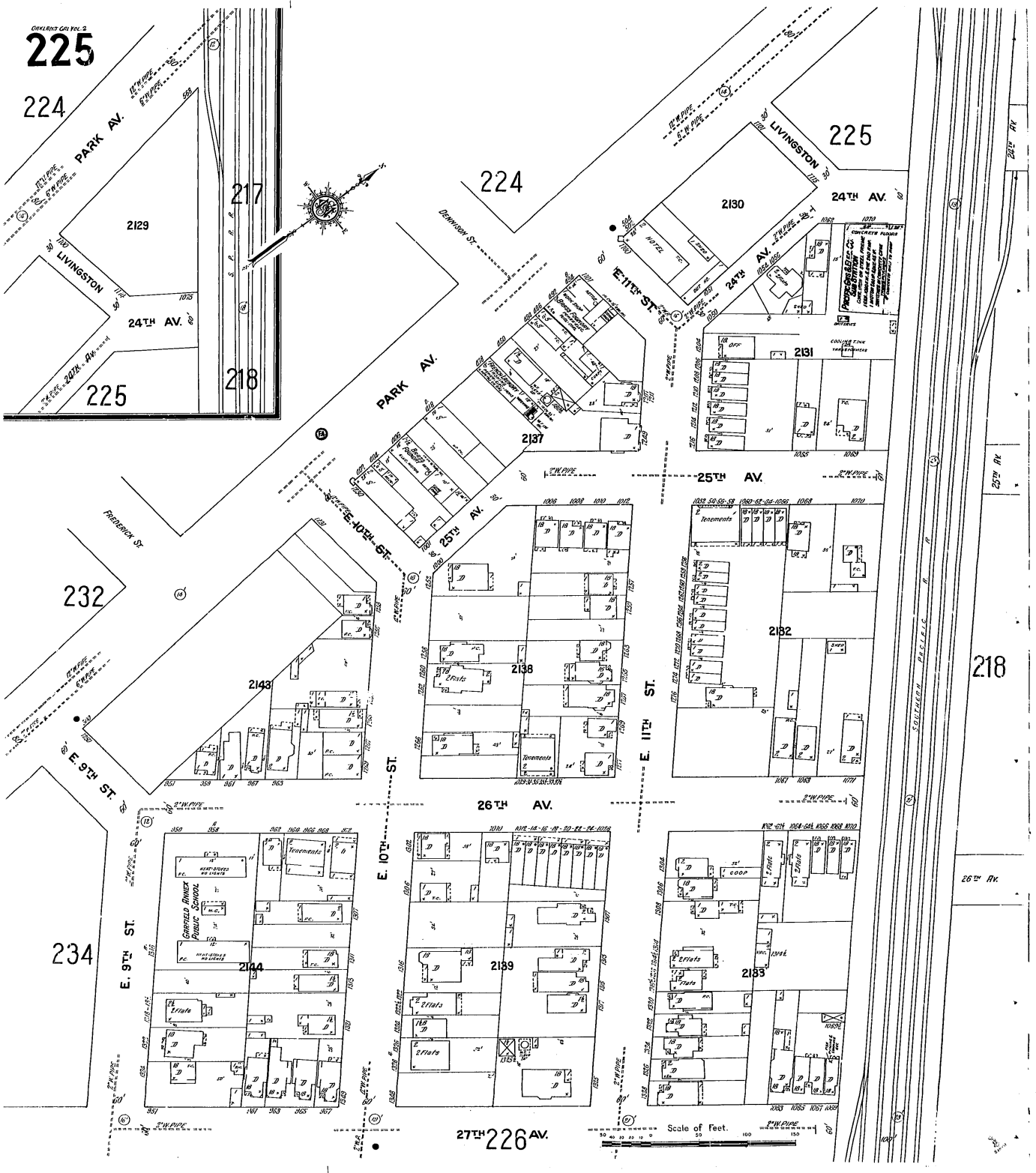

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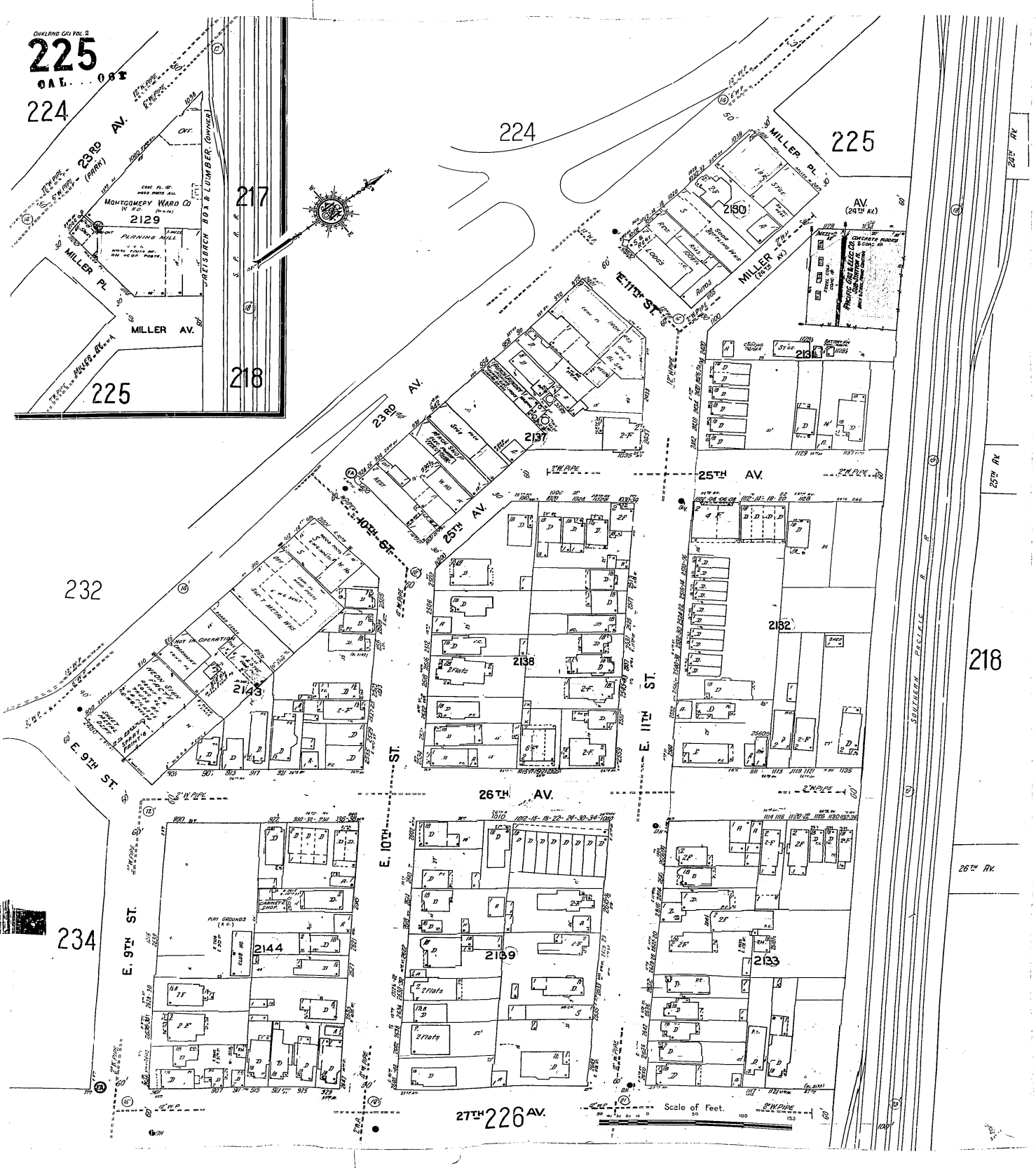

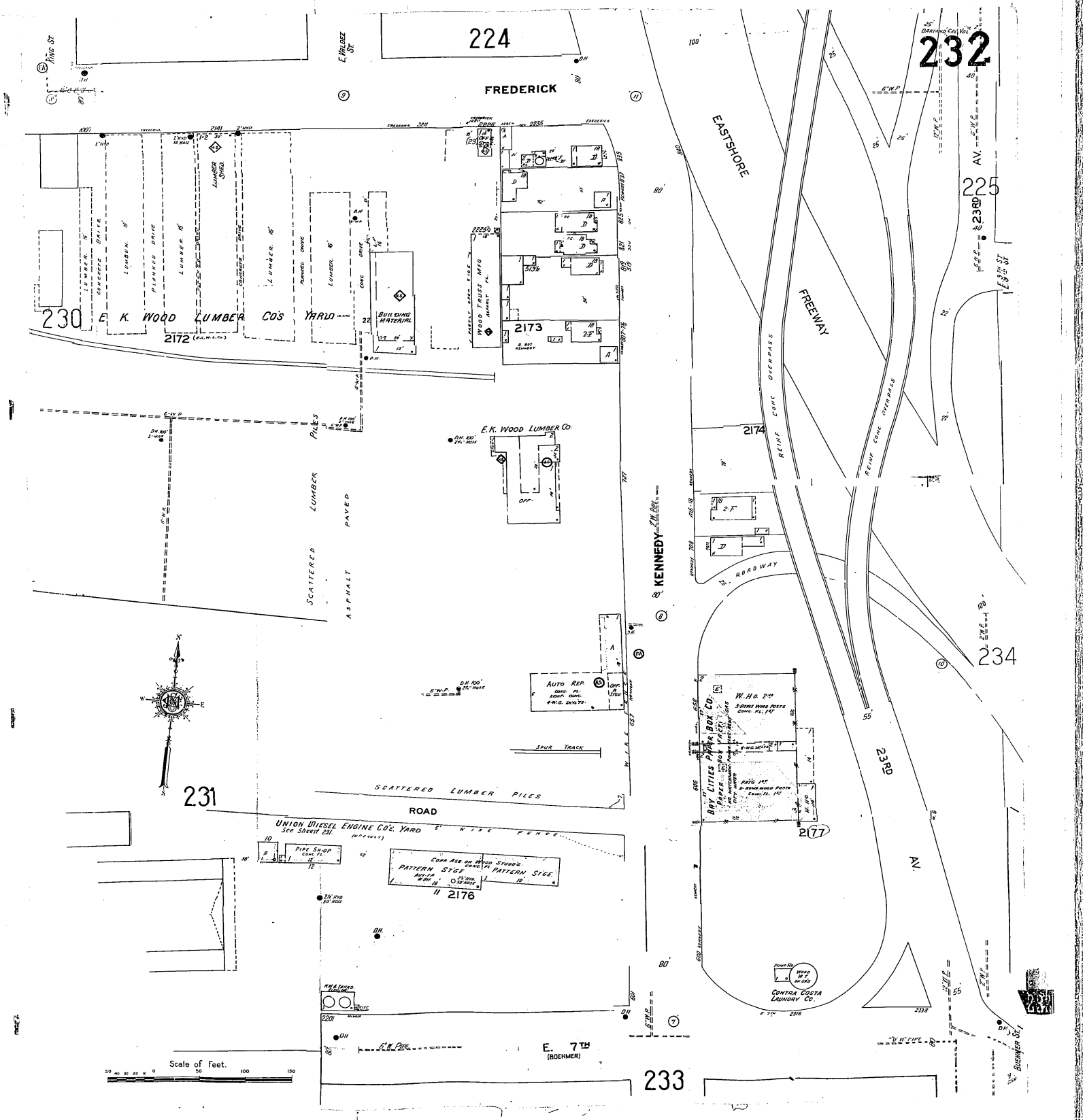

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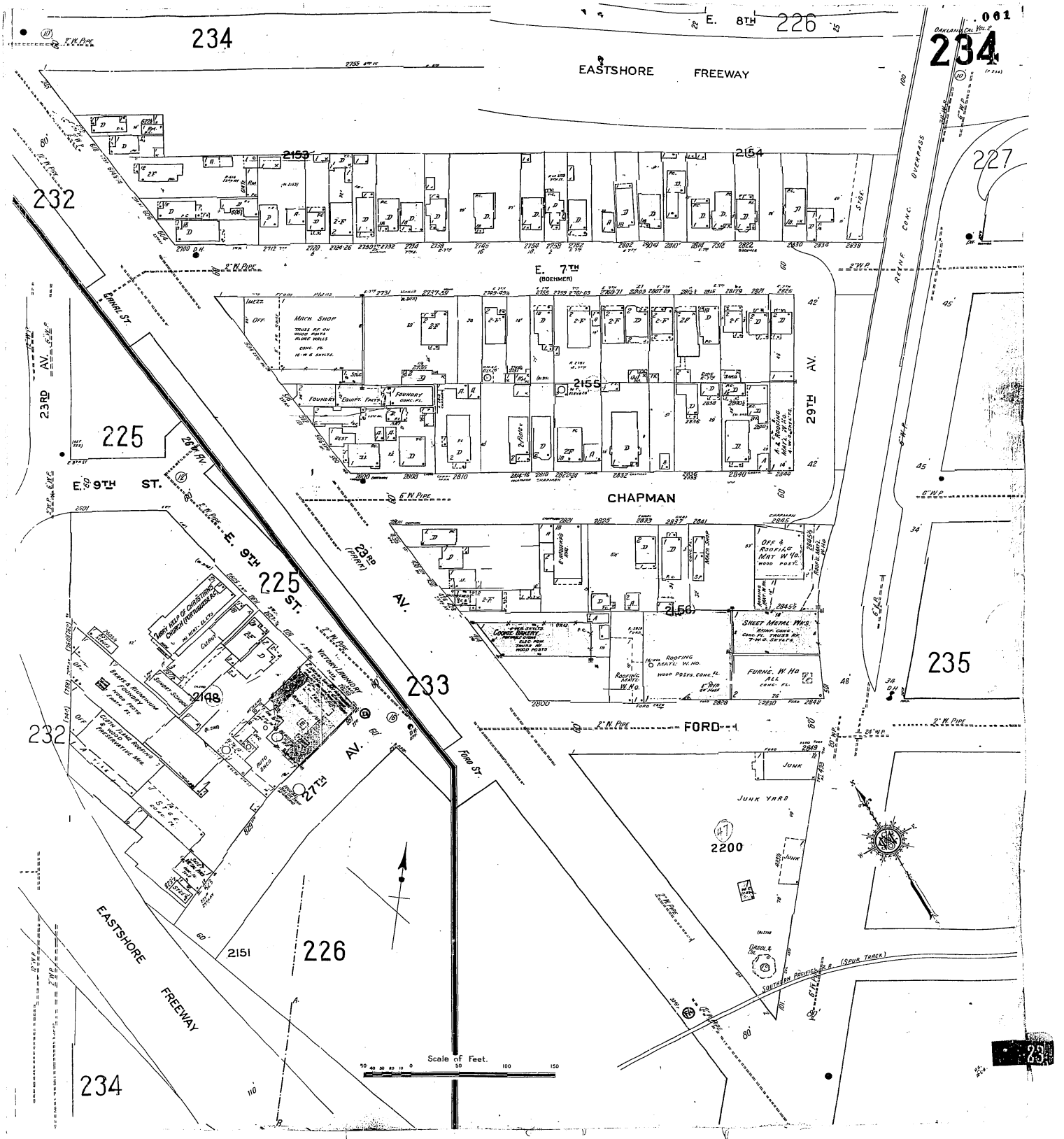

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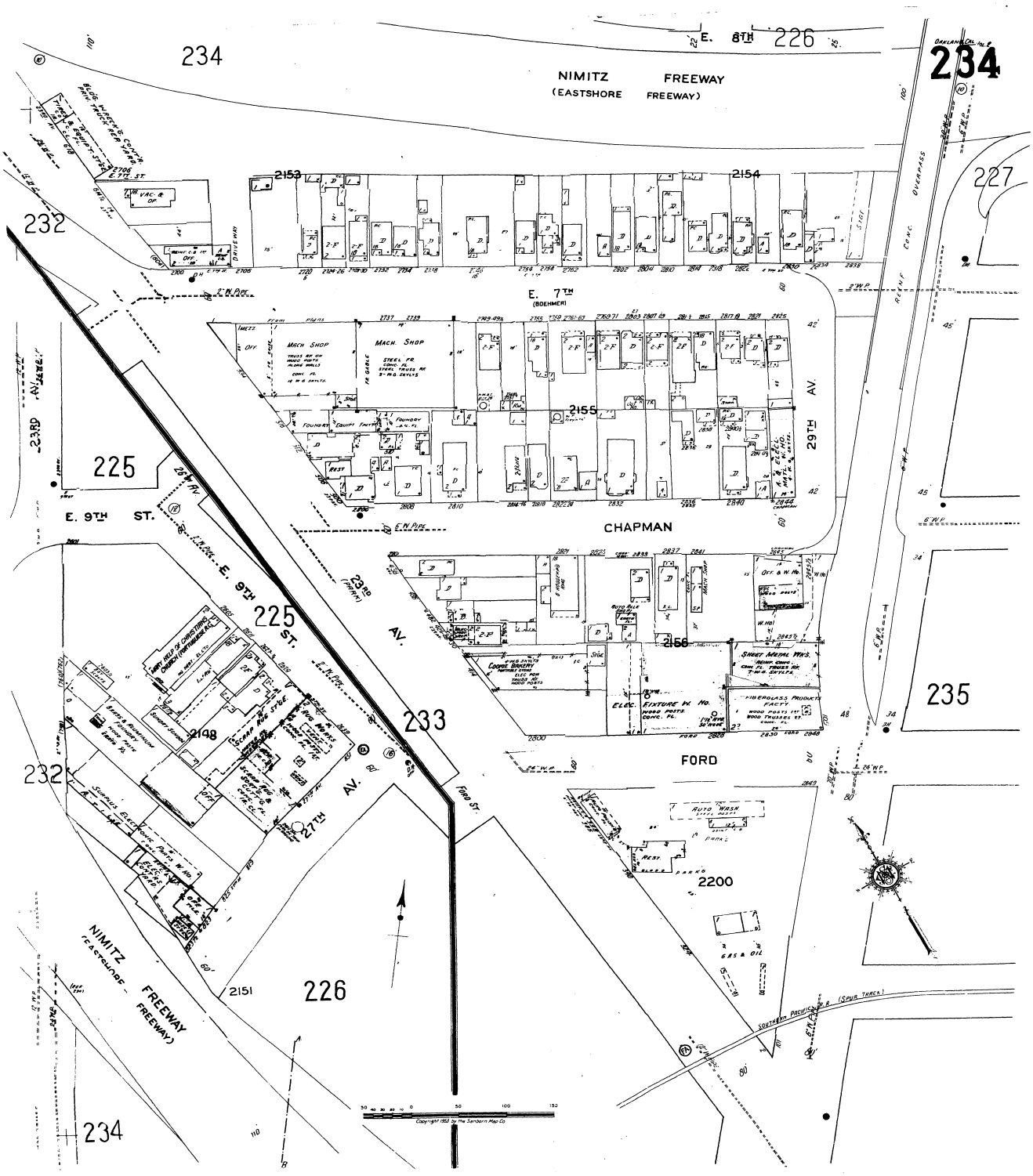

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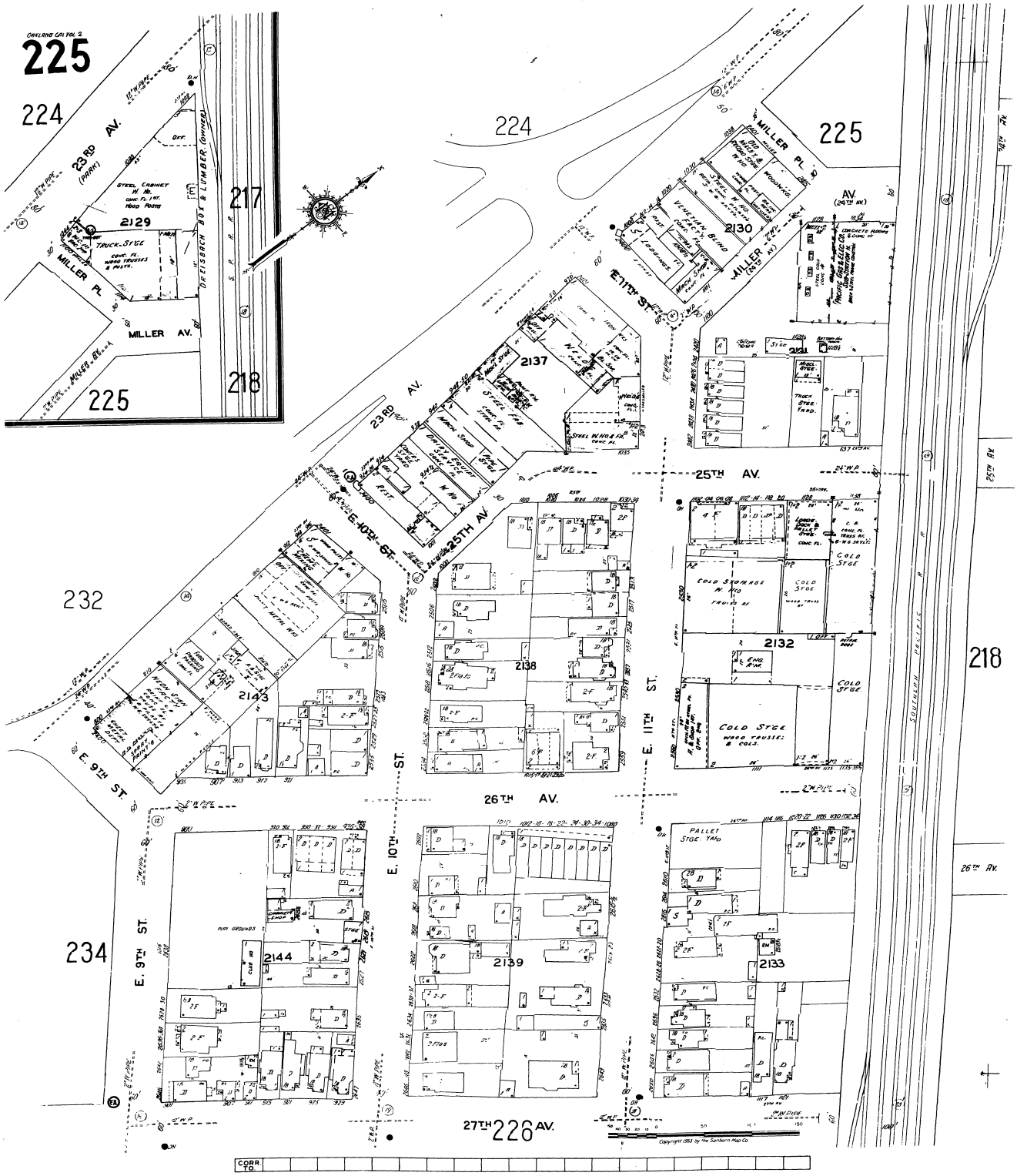

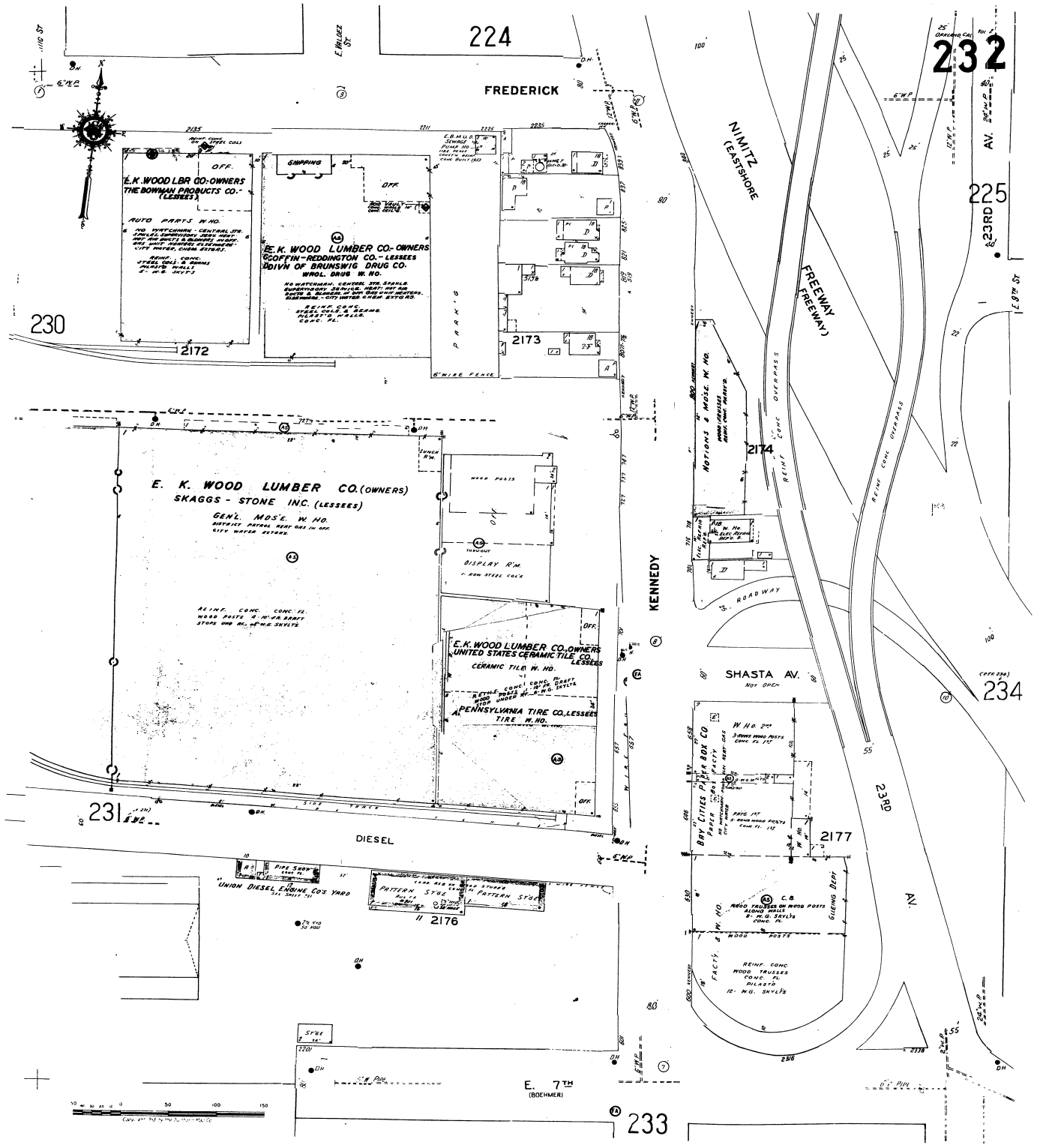

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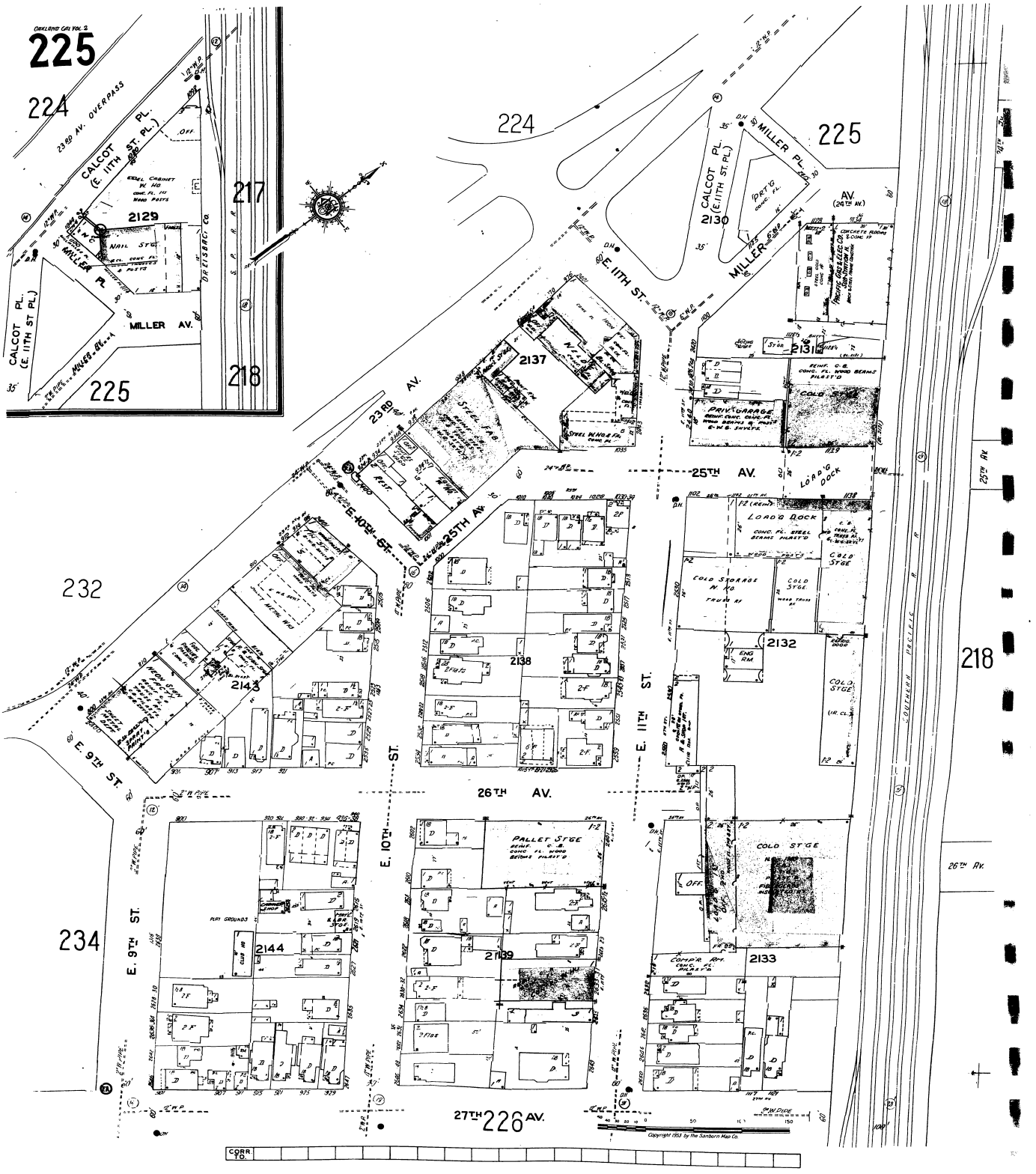

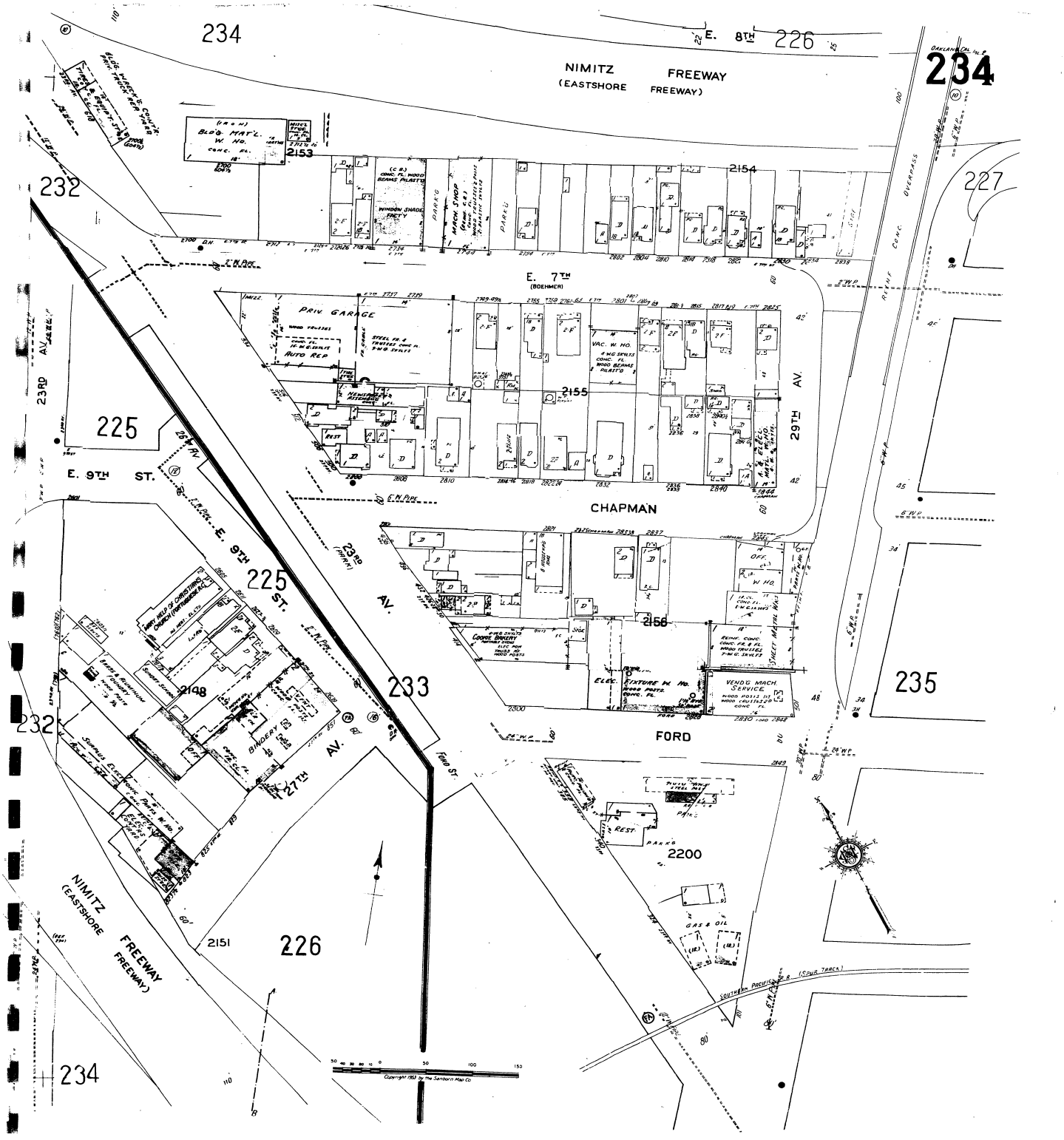

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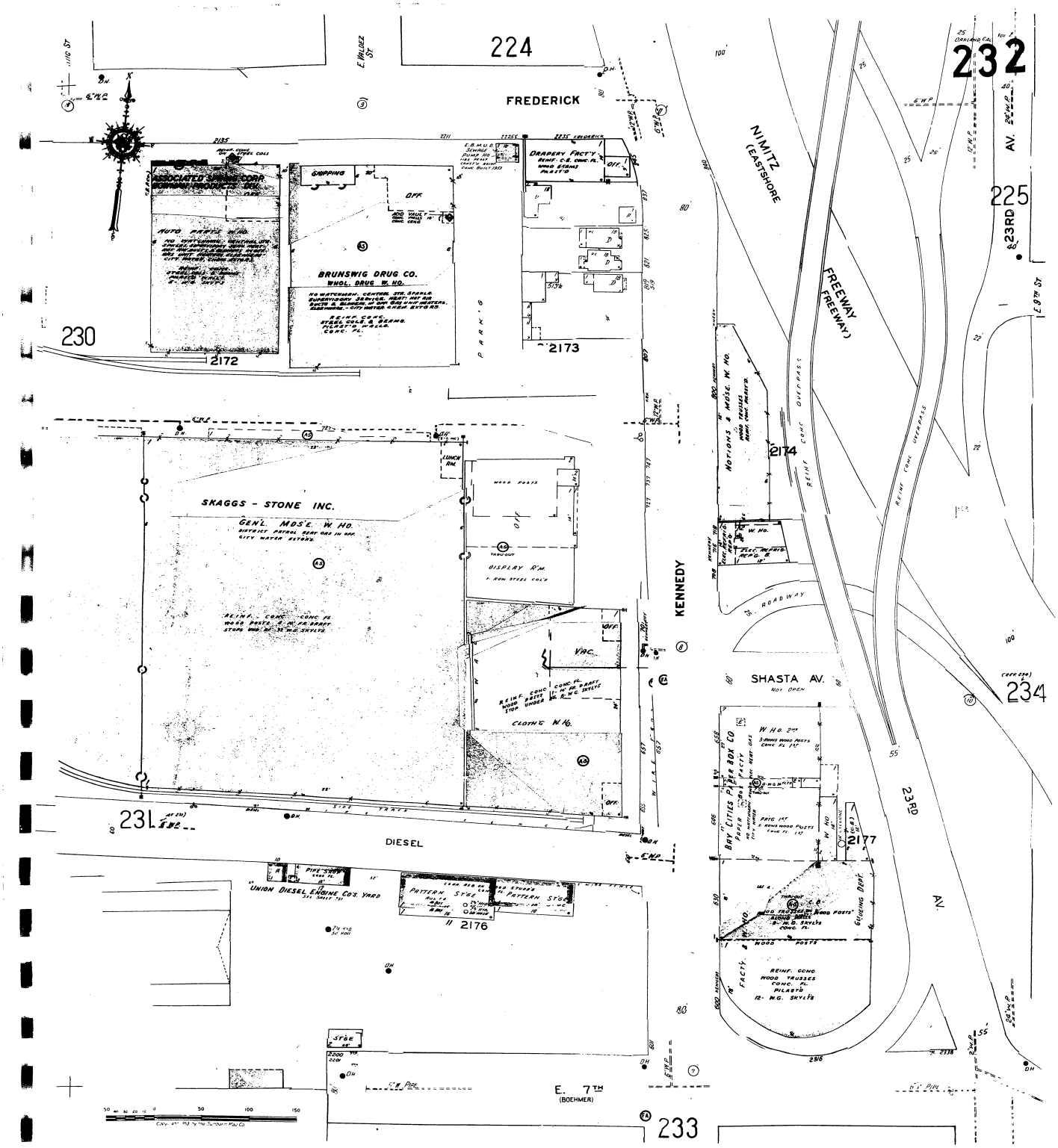

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APPENDIX B

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Photograph No. 1: **View of vacant lot along 29th Avenue, looking south from northwest corner of 29th Avenue and 10th Street.**

Photograph No. 2: **View of vacant lot at 29th Avenue / East 9th Street, looking north.**

Photograph No. 3: **View of housing development from island on 29th Avenue / East 10th Street, looking north.**

Photograph No. 4: **View of Lazear School and 29th Avenue overpass from 29th Avenue / East 9th Street, looking south.**

Photograph No. 5: **View of park at the end of East 9th Street from 29th Avenue overpass, looking west.**

Photograph No. 6: **View of 29th Avenue overpass from southwest corner of East 9th Street and 29th Avenue, looking southeast.**

Photograph No. 7: **View of northbound I-880 off-ramp and island from southeast corner of East 9th Street and 29th Avenue, looking south.**

Photograph No. 8: **View of Shell Gasoline station from northwest corner of East 8th Street and Portwood Avenue, looking east.**

Photograph No. 9: **View of Universal Metal Polishing on northwest corner of Portwood Avenue and East 8th Street, looking northwest.**

Photograph No. 10: **View of northeast corner of East 7th Street and 23rd Avenue where former truck repair yard was located.**

Photograph No. 11: **View of WOW Carpet Cleaning and northbound I-880 on-ramp, looking west.**

Photograph No. 12: **View of western end of 27th Avenue on east side of I-880, looking west.**

Photograph No. 13: **View of grass field adjacent to Mary Help of Christians Church on 9th Street, looking west.**

Photograph No. 14: **View of Bay Auto Center, 810 23rd Avenue, from Mary Help of Christians Church, looking west.**

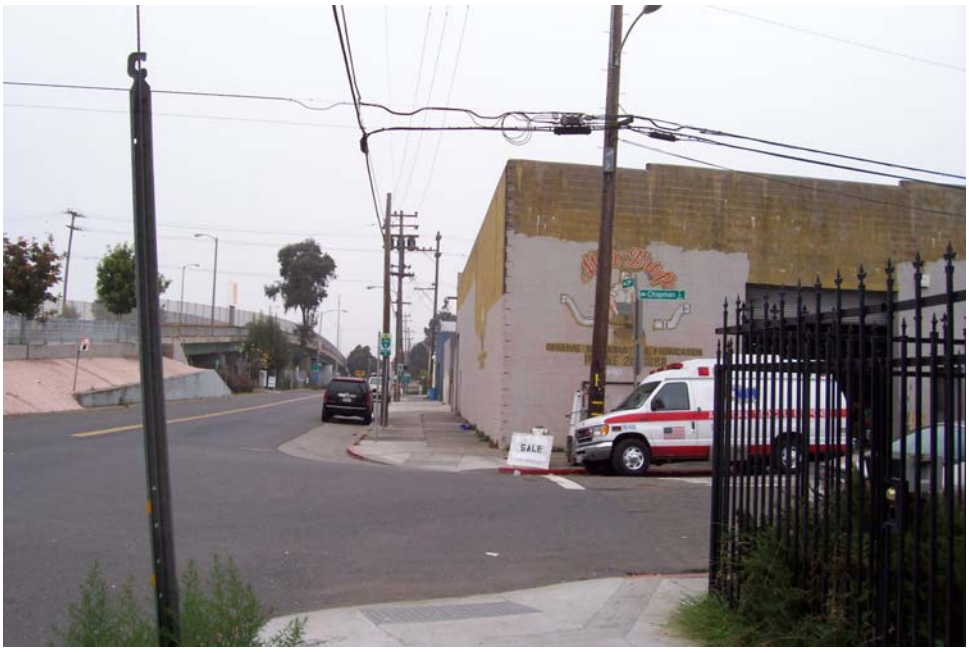
Photograph No. 15: **View of I-880 northbound 23rd Avenue off-ramp from 23rd Avenue, looking south.**

Photograph No. 16: **View of Eandi Metal Works building and 23rd Avenue from island, looking east.**

Photograph No. 17: **View of property at northwest corner of 27th Avenue and I-880 from the 23rd Avenue overpass, looking southeast.**

Photograph No. 18: **View of machine shop at southwest corner of I-880 and 29th Avenue, looking north.**

Photograph No. 19: **View of 29th Avenue overpass from 29th Avenue / Ford Street, looking northeast.**



Photograph No. 20: **View of 23rd Avenue and overpass as well as former Lemoine Cold Storage property from Chapman Street, looking northeast.**

Photograph No. 21: **View of 23rd Avenue and overpass from island near I-880 off-ramp, looking north.**

Photograph No. 22: **View of 29th Avenue overpass and on-ramp from 29th Avenue / East 7th Street, looking northwest.**

APPENDIX C

ENVIRONMENTAL DATABASE REPORT

Additional Listings and Updates from July 24, 2009 EDR Report Relative to November 30, 2006 EDR Report

Database	New Listing(s) or New Database	Property and Address of Potential Concern	Notes
LUST Facilities	Fifteen new listings. Fourteen of these are either closed cases or too far from the site to be a concern. Remaining property is listed to right.	Earthgrains Baking Company, 955 Kennedy Street	This address was listed as a closed case for Kilpatrick's Bakery Inc. Garagein the old EDR report but is now listed as an open Site Assessment for Earthgrains Baking Company
Multiple Agency, Underground Storage Tank (UST) and Aboveground Storage Tank (AST) Facility Lists	Four new listings. All are either closed cases or too far from the site to be a concern.		
SLIC Facilities	Seven new listings. All are either closed cases or located too far from the site to be a concern.		
RCRA Non-Generator Facilities updated 12/2008	This new database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the RCRA. Non-generators do not presently generate hazardous waste, This database was updated in November 2008. Seven properties were listed within a 0.4-kilometer (0.25-mile) radius of the site. These properties may handle hazardous waste; however they do not currently generate hazardous waste. According to this database, no violations or specific environmental concerns were noted for five of these properties; therefore these properties pose a low risk of environmentally impacting the site. The remaining two properties (listed to right) were listed upgradient of and/or close enough to the site to be of potential environmental concern.	1. Sav On Drug 3714, 3100 East 9th Street - listed as Former Del-Monte Plant # 237 in Table 3 (No.20) of 12/06 report. 2. Bay Area Petroleum Inc., 421 23rd Avenue - listed in Table 3 (No. 14) of 12/06 report.	This database not included in 11/06 EDR report
California Facility Inventory Database (CA FID) Facilities - updated in 10/1994	One new listing located downgradient from and too far from the site to be a concern.		
Cortese Facilities	Four new listings. All are located downgradient from and too far from the site to be a concern.	None	
Voluntary Cleanup Program (VCP) Facilities	One new listing.	Esposito Plating and Polishing Company, 2904 Chapman Street, is a potential concern to the site and discussed in detail in Table 3 of 12/06 report as No. 23	
Alameda County Contaminated Sites (CS) Facilities	Two new listings. All are located downgradient from and too far from the site to be a concern.		
Dry Cleaners Facilities	One new listing located downgradient from and too far from the site to be a concern.		

Additional Listings and Updates from July 24, 2009 EDR Report Relative to November 30, 2006 EDR Report

Database	New Listing(s) or New Database	Property and Address of Potential Concern	Notes
California Water Resources Control Board - Waste Discharge System (CA WDS) Facilities	Nine new listings.		This database not included in 11/06 EDR report. A listing on this database indicates a continuous or seasonal waste discharge under waste discharge requirements. Each facility on this database was operating under at least one active discharge permit and no violations were noted. Based on this information a listing on this database poses a low risk of environmentally impacting the site
Registered Recycling Facility List (SWRCY) Facilities	One new listing located downgradient from and too far from the site to be a concern.		
Envirostor Facilities	Three new listings. All are located downgradient from and too far from the site to be a concern		
EDR Historical Auto Station Facilities	Five new listings. All are located downgradient from and/or too far from the site to be a concern		
EDR Historical Cleaner Facilities	One new listing located downgradient from and too far from the site to be a concern.		
Manufactured Gas Plant Facilities - updated 12/2008	This new EDR proprietary database includes records of manufactured coal gas plants (MCPGs) compliled by EDR's researchers. The byproducts from the MCPG process were frequently disposed of directly at the plant site and can serve as a continuous source of soil and groundwater contamination. The one new listing was located downgradient from and too far from the site to be a concern.		This database not included in 11/06 EDR report

I-880/29th Avenue Interchange Project
I-880/29th Avenue
Oakland, CA 94601

Inquiry Number: 2549972.1s
July 24, 2009

The EDR Radius Map™ Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
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www.edrnet.com

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GEOCHECK ADDENDUM

GeoCheck - Not Requested

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

I-880/29TH AVENUE
OAKLAND, CA 94601

COORDINATES

Latitude (North):	37.775000 - 37° 46' 30.0''
Longitude (West):	122.233300 - 122° 13' 59.9''
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	567521.6
UTM Y (Meters):	4180923.0
Elevation:	22 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	37122-G2 OAKLAND EAST, CA
Most Recent Revision:	1980
West Map:	37122-G3 OAKLAND WEST, CA
Most Recent Revision:	1980

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

EXECUTIVE SUMMARY

Federal RCRA generators list

RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Solid Waste Information System

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

AST ---------- Aboveground Petroleum Storage Tank Facilities
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---------- Open Dump Inventory
WMUDS/SWAT ---------- Waste Management Unit Database
HAULERS ---------- Registered Waste Tire Haulers Listing
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---------- Clandestine Drug Labs
Toxic Pits ---------- Toxic Pits Cleanup Act Sites
CDL ---------- Clandestine Drug Labs

Local Land Records

LIENS 2 ---------- CERCLA Lien Information
LUCIS ---------- Land Use Control Information System
LIENS ---------- Environmental Liens Listing

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System

CHMIRS	California Hazardous Material Incident Report System
LDS	Land Disposal Sites Listing
MCS	Military Cleanup Sites Listing

Other Ascertainable Records

DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
NPDES	NPDES Permits Listing
CA WDS	Waste Discharge System
WIP	Well Investigation Program Case List
HAZNET	Facility and Manifest Data
EMI	Emissions Inventory Data
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal CERCLIS list

EXECUTIVE SUMMARY

CERCLIS: The Comprehensive Environmental Response, Compensation and Liability Information System contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the CERCLIS list, as provided by EDR, and dated 01/09/2009 has revealed that there is 1 CERCLIS site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
AAAAA RENT-A-SPACE	2201 CLEMENT AVENUE	WSW 1/4 - 1/2 (0.435 mi.)	BN254	411

Federal CERCLIS NFRAP site List

CERC-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

A review of the CERC-NFRAP list, as provided by EDR, and dated 12/03/2007 has revealed that there are 3 CERC-NFRAP sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
US HUD OAKLAND CITY OF HOUSING	***1180 25TH AVENUE***	***N 1/8 - 1/4 (0.138 mi.)***	***121***	***182***
AMERICAN NATIONAL CAN CO	***3801 EAST 8TH ST***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK244***	***392***

Lower Elevation	Address	Direction / Distance	Map ID	Page
ESPOSITO PLATING & POLISHING C	***2904 CHAPMAN ST.***	***0 - 1/8 (0.000 mi.)***	***J32***	***37***

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 03/25/2009 has revealed that there is 1 CORRACTS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
AMERICAN NATIONAL CAN CO	***3801 EAST 8TH ST***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK244***	***392***

EXECUTIVE SUMMARY

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRA-TSDF list, as provided by EDR, and dated 11/12/2008 has revealed that there is 1 RCRA-TSDF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
AMERICAN NATIONAL CAN CO	***3801 EAST 8TH ST***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK244***	***392***

Federal RCRA generators list

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 11/12/2008 has revealed that there is 1 RCRA-LQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CLEVELAND STEEL CONTAINER CORP	***3100 E 10TH ST***	***E 1/8 - 1/4 (0.142 mi.)***	***AA122***	***184***

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 11/12/2008 has revealed that there are 31 RCRA-SQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SAV ON DRUG NO 3714	3000 E NINETH ST	0 - 1/8 (0.000 mi.)	6	9
SHELL SERVICE STATION	***820 PORTWOOD***	***0 - 1/8 (0.000 mi.)***	***E14***	***15***
ROADWAY EXPRESS	***2806 E 10TH ST***	***0 - 1/8 (0.000 mi.)***	***27***	***25***
CALTRANS 29TH AVE	***1112 29TH AVE***	***0 - 1/8 (0.000 mi.)***	***I29***	***26***
DEL MONTE USA OAKLAND #37	***1100 29TH ST***	***0 - 1/8 (0.000 mi.)***	***I31***	***33***
LUCASEY MANUFACTURING CORP	***2744 E 11TH ST***	***N 0 - 1/8 (0.025 mi.)***	***48***	***69***
GOLD SEAL PLATING	***3125 EAST 7TH STREET***	***SE 0 - 1/8 (0.109 mi.)***	***108***	***161***
US HUD OAKLAND CITY OF HOUSING	***1180 25TH AVENUE***	***N 1/8 - 1/4 (0.138 mi.)***	***121***	***182***
MONTGOMERY WARD BUILDING	***2825 E 14TH ST***	***NNE 1/8 - 1/4 (0.156 mi.)***	***AB124***	***192***
PACIFIC BELL	***1415 MITCHELL STREET***	***N 1/8 - 1/4 (0.200 mi.)***	***152***	***221***
DIAMOND DIESEL	***2550 E 12TH ST***	***N 1/8 - 1/4 (0.201 mi.)***	***AM155***	***223***
AMERICAN CONTRACTING SERV	***3229 SAN LEANDRO ST***	***E 1/8 - 1/4 (0.208 mi.)***	***AK156***	***226***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MELROSE FORD	*3050 E 14TH ST*	*ENE 1/8 - 1/4 (0.216 mi.)*	*AL158*	*229*
OAKLAND HOSPITAL	*2648 E 14TH ST*	*N 1/8 - 1/4 (0.225 mi.)*	*AN163*	*239*

Lower Elevation	Address	Direction / Distance	Map ID	Page
ESPOSITO PLATING & POLISHING C	*2904 CHAPMAN ST.*	*0 - 1/8 (0.000 mi.)*	*J32*	*37*
EXCHANGE LINEN SERVICE	*527 23RD AVE*	*WSW 0 - 1/8 (0.006 mi.)*	*K40*	*58*
SEATCO OFFICE SERVICES	*2921 CHAPMAN ST*	*S 0 - 1/8 (0.011 mi.)*	*J44*	*65*
FIDELITY PACKAGING CORP	*646 KENNEDY ST*	*WSW 0 - 1/8 (0.030 mi.)*	*M53*	*79*
EMPIRE PAPER CO	*655 KENNEDY ST*	*WSW 0 - 1/8 (0.035 mi.)*	*M55*	*84*
ANALYSTS INCORPORATED	*2910 FORD ST*	*S 0 - 1/8 (0.046 mi.)*	*P61*	*91*
GILRO STAMPING CO.	*2915-37 FORD ST*	*S 0 - 1/8 (0.049 mi.)*	*P62*	*97*
SEA POWER MARINE	*333 KENNEDY ST*	*WSW 0 - 1/8 (0.053 mi.)*	*Q66*	*100*
KILPATRICKS BAKERIES INC	*955 KENNEDY ST*	*N 0 - 1/8 (0.056 mi.)*	*R72*	*109*
CONSOLIDATED ENGINEERING LABS	*415 PETERSON ST*	*S 0 - 1/8 (0.072 mi.)*	*T85*	*128*
WISCO ENVELOPE CO	1021 COTTON ST	NNW 0 - 1/8 (0.106 mi.)	106	159
JOHNSON PROPELLER CO	*603 LANCASTER ST*	*SSE 0 - 1/8 (0.115 mi.)*	*109*	*167*
ICONOCO CALIFORNIA INC	*303 DERBY AVE*	*S 0 - 1/8 (0.116 mi.)*	*Y111*	*169*
SIMMONS TERMINAL CORP	*315 DERBY AVE*	*S 0 - 1/8 (0.116 mi.)*	*Y113*	*175*
HASLETT COMPANY	*1991 DENNISON STREET*	*WNW 1/8 - 1/4 (0.133 mi.)*	*119*	*180*
GENETROL BIOTHERAPEUTICS	*2220 LIVINGSTON ST STE*	*NNW 1/8 - 1/4 (0.172 mi.)*	*128*	*199*
MORGAN ENVIRONMENTAL SERVICES	*1091 CALCOT PL STE 2323*	*N 1/8 - 1/4 (0.242 mi.)*	*180*	*277*

State- and tribal - equivalent NPL

RESPONSE: Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

A review of the RESPONSE list, as provided by EDR, and dated 05/27/2009 has revealed that there are 4 RESPONSE sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
850 FORTY SECOND ST L L C	*850 42ND AVE*	*ESE 1/2 - 1 (0.654 mi.)*	*281*	*473*

Lower Elevation	Address	Direction / Distance	Map ID	Page
PORT OF OAKLAND - EMBARCADERO	*DENNISON AND EMBARCADER*	*WNW 1/8 - 1/4 (0.238 mi.)*	*AP173*	*252*
FORMER J. H. BAXTER FACILITY,	*2201 CLEMENT AVENUE*	*WSW 1/4 - 1/2 (0.435 mi.)*	*BN255*	*412*
ALAMEDA, NAVAL AND MARINE RESE	*2144 CLEMENT AVENUE*	*WSW 1/4 - 1/2 (0.483 mi.)*	*272*	*458*

State- and tribal - equivalent CERCLIS

ENVIROSTOR: The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to,

identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

A review of the ENVIROSTOR list, as provided by EDR, and dated 05/27/2009 has revealed that there are 19 ENVIROSTOR sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORMER MONTGOMERY WARD BUILDIN Status: Certified	***2825 INTERNATIONAL BOUL***	***NNE 1/8 - 1/4 (0.161 mi.)***	***AB125***	***194***
PG&E - FORMER OAKLAND STATION Status: Certified	***1134 MILLER AVENUE***	***N 1/8 - 1/4 (0.188 mi.)***	***AH141***	***209***
AMERICAN NATIONAL CAN Status: Refer: RWQCB	***3801 E 8TH ST***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK242***	***389***
DEWEY SENIOR HIGH SCHOOL Status: Certified	***3709 E 12TH ST***	***E 1/4 - 1/2 (0.478 mi.)***	***268***	***441***
850 FORTY SECOND ST L L C Status: Certified / Operation & Maintenance	***850 42ND AVE***	***ESE 1/2 - 1 (0.654 mi.)***	***281***	***473***
EAST BAY BLUE PRINT & SUPPLY C Status: Inactive - Needs Evaluation	***1745 14TH AVE***	***NNW 1/2 - 1 (0.924 mi.)***	***294***	***507***
WEST COAST FLOOR COVERING Status: No Further Action	***1468 44TH AVE***	***E 1/2 - 1 (0.938 mi.)***	***295***	***511***
FREMONT HIGH SCHOOL NO. 2 Status: Inactive - Needs Evaluation	***1201 46TH AVENUE***	***ESE 1/2 - 1 (0.987 mi.)***	***297***	***522***

Lower Elevation	Address	Direction / Distance	Map ID	Page
ESPOSITO PLATING CORPORATION Status: Active	***2904-2908 CHAPMAN STREE***	***S 0 - 1/8 (0.002 mi.)***	***J33***	***45***
PORT OF OAKLAND - EMBARCADERO Status: Certified / Operation & Maintenance	***DENNISON AND EMBARCADER***	***WNW 1/8 - 1/4 (0.238 mi.)***	***AP173***	***252***
COLLINS PROPERTY Status: Certified	***2235 CLEMENT AVENUE***	***WSW 1/4 - 1/2 (0.387 mi.)***	***BF232***	***367***
FORMER J. H. BAXTER FACILITY, Status: Active	***2201 CLEMENT AVENUE***	***WSW 1/4 - 1/2 (0.435 mi.)***	***BN255***	***412***
ALAMEDA, NAVAL AND MARINE RESE Status: Active	***2144 CLEMENT AVENUE***	***WSW 1/4 - 1/2 (0.483 mi.)***	***272***	***458***
EKOTEK LUBE (FORMER) Status: Refer: RWQCB	***4200 ALAMEDA AVENUE***	***SE 1/2 - 1 (0.603 mi.)***	***279***	***470***
BIG B LUMBERTERIA Status: Refer: RWQCB	301/411 HIGH STREET	SSE 1/2 - 1 (0.677 mi.)	283	489
KEN MIL COMPANY Status: Refer: Other Agency	***1829 CLEMENT AVE***	***WSW 1/2 - 1 (0.693 mi.)***	***285***	***492***
Not reported Status: Refer: RWQCB	***2015 GRAND STREET***	***W 1/2 - 1 (0.800 mi.)***	***288***	***495***
PACIFIC GALVANIZING INC. Status: Active	***715 46TH AVE***	***SE 1/2 - 1 (0.866 mi.)***	***290***	***499***
DUTCH BOY PAINT Status: Certified / Operation & Maintenance	***4701 SAN LEANDRO STREET***	***ESE 1/2 - 1 (0.966 mi.)***	***296***	***516***

EXECUTIVE SUMMARY

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the State Water Resources Control Board Leaking Underground Storage Tank Information System.

A review of the LUST list, as provided by EDR, and dated 07/07/2009 has revealed that there are 76 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
LEMOINE COLD STORAGE Status: Open - Site Assessment	***630 29TH AVE***	***0 - 1/8 (0.000 mi.)***	***D10***	***12***
CALTRANS 29TH AVE Status: Open - Verification Monitoring	***1112 29TH AVE***	***0 - 1/8 (0.000 mi.)***	***I29***	***26***
SAV ON DRUG 3714 Status: Completed - Case Closed	***3100 E NINETH ST***	***E 0 - 1/8 (0.041 mi.)***	***N58***	***88***
DEL MONTE PLANT #37 Status: Completed - Case Closed	3100 9TH	E 0 - 1/8 (0.041 mi.)	N59	90
AN FO MANUFACTURING COMPANY Status: Completed - Case Closed	***3129 ELMWOOD AVE***	***ESE 0 - 1/8 (0.093 mi.)***	***W94***	***141***
EANDI METAL WORKS INC Status: Open - Site Assessment	***976 23RD AVE***	***N 0 - 1/8 (0.096 mi.)***	***U99***	***148***
GOODWILL INDUSTRIES Status: Completed - Case Closed	***1301 30TH AVE***	***ENE 1/8 - 1/4 (0.130 mi.)***	***117***	***179***
STATE SHINGLE Status: Completed - Case Closed	***880 FRUITVALE AVE***	***E 1/8 - 1/4 (0.179 mi.)***	***AD131***	***202***
23RD AVENUE PARTNERS Status: Open - Site Assessment	1125 MILLER	N 1/8 - 1/4 (0.183 mi.)	AH140	209
OIL CHANGER #616 Status: Completed - Case Closed	***3132 12TH ST E***	***E 1/8 - 1/4 (0.188 mi.)***	***AE143***	***214***
MELROSE FORD Status: Completed - Case Closed	***3050 E 14TH ST***	***ENE 1/8 - 1/4 (0.216 mi.)***	***AL158***	***229***
ST JOSEPH PROFESSIONAL CENTER Status: Completed - Case Closed	***2647 14TH ST E***	***N 1/8 - 1/4 (0.220 mi.)***	***AN160***	***235***
TRI CITY CLEANERS Status: Completed - Case Closed	***2560 14TH ST E***	***N 1/4 - 1/2 (0.259 mi.)***	***AR187***	***288***
DELAWARE DEVELOPMENT COMPANY Status: Completed - Case Closed	***2530 14TH ST E***	***N 1/4 - 1/2 (0.274 mi.)***	***191***	***290***
MEL SENNA BRAKE SERVICE INC Status: Open - Remediation	2301 12TH ST E	N 1/4 - 1/2 (0.279 mi.)	AV196	292
ARCO #0402 / PARKING LOT Status: Open - Site Assessment	1450 FRUITVALE	E 1/4 - 1/2 (0.294 mi.)	AX200	302
STANDARD BRANDS PAINT Status: Completed - Case Closed	***2442 14TH ST E***	***N 1/4 - 1/2 (0.297 mi.)***	***202***	***303***
TAXI TAXI INC Status: Open - Remediation	2345 14TH ST E	N 1/4 - 1/2 (0.330 mi.)	BB211	324
CHEVRON Status: Open - Site Assessment	3616 SAN LEANDRO ST	E 1/4 - 1/2 (0.390 mi.)	BH234	374
CHEVRON TRAINING CENTER Status: Open - Site Assessment	3616 SAN LEANDRO ST	E 1/4 - 1/2 (0.390 mi.)	BH235	375

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TSK AMERICAN CAN COMPAY Status: Completed - Case Closed	***3801 8TH ST E***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK245***	***400***
JOHN B HENRY ESTATE Status: Completed - Case Closed	1726 PARK	SW 1/4 - 1/2 (0.418 mi.)	BM248	402
JOHN B HENRY ESTATE	***1726 PARK ST***	***SW 1/4 - 1/2 (0.419 mi.)***	***BM249***	***403***
EXXON REGAL Status: Open - Remediation	***1725 PARK ST***	***SW 1/4 - 1/2 (0.419 mi.)***	***BM250***	***404***
XTRA OIL COMPANY Status: Open - Remediation	***1701 PARK ST***	***SW 1/4 - 1/2 (0.433 mi.)***	***BM252***	***408***
CAVANAUGH MOTORS Status: Completed - Case Closed	***1700 PARK ST***	***SW 1/4 - 1/2 (0.436 mi.)***	***BM257***	***427***
WALT'S TRANSMISSION Status: Open - Site Assessment	1723 FRUITVALE	NE 1/4 - 1/2 (0.459 mi.)	BQ264	436
ON TIME TOWING Status: Completed - Case Closed	***3800 WATTLING ST***	***ESE 1/4 - 1/2 (0.463 mi.)***	***266***	***437***
ALAMEDA FORD Status: Completed - Case Closed	***1650 PARK ST***	***SW 1/4 - 1/2 (0.481 mi.)***	***BR269***	***451***
TONY'S EXPRESS AUTO SERVICE Status: Open - Remediation	3609 14TH ST E	E 1/4 - 1/2 (0.481 mi.)	BS270	456
GOOD CHEVROLET	***1630 PARK ST***	***SW 1/4 - 1/2 (0.496 mi.)***	***BR275***	***463***
GOOD CHEVROLET Status: Open - Site Assessment	***1630 PARK ST***	***SW 1/4 - 1/2 (0.496 mi.)***	***BR276***	***466***
GUY'S SERVICE STATION Status: Open - Site Assessment	***3820 SAN LEANDRO ST***	***E 1/4 - 1/2 (0.500 mi.)***	***277***	***469***

Lower Elevation	Address	Direction / Distance	Map ID	Page
HOLT VISUAL COMMUNICATIONS Status: Completed - Case Closed	***802 KENNEDY ST***	***0 - 1/8 (0.000 mi.)***	***A4***	***8***
OAKLAND PORT OF Status: Open - Site Assessment	***2700 7TH ST***	***0 - 1/8 (0.000 mi.)***	***H22***	***22***
FILLMORE MARKS PROPERTY Status: Completed - Case Closed	***534 23RD AVE***	***WSW 0 - 1/8 (0.005 mi.)***	***K37***	***52***
SARONI TOTAL FOOD Status: Completed - Case Closed	***727 KENNEDY ST***	***WSW 0 - 1/8 (0.005 mi.)***	***A39***	***55***
EXCHANGE LINEN SERVICE Status: Completed - Case Closed	***527 23RD AVE***	***WSW 0 - 1/8 (0.006 mi.)***	***K40***	***58***
BAY AREA DIABLO PETROLEUM COMP Status: Open - Site Assessment	***421 23RD AVE***	***WSW 0 - 1/8 (0.026 mi.)***	***L51***	***75***
RIGHT AWAY READY MIX INC Status: Completed - Case Closed	***435 23RD AVE***	***WSW 0 - 1/8 (0.028 mi.)***	***L52***	***78***
FIDELITY PACKAGING CORP Status: Completed - Case Closed	***646 KENNEDY ST***	***WSW 0 - 1/8 (0.030 mi.)***	***M53***	***79***
RHODES & JAMIESON BATCH PLANT Status: Open - Site Assessment	333 KENNEDY ST	WSW 0 - 1/8 (0.053 mi.)	Q65	100
EARTHGRAINS BAKING COMPANY Status: Open - Site Assessment	955 KENNEDY	N 0 - 1/8 (0.056 mi.)	R68	103

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
KILPATRICK'S BAKERY INC GARAGE Status: Completed - Case Closed	***955 KENNEDY ST***	***N 0 - 1/8 (0.056 mi.)***	***R70***	***107***
GLASCOCK AVE WAREHOUSE Status: Open - Verification Monitoring	***2901 GLASCOCK AVE***	***S 0 - 1/8 (0.082 mi.)***	***T90***	***134***
RIGHT AWAY READY MIX INC Status: Completed - Case Closed	***401 KENNEDY ST***	***WSW 0 - 1/8 (0.085 mi.)***	***V92***	***139***
ICONOCO CALIFORNIA INC Status: Completed - Case Closed	***303 DERBY AVE***	***S 0 - 1/8 (0.116 mi.)***	***Y111***	***169***
SIMMONS OIL CORPORATION Status: Open - Site Assessment	315 DERBY AVE	S 1/8 - 1/4 (0.175 mi.)	AC130	202
CONAGRA INC Status: Open - Site Assessment	2201 7TH ST E	WSW 1/8 - 1/4 (0.180 mi.)	AF134	205
WEST COAST VENDING INC Status: Open - Site Assessment	***2124 LIVINGSTON ST***	***NNW 1/8 - 1/4 (0.191 mi.)***	***AI145***	***215***
DEL MONTE PLANT #26 Status: Completed - Case Closed	***400 LANCASTER ST***	***S 1/8 - 1/4 (0.191 mi.)***	***AJ146***	***216***
KILPATRICK'S BAKERY INC Status: Completed - Case Closed	***2100 LIVINGSTON ST***	***NW 1/8 - 1/4 (0.199 mi.)***	***AI151***	***220***
ALLIED ENGINEERING CORPORATION Status: Open - Site Assessment	2421 BLANDING	SSW 1/8 - 1/4 (0.230 mi.)	AO165	241
ALAMEDA ELECTRIC Status: Completed - Case Closed	***2420 BLANDING AVE***	***SSW 1/8 - 1/4 (0.230 mi.)***	***AO166***	***241***
DOLORES STAUNDENRAUS Status: Completed - Case Closed	***2424 BLANDING AVE***	***SSW 1/8 - 1/4 (0.231 mi.)***	***AO168***	***245***
CHILDRENS HOSPITAL Status: Completed - Case Closed	***1050 22ND AVE***	***NNW 1/4 - 1/2 (0.259 mi.)***	***AT186***	***287***
FIRST SAMOAN CONGREGATIONAL CH Status: Completed - Case Closed	2526 BLANDING AVE	S 1/4 - 1/2 (0.263 mi.)	AS189	289
PARK ST LANDING Status: Completed - Case Closed	2301 BLANDING AVE	WSW 1/4 - 1/2 (0.277 mi.)	AU193	291
ALAMEDA COLLISION REPAIR INCOR Status: Completed - Case Closed	***1911 PARK STREET***	***SW 1/4 - 1/2 (0.291 mi.)***	***198***	***293***
CLAMP SWING Status: Open - Site Assessment	2515 BLANDING	S 1/4 - 1/2 (0.291 mi.)	AW199	302
STONE BOAT YARD Status: Completed - Case Closed	2517 BLANDING	S 1/4 - 1/2 (0.298 mi.)	AW203	304
OWENS BROCKWAY GLASS CONTAINER Status: Open - Site Assessment	***3600 ALAMEDA AVE***	***SSE 1/4 - 1/2 (0.318 mi.)***	***AZ208***	***307***
CONTRACTORS EQUIPMENT RENTAL Status: Completed - Case Closed	2250 12TH ST E	N 1/4 - 1/2 (0.320 mi.)	BA209	322
ALPHA BETA Status: Open - Site Assessment	2691 BLANDING AVE	S 1/4 - 1/2 (0.345 mi.)	BC215	326
RON GOODE RAMBLER & TOYOTA Status: Completed - Case Closed	***1825 PARK ST***	***SW 1/4 - 1/2 (0.350 mi.)***	***BD218***	***327***
EXXON Status: Open - Remediation	2200 12TH ST E	N 1/4 - 1/2 (0.360 mi.)	BE222	358

Lower Elevation	Address	Direction / Distance	Map ID	Page
CHEVRON Status: Completed - Case Closed	***1801 PARK ST***	***SW 1/4 - 1/2 (0.367 mi.)***	***BD225***	***359***
CAMISA BROS ROOFING Status: Completed - Case Closed	***1901 BROADWAY***	***S 1/4 - 1/2 (0.368 mi.)***	***227***	***362***
CLEMENT AVENUE PROJECT Status: Completed - Case Closed	***2241 CLEMENT AVE***	***WSW 1/4 - 1/2 (0.382 mi.)***	***BF229***	***364***
CHEVRON Status: Completed - Case Closed	2142 12TH ST E	N 1/4 - 1/2 (0.386 mi.)	BG230	365
ORIENTAL AUTO SALES Status: Completed - Case Closed	***2200 14TH ST E***	***N 1/4 - 1/2 (0.414 mi.)***	***BL247***	***401***
CLIFFORD E MAPES INC Status: Completed - Case Closed	***2001 VERSAILLES AVE***	***S 1/4 - 1/2 (0.423 mi.)***	***251***	***407***
ARCO Status: Completed - Case Closed	***2032 12TH ST E***	***NNW 1/4 - 1/2 (0.445 mi.)***	***BO260***	***431***
ALAMEDA UNIFIED SCHOOL DISTRIC Status: Completed - Case Closed	***2615 EAGLE AVE***	***S 1/4 - 1/2 (0.452 mi.)***	***BP263***	***435***
WILLIAM WURZBACH COMPANY Status: Open - Remediation	***1200 20TH AVE***	***NNW 1/4 - 1/2 (0.464 mi.)***	***BO267***	***440***
LERNER COMPANY Status: Completed - Case Closed	***3675 ALAMEDA AVE***	***SE 1/4 - 1/2 (0.483 mi.)***	***BT273***	***461***

SLIC: SLIC Region comes from the California Regional Water Quality Control Board.

A review of the SLIC list, as provided by EDR, and dated 07/07/2009 has revealed that there are 21 SLIC sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ROADWAY EXPRESS,INC Facility Status: Open - Inactive	1125 27TH AVE	N 0 - 1/8 (0.010 mi.)	42	63
BLUE DOG / HARDING DEVELOPMENT Facility Status: Open - Site Assessment	***3001-3007 E 12TH ST***	***E 0 - 1/8 (0.106 mi.)***	***107***	***160***
FRUITVALE TRANSIT VILLAGE Facility Status: Open - Verification Monitoring	3501-3601 E 12TH ST	E 1/4 - 1/2 (0.406 mi.)	BJ240	382
AMERICAN NATIONAL CAN Facility Status: Completed - Case Closed	***3801 E 8TH ST***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK242***	***389***

Lower Elevation	Address	Direction / Distance	Map ID	Page
ATWOOD INDUSTRIES INC Facility Status: Open - Inactive	2915 FORD ST	S 0 - 1/8 (0.049 mi.)	P63	98
CHEVRON Facility Status: Completed - Case Closed	***333 23RD AVE***	***WSW 0 - 1/8 (0.057 mi.)***	***O75***	***116***
CHEVRON #20-6142 / RMC LONESTA Facility Status: Completed - Case Closed	333 23RD	SW 0 - 1/8 (0.058 mi.)	O77	123
GLASCOCK PROPERTIES (TOXICS) Facility Status: Completed - Case Closed	2901 GLASCOCK	S 0 - 1/8 (0.082 mi.)	T89	133
FORMER INDUSTRIAL STEAM PROPER Facility Status: Completed - Case Closed	2985 FORD STREET	S 0 - 1/8 (0.094 mi.)	X97	147

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
F&F PRECISION GRINDING Facility Status: Completed - Case Closed	510 DERBY	S 0 - 1/8 (0.099 mi.)	X102	157
SOUTHERN PACIFIC TRANSPORTATIO Facility Status: Completed - Case Closed	0 FRUITVALE	S 1/8 - 1/4 (0.192 mi.)	AJ148	219
ALLIED ENGINEERING PRODUCT CO Facility Status: Open - Inactive	***2421 BLANDING AVE***	***SSW 1/8 - 1/4 (0.230 mi.)***	***AO167***	***243***
BYTECH CHEMICAL Facility Status: Open - Inactive	***1905 DENNISON ST***	***WNW 1/8 - 1/4 (0.231 mi.)***	***AP171***	***250***
CRYER BOATYARD FORMER	1899 DENNISON ST	WNW 1/8 - 1/4 (0.240 mi.)	AP176	274
CRYER-STEAMVALVE Facility Status: Open	1899 DENNISON ST.	WNW 1/8 - 1/4 (0.240 mi.)	AP177	275
PARK STREET LANDING Facility Status: Open - Verification Monitoring	2301-2337 BLANDING	WSW 1/4 - 1/2 (0.277 mi.)	AU194	292
BRIDGESIDE SHOPPING CENTER Facility Status: Completed - Case Closed	2523-2691 BLANDING	S 1/4 - 1/2 (0.314 mi.)	AY205	305
OWENS ILLINOIS INC GCD 20 Facility Status: Completed - Case Closed	***3600 ALAMEDA AVE***	***SSE 1/4 - 1/2 (0.318 mi.)***	***AZ207***	***306***
FOX PROPERTY Facility Status: Open - Inactive	***2229 CLEMENT AVE***	***WSW 1/4 - 1/2 (0.391 mi.)***	***BF237***	***376***
SKS DIE CASTING AND MACHINING Facility Status: Completed - Case Closed	1849 OAK	SW 1/4 - 1/2 (0.394 mi.)	BI239	382
LEARNER COMPANY Facility Status: Completed - Case Closed	3675 ALAMEDA AVE	SE 1/4 - 1/2 (0.483 mi.)	BT274	462

Alameda County CS: A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

A review of the Alameda County CS list, as provided by EDR, and dated 04/24/2009 has revealed that there are 76 Alameda County CS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
LEMOINE COLD STORAGE	***630 29TH AVE***	***0 - 1/8 (0.000 mi.)***	***D10***	***12***
HANS AND GUNTER ROOFING COMPAN	2834 E 7TH ST	0 - 1/8 (0.000 mi.)	28	26
CALTRANS 29TH AVE	***1112 29TH AVE***	***0 - 1/8 (0.000 mi.)***	***I29***	***26***
LUCASEY MANUFACTURING CORP	***2744 E 11TH ST***	***N 0 - 1/8 (0.025 mi.)***	***48***	***69***
PLANT #237	***3100 E 9TH ST***	***E 0 - 1/8 (0.041 mi.)***	***N57***	***87***
AN-FO MANUFACTURING CO.	***3129 ELMWOOD AVE***	***ESE 0 - 1/8 (0.093 mi.)***	***W95***	***145***
BLUE DOG / HARDING DEVELOPMENT	***3001-3007 E 12TH ST***	***E 0 - 1/8 (0.106 mi.)***	***107***	***160***
EANDI METAL WORKS INC	2440 E 11TH ST	N 0 - 1/8 (0.121 mi.)	Z115	178
GOODWILL INDUSTRIES	***1301 30TH AVE***	***ENE 1/8 - 1/4 (0.130 mi.)***	***117***	***179***
STATE SHINGLE	***880 FRUITVALE AVE***	***E 1/8 - 1/4 (0.179 mi.)***	***AD131***	***202***
23RD AVENUE PARTNERS	***1125 MILLER PL***	***N 1/8 - 1/4 (0.182 mi.)***	***AH138***	***206***
OIL CHANGER #616	***3132 12TH ST E***	***E 1/8 - 1/4 (0.188 mi.)***	***AE143***	***214***
MELROSE FORD	3050 INTERNATIONAL BLVD	ENE 1/8 - 1/4 (0.198 mi.)	AL150	220
OAKLAND DENTAL ASSOCIATES	***2647 INTERNATIONAL BLVD***	***N 1/8 - 1/4 (0.220 mi.)***	***AN161***	***236***
TRI CITY CLEANERS	2560 INTERNATIONAL BLVD	N 1/4 - 1/2 (0.256 mi.)	AR181	280
ERNIE'S AUTOMOTIVE	2400 E 12TH ST	N 1/4 - 1/2 (0.258 mi.)	184	286
DELAWARE DEVELOPMENT CORPORATI	2530 INTERNATIONAL BLVD	N 1/4 - 1/2 (0.260 mi.)	AR188	289

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MEL SENNA BRAKE SERVICE	2301 E 12TH ST	N 1/4 - 1/2 (0.279 mi.)	AV197	293
ARCO #0402 / PARKING LOT	1450 FRUITVALE AVE	E 1/4 - 1/2 (0.294 mi.)	AX201	303
TAXI TAXI INC	2345 INTERNATIONAL BLVD	N 1/4 - 1/2 (0.337 mi.)	BB214	325
TERRY MCILRAITH	***3616 SAN LEANDRO ST***	***E 1/4 - 1/2 (0.390 mi.)***	***BH236***	***375***
AMERICAN NATIONAL CAN CO	***3801 E 8TH ST***	***ESE 1/4 - 1/2 (0.413 mi.)***	***BK243***	***390***
JOHN B HENRY ESTATE	***1726 PARK ST***	***SW 1/4 - 1/2 (0.419 mi.)***	***BM249***	***403***
EXXON REGAL	***1725 PARK ST***	***SW 1/4 - 1/2 (0.419 mi.)***	***BM250***	***404***
XTRA OIL	1701 PARK ST	SW 1/4 - 1/2 (0.433 mi.)	BM253	411
CAVANAUGH MOTORS INC	***1700 PARK ST***	***SW 1/4 - 1/2 (0.436 mi.)***	***BM258***	***429***
WALT'S TRANSMISSION	1723 FRUITVALE AVE	NE 1/4 - 1/2 (0.459 mi.)	BQ265	437
ON TIME TOWING	***3800 WATTLING ST***	***ESE 1/4 - 1/2 (0.463 mi.)***	***266***	***437***
ALAMEDA FORD	***1650 PARK ST***	***SW 1/4 - 1/2 (0.481 mi.)***	***BR269***	***451***
MOSTLY JAPANESE AUTO SERVICE	***3609 INTERNATIONAL BLVD***	***E 1/4 - 1/2 (0.482 mi.)***	***BS271***	***456***
GOOD CHEVROLET	***1630 PARK ST***	***SW 1/4 - 1/2 (0.496 mi.)***	***BR276***	***466***
GUY'S SERVICE STATION	***3820 SAN LEANDRO ST***	***E 1/4 - 1/2 (0.500 mi.)***	***277***	***469***

Lower Elevation	Address	Direction / Distance	Map ID	Page
HOLT VISUAL COMMUNICATION	802 KENNEDY ST	0 - 1/8 (0.000 mi.)	A1	7
PORT OF OAKLAND	2700 7TH ST	0 - 1/8 (0.000 mi.)	H26	25
FILLMORE MARKS PROPERTY	***534 23RD AVE***	***WSW 0 - 1/8 (0.005 mi.)***	***K37***	***52***
SARONI TOTAL FOOD	***727 KENNEDY ST***	***WSW 0 - 1/8 (0.005 mi.)***	***A39***	***55***
EXCHANGE LINEN SERVICE	***527 23RD AVE***	***WSW 0 - 1/8 (0.006 mi.)***	***K40***	***58***
BAY AREA DIABLO PETROLEUM COMP	***421 23RD AVE***	***WSW 0 - 1/8 (0.026 mi.)***	***L51***	***75***
FIDELITY PACKAGING CORP	***646 KENNEDY ST***	***WSW 0 - 1/8 (0.030 mi.)***	***M53***	***79***
KILPATRICK'S BAKERY INC GARAGE	***955 KENNEDY ST***	***N 0 - 1/8 (0.056 mi.)***	***R70***	***107***
CHEVRON	***333 23RD AVE***	***WSW 0 - 1/8 (0.057 mi.)***	***O75***	***116***
GLASCOCK AVE WAREHOUSE	***2901 GLASCOCK AVE***	***S 0 - 1/8 (0.082 mi.)***	***T90***	***134***
RIGHT AWAY READY MIX INC	***401 KENNEDY ST***	***WSW 0 - 1/8 (0.085 mi.)***	***V92***	***139***
F&F PRECISION GRINDING	510 DERBY AVE	S 0 - 1/8 (0.099 mi.)	X104	158
WEST COAST VENDING INC	***2124 LIVINGSTON ST***	***NNW 1/8 - 1/4 (0.191 mi.)***	***AI145***	***215***
DEL MONTE PLANT #26	***400 LANCASTER ST***	***S 1/8 - 1/4 (0.191 mi.)***	***AJ146***	***216***
KILPATRICK'S BAKERY INC	***2100 LIVINGSTON ST***	***NW 1/8 - 1/4 (0.199 mi.)***	***AI151***	***220***
ALAMEDA ELECTRIC	***2420 BLANDING AVE***	***SSW 1/8 - 1/4 (0.230 mi.)***	***AO166***	***241***
ALLIED ENGINEERING PRODUCT CO	***2421 BLANDING AVE***	***SSW 1/8 - 1/4 (0.230 mi.)***	***AO167***	***243***
DOLORES STAUNDENRAUS	***2424 BLANDING AVE***	***SSW 1/8 - 1/4 (0.231 mi.)***	***AO168***	***245***
PORT OF OAKLAND	***1899 DENNISON ST***	***WNW 1/8 - 1/4 (0.240 mi.)***	***AP178***	***275***
WILFRED & WILMA GARFINKLE	***2515 BLANDING AVE***	***S 1/4 - 1/2 (0.256 mi.)***	***AS182***	***280***
STONE BOAT YARD INC	***2517 BLANDING AVE***	***S 1/4 - 1/2 (0.257 mi.)***	***AS183***	***281***
CHILDREN'S HOSPITAL	1050 22ND AVE	NNW 1/4 - 1/2 (0.259 mi.)	AT185	287
FIRST SAMOAN CONGREGATION	2526 BLANDING AVE	S 1/4 - 1/2 (0.263 mi.)	AS190	290
PARK STREET LANDING	2301-2337 BLANDING AVE	WSW 1/4 - 1/2 (0.277 mi.)	AU192	291
ALAMEDA COLLISION REPAIR INCOR	***1911 PARK STREET***	***SW 1/4 - 1/2 (0.291 mi.)***	***198***	***293***
BRIDGESIDE SHOPPING CENTER	2523-2691 BLANDING AVE	S 1/4 - 1/2 (0.314 mi.)	AY204	304
OWENS BROCKWAY GLASS CONTAINER	***3600 ALAMEDA AVE***	***SSE 1/4 - 1/2 (0.318 mi.)***	***AZ208***	***307***
ACTION RENTALS	***2250 E 12TH ST***	***N 1/4 - 1/2 (0.320 mi.)***	***BA210***	***323***
RON GOODE RAMBLER & TOYOTA	***1825 PARK ST***	***SW 1/4 - 1/2 (0.350 mi.)***	***BD218***	***327***
EXXON R/S #7-0238	***2200 E 12TH ST***	***N 1/4 - 1/2 (0.360 mi.)***	***BE221***	***353***
SOUTHERN PACIFIC TRANSPORTATIO	0 E 12TH ST / 22ND AV	N 1/4 - 1/2 (0.361 mi.)	BE223	359
CHEVRON	***1801 PARK ST***	***SW 1/4 - 1/2 (0.367 mi.)***	***BD225***	***359***
CAMISA BROS ROOFING	***1901 BROADWAY***	***S 1/4 - 1/2 (0.368 mi.)***	***227***	***362***
CLEMENT AVENUE PROJECT	***2241 CLEMENT AVE***	***WSW 1/4 - 1/2 (0.382 mi.)***	***BF229***	***364***
CHEVRON USA #201919	***2142 E 12TH ST***	***N 1/4 - 1/2 (0.386 mi.)***	***BG231***	***366***
RELIANCE SHEET & STRIP COMPANY	***2235 CLEMENT AVE***	***WSW 1/4 - 1/2 (0.387 mi.)***	***BF233***	***372***
SKS DIE CASTING INCORPORATED	***1849 OAK ST.***	***SW 1/4 - 1/2 (0.394 mi.)***	***BI238***	***378***
EXXON #7-7516 / CONTINENTAL AU	2200 INTERNATIONAL BLVD	N 1/4 - 1/2 (0.414 mi.)	BL246	401

Lower Elevation	Address	Direction / Distance	Map ID	Page
CLIFFORD E MAPES INC	***2001 VERSAILLES AVE***	***S 1/4 - 1/2 (0.423 mi.)***	***251***	***407***
FORMER J. H. BAXTER FACILITY,	***2201 CLEMENT AVENUE***	***WSW 1/4 - 1/2 (0.435 mi.)***	***BN255***	***412***
SMITH-RICE COMPANY YARD	***2199 CLEMENT AVE***	***WSW 1/4 - 1/2 (0.435 mi.)***	***BN256***	***425***
ARCO SERVICE	***2032 E 12TH ST***	***NNW 1/4 - 1/2 (0.445 mi.)***	***BO261***	***432***
ALAMEDA UNIFIED SCHOOL DISTRIC	***2615 EAGLE AVE***	***S 1/4 - 1/2 (0.452 mi.)***	***BP263***	***435***
WILLIAM WURZBACH COMPANY	***1200 20TH AVE***	***NNW 1/4 - 1/2 (0.464 mi.)***	***BO267***	***440***

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the UST list, as provided by EDR, and dated 07/07/2009 has revealed that there are 6 UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
SARONI T.F.I.	727 KENNEDY ST	WSW 0 - 1/8 (0.005 mi.)	A38	54
OAKLAND CARDLOCK	421 23RD AVE	WSW 0 - 1/8 (0.026 mi.)	L49	72
THE EARTHGRAINS CO.	955 KENNEDY ST	N 0 - 1/8 (0.056 mi.)	R71	109
RMC LONESTAR	***333 23RD AVE***	***WSW 0 - 1/8 (0.057 mi.)***	***O76***	***119***
RIGHT AWAY REDY MIX INC	***401 KENNEDY STREET***	***WSW 0 - 1/8 (0.085 mi.)***	***V91***	***135***
ACKER & GUERRERO ROOF COMPANY	1092 CALCOT PL	N 1/8 - 1/4 (0.219 mi.)	159	235

State and tribal voluntary cleanup sites

VCP: Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

A review of the VCP list, as provided by EDR, and dated 05/27/2009 has revealed that there are 3 VCP sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PG&E - FORMER OAKLAND STATION	***1134 MILLER AVENUE***	***N 1/8 - 1/4 (0.188 mi.)***	***AH141***	***209***

Lower Elevation	Address	Direction / Distance	Map ID	Page
ESPOSITO PLATING CORPORATION	***2904-2908 CHAPMAN STREE***	***S 0 - 1/8 (0.002 mi.)***	***J33***	***45***
COLLINS PROPERTY	***2235 CLEMENT AVENUE***	***WSW 1/4 - 1/2 (0.387 mi.)***	***BF232***	***367***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

EXECUTIVE SUMMARY

US BROWNFIELDS: The EPA's listing of Brownfields properites addressed by Cooperative Agreement Recipients and Brownfields properties addressed by Targeted Brownfields Assessments

A review of the US BROWNFIELDS list, as provided by EDR, and dated 10/01/2008 has revealed that there are 2 US BROWNFIELDS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BART PARKING LOT	3501-3601 E. 12TH STREE	E 1/4 - 1/2 (0.406 mi.)	BJ241	383
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
URBAN PROMISE ACADEMY - OAKLAN	2200-2288 EAST 12TH ST/	N 1/4 - 1/2 (0.355 mi.)	BE219	332

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: A listing of recycling facilities in California.

A review of the SWRCY list, as provided by EDR, and dated 04/07/2009 has revealed that there is 1 SWRCY site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NEXCYCLE	2531 BLANDING AVE	S 1/4 - 1/2 (0.315 mi.)	AY206	305

Local Lists of Hazardous waste / Contaminated Sites

HIST Cal-Sites: Formerly known as ASPIS, this database contains both known and potential hazardous substance sites. The source is the California Department of Toxic Substance Control. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

A review of the HIST Cal-Sites list, as provided by EDR, and dated 08/08/2005 has revealed that there are 3 HIST Cal-Sites sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
850 FORTY SECOND ST L L C	***850 42ND AVE***	***ESE 1/2 - 1 (0.654 mi.)***	***281***	***473***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
PORT OF OAKLAND - EMBARCADERO	***DENNISON AND EMBARCADER***	***WNW 1/8 - 1/4 (0.238 mi.)***	***AP173***	***252***
FORMER J. H. BAXTER FACILITY,	***2201 CLEMENT AVENUE***	***WSW 1/4 - 1/2 (0.435 mi.)***	***BN255***	***412***

SCH: This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category. depending on the level of threat to public health and safety or the. environment they pose.

A review of the SCH list, as provided by EDR, and dated 05/27/2009 has revealed that there is 1 SCH site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORMER MONTGOMERY WARD BUILDIN	***2825 INTERNATIONAL BOUL***	***NNE 1/8 - 1/4 (0.161 mi.)***	***AB125***	***194***

Local Lists of Registered Storage Tanks

CA FID UST: The Facility Inventory Database contains active and inactive underground storage tank locations. The source is the State Water Resource Control Board.

A review of the CA FID UST list, as provided by EDR, and dated 10/31/1994 has revealed that there are 31 CA FID UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PORTWOOD SHELL	820 PORTWOOD	0 - 1/8 (0.000 mi.)	E13	15
SOUTH OAKLAND	1112 029TH AVE	0 - 1/8 (0.000 mi.)	19	19
DEL MONTE-PLANT #37	***2980 E 009TH ST***	***0 - 1/8 (0.000 mi.)***	***D21***	***21***
DEL MONTE USA OAKLAND #37	***1100 29TH ST***	***0 - 1/8 (0.000 mi.)***	***I31***	***33***
PLANT #237	***3100 E 009TH ST***	***ESE 0 - 1/8 (0.068 mi.)***	***82***	***126***
T-GAS	***3132 E 012TH ST***	***E 0 - 1/8 (0.071 mi.)***	***84***	***127***
FLEMING COMPANIES	***2530 E 011TH ST***	***N 0 - 1/8 (0.080 mi.)***	***U88***	***133***
EANDI METAL WORKS INC	***976 23RD AVE***	***N 0 - 1/8 (0.096 mi.)***	***U99***	***148***
HEITZ TRUCKING INC	1125 MILLER PO BOX 6607	N 0 - 1/8 (0.125 mi.)	Z116	178
NORTON PACKAGING INCORPORATED	***3100 EAST 10TH STREET***	***E 1/8 - 1/4 (0.142 mi.)***	***AA123***	***190***
STATE SHINGLE	***880 FRUITVALE AVE***	***E 1/8 - 1/4 (0.179 mi.)***	***AD131***	***202***
AMERICAN CONTRACTING SERV INC	***3229 SAN LEANDRO ST***	***E 1/8 - 1/4 (0.208 mi.)***	***AK157***	***228***
MELROSE FORD	***3050 E 14TH ST***	***ENE 1/8 - 1/4 (0.216 mi.)***	***AL158***	***229***

Lower Elevation	Address	Direction / Distance	Map ID	Page
HOLT GRAPHIC ARTS INC	***800 KENNEDY ST***	***0 - 1/8 (0.000 mi.)***	***A7***	***10***
ANDRADE WAREHOUSE	***2914 E 007TH ST***	***0 - 1/8 (0.000 mi.)***	***B16***	***18***
SERVICE BRASS AND ALUMINUM FOU	***2870 CHAPMAN ST***	***0 - 1/8 (0.000 mi.)***	***B17***	***18***
N. V. HEATHORN INC.	***2846 CHAPMAN ST***	***0 - 1/8 (0.000 mi.)***	***G20***	***20***
VULCAN STEEL FOUNDRY	***2909 CHAPMAN ST***	***S 0 - 1/8 (0.003 mi.)***	***J34***	***48***
SARONI TOTAL FOOD	***727 KENNEDY ST***	***WSW 0 - 1/8 (0.005 mi.)***	***A39***	***55***
B & J FORKLIFT INC	***430 23RD AVE***	***WSW 0 - 1/8 (0.023 mi.)***	***L47***	***68***
VACANT LOT	***534 023RD AVE***	***WSW 0 - 1/8 (0.030 mi.)***	***54***	***83***
ANALYSTS INCORPORATED	***2910 FORD ST***	***S 0 - 1/8 (0.046 mi.)***	***P61***	***91***
KILPATRICKS BAKERIES INC	***955 KENNEDY ST***	***N 0 - 1/8 (0.056 mi.)***	***R72***	***109***
RMC LONESTAR	***333 023RD AVE***	***SW 0 - 1/8 (0.059 mi.)***	***O78***	***123***
ALAMEDA COUNTY MOSQUITO ABATE.	***3024 E 007TH ST***	***S 0 - 1/8 (0.062 mi.)***	***79***	***124***
RIGHT AWAY READY MIX INC	***401 KENNEDY ST***	***WSW 0 - 1/8 (0.085 mi.)***	***V92***	***139***
INDUSTRIAL STEAM	***2985 FORD ST***	***S 0 - 1/8 (0.094 mi.)***	***X96***	***146***
PETRO-STOP INC	***315 DERBY***	***S 0 - 1/8 (0.116 mi.)***	***Y112***	***174***
DEL MONTE PLANT #26	***400 LANCASTER ST***	***S 1/8 - 1/4 (0.191 mi.)***	***AJ146***	***216***
ALAMEDA ELECTRIC	***2420 BLANDING AVE***	***SSW 1/8 - 1/4 (0.230 mi.)***	***AO166***	***241***
BYTECH CHEMICAL CORPORATION	***1905 DENNISON ST***	***WNW 1/8 - 1/4 (0.231 mi.)***	***AP170***	***247***

HIST UST: Historical UST Registered Database.

A review of the HIST UST list, as provided by EDR, and dated 10/15/1990 has revealed that there are 32 HIST UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PORTWOOD SHELL	***820 PORTWOOD AVE***	***0 - 1/8 (0.000 mi.)***	***E11***	***13***
DEL MONTE-PLANT #37	2980 E. 9TH STREET	0 - 1/8 (0.000 mi.)	12	14
DEL MONTE USA OAKLAND #37	***1100 29TH ST***	***0 - 1/8 (0.000 mi.)***	***I31***	***33***
ALAMEDA COUNTY MOSQUITO ABATE.	3024 E 7TH ST	S 0 - 1/8 (0.035 mi.)	56	86
PLANT #237	***3100 E 9TH ST***	***E 0 - 1/8 (0.041 mi.)***	***N57***	***87***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EANDI METAL WORKS, INC.	976 23RD AVE	N 0 - 1/8 (0.096 mi.)	U100	155
FLEMING COMPANIES	2530 E 11TH ST	N 0 - 1/8 (0.098 mi.)	101	156
NORTON PACKAGING INCORPORATED	***3100 EAST 10TH STREET***	***E 1/8 - 1/4 (0.142 mi.)***	***AA123***	***190***
STATE SHINGLE COMPANY	880 FRUITVALE AVE	E 1/8 - 1/4 (0.179 mi.)	AD132	204
HEITZ TRUCKING INC	***1125 MILLER AVE***	***N 1/8 - 1/4 (0.182 mi.)***	***AH139***	***206***
PERALTA SERVICE UNION STATION	3132 E 12TH ST	E 1/8 - 1/4 (0.188 mi.)	AE142	213
AMERICAN CONTRACTING SERV	***3229 SAN LEANDRO ST***	***E 1/8 - 1/4 (0.208 mi.)***	***AK156***	***226***
MELROSE FORD	***3050 E 14TH ST***	***ENE 1/8 - 1/4 (0.216 mi.)***	***AL158***	***229***

Lower Elevation	Address	Direction / Distance	Map ID	Page
SERVICE BRASS AND ALUMINUM FOU	2870 CHAPMAN ST	0 - 1/8 (0.000 mi.)	B2	7
HOLT GRAPHIC ARTS	800 KENNEDY ST	0 - 1/8 (0.000 mi.)	A8	11
N. V. HEATHORN INC.	2846 CHAPMAN ST	0 - 1/8 (0.000 mi.)	G25	24
ANDRADE WAREHOUSE	2914 E 7TH ST	0 - 1/8 (0.000 mi.)	30	32
ESPOSITO PLATING & POLISHING C	***2904 CHAPMAN ST.***	***0 - 1/8 (0.000 mi.)***	***J32***	***37***
VULCAN STEEL FOUNDRY	2909 CHAPMAN ST	S 0 - 1/8 (0.003 mi.)	J35	51
SAN FRANCISCO NEWS PAPER AGENC	534 23RD AVE	WSW 0 - 1/8 (0.005 mi.)	K36	52
EXCHANGE LINEN SERVICE	***527 23RD AVE***	***WSW 0 - 1/8 (0.006 mi.)***	***K40***	***58***
ANALYSTS INCORPORATED	***2910 FORD ST***	***S 0 - 1/8 (0.046 mi.)***	***P61***	***91***
SAN FRANCISCO NEWSPAPER AGENCY	534-23RD AVENUE	WSW 0 - 1/8 (0.049 mi.)	64	99
KILPATRICK'S BAKERY	955 KENNEDY ST	N 0 - 1/8 (0.056 mi.)	R73	114
OAKLAND YARD	333 23RD AVE	WSW 0 - 1/8 (0.057 mi.)	O74	115
RIGHT AWAY REDY MIX, INC.	401 KENNEDY ST	WSW 0 - 1/8 (0.085 mi.)	V93	141
INDUSTRIAL STEAM	2985 FORD ST	S 0 - 1/8 (0.094 mi.)	X98	147
PETRO-STOP, INC.	315 DERBY AVE	S 0 - 1/8 (0.116 mi.)	Y110	168
SIMMONS TERMINAL CORP	***315 DERBY AVE***	***S 0 - 1/8 (0.116 mi.)***	***Y113***	***175***
DEL MONTE-PLANT #26	400 LANCASTER ST	S 1/8 - 1/4 (0.191 mi.)	AJ147	219
BYTECH CHEMICAL CORPORATION	1905 DENNISON ST	WNW 1/8 - 1/4 (0.231 mi.)	AP169	246
BYTECH CHEMICAL	***1905 DENNISON ST***	***WNW 1/8 - 1/4 (0.231 mi.)***	***AP171***	***250***

SWEEPS UST: Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

A review of the SWEEPS UST list, as provided by EDR, and dated 06/01/1994 has revealed that there are 34 SWEEPS UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PORTWOOD SHELL	***820 PORTWOOD AVE***	***0 - 1/8 (0.000 mi.)***	***E11***	***13***
DEL MONTE-PLANT #37	***2980 E 009TH ST***	***0 - 1/8 (0.000 mi.)***	***D21***	***21***
CALTRANS 29TH AVE	***1112 29TH AVE***	***0 - 1/8 (0.000 mi.)***	***I29***	***26***
DEL MONTE USA OAKLAND #37	***1100 29TH ST***	***0 - 1/8 (0.000 mi.)***	***I31***	***33***
PLANT #237	***3100 E 009TH ST***	***ESE 0 - 1/8 (0.068 mi.)***	***82***	***126***
T-GAS	***3132 E 012TH ST***	***E 0 - 1/8 (0.071 mi.)***	***84***	***127***
FLEMING COMPANIES	***2530 E 011TH ST***	***N 0 - 1/8 (0.080 mi.)***	***U88***	***133***
EANDI METAL WORKS INC	***976 23RD AVE***	***N 0 - 1/8 (0.096 mi.)***	***U99***	***148***
NORTON PACKAGING INCORPORATED	***3100 EAST 10TH STREET***	***E 1/8 - 1/4 (0.142 mi.)***	***AA123***	***190***
STATE SHINGLE	***880 FRUITVALE AVE***	***E 1/8 - 1/4 (0.179 mi.)***	***AD131***	***202***
HEITZ TRUCKING INC	***1125 MILLER AVE***	***N 1/8 - 1/4 (0.182 mi.)***	***AH139***	***206***
AMERICAN CONTRACTING SERV INC	***3229 SAN LEANDRO ST***	***E 1/8 - 1/4 (0.208 mi.)***	***AK157***	***228***
MELROSE FORD	***3050 E 14TH ST***	***ENE 1/8 - 1/4 (0.216 mi.)***	***AL158***	***229***
OAKLAND HOSPITAL	***2648 E 14TH ST***	***N 1/8 - 1/4 (0.225 mi.)***	***AN163***	***239***

Lower Elevation	Address	Direction / Distance	Map ID	Page
HOLT GRAPHIC ARTS INC	*800 KENNEDY ST*	*0 - 1/8 (0.000 mi.)*	*A7*	*10*
ANDRADE WAREHOUSE	*2914 E 007TH ST*	*0 - 1/8 (0.000 mi.)*	*B16*	*18*
SERVICE BRASS AND ALUMINUM FOU	*2870 CHAPMAN ST*	*0 - 1/8 (0.000 mi.)*	*B17*	*18*
N. V. HEATHORN INC.	*2846 CHAPMAN ST*	*0 - 1/8 (0.000 mi.)*	*G20*	*20*
VULCAN STEEL FOUNDRY	*2909 CHAPMAN ST*	*S 0 - 1/8 (0.003 mi.)*	*J34*	*48*
SARONI TOTAL FOOD	*727 KENNEDY ST*	*WSW 0 - 1/8 (0.005 mi.)*	*A39*	*55*
EXCHANGE LINEN SERVICE	*527 23RD AVE*	*WSW 0 - 1/8 (0.006 mi.)*	*K40*	*58*
B & J FORKLIFT INC	*430 23RD AVE*	*WSW 0 - 1/8 (0.023 mi.)*	*L47*	*68*
BAY AREA DIABLO PETROLEUM COMP	*421 23RD AVE*	*WSW 0 - 1/8 (0.026 mi.)*	*L51*	*75*
VACANT LOT	*534 023RD AVE*	*WSW 0 - 1/8 (0.030 mi.)*	*54*	*83*
ANALYSTS INCORPORATED	*2910 FORD ST*	*S 0 - 1/8 (0.046 mi.)*	*P61*	*91*
KILPATRICKS BAKERIES INC	*955 KENNEDY ST*	*N 0 - 1/8 (0.056 mi.)*	*R72*	*109*
RMC LONESTAR	*333 023RD AVE*	*SW 0 - 1/8 (0.059 mi.)*	*O78*	*123*
ALAMEDA COUNTY MOSQUITO ABATE.	*3024 E 007TH ST*	*S 0 - 1/8 (0.062 mi.)*	*79*	*124*
RIGHT AWAY READY MIX INC	*401 KENNEDY ST*	*WSW 0 - 1/8 (0.085 mi.)*	*V92*	*139*
INDUSTRIAL STEAM	*2985 FORD ST*	*S 0 - 1/8 (0.094 mi.)*	*X96*	*146*
PETRO-STOP INC	*315 DERBY*	*S 0 - 1/8 (0.116 mi.)*	*Y112*	*174*
DEL MONTE PLANT #26	*400 LANCASTER ST*	*S 1/8 - 1/4 (0.191 mi.)*	*AJ146*	*216*
ALAMEDA ELECTRIC	*2420 BLANDING AVE*	*SSW 1/8 - 1/4 (0.230 mi.)*	*AO166*	*241*
BYTECH CHEMICAL CORPORATION	*1905 DENNISON ST*	*WNW 1/8 - 1/4 (0.231 mi.)*	*AP170*	*247*

Local Land Records

DEED: The use of recorded land use restrictions is one of the methods the DTSC uses to protect the public from unsafe exposures to hazardous substances and wastes .

A review of the DEED list, as provided by EDR, and dated 06/29/2009 has revealed that there is 1 DEED site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
PORT OF OAKLAND - EMBARCADERO	*DENNISON AND EMBARCADER*	*WNW 1/8 - 1/4 (0.238 mi.)*	*AP173*	*252*

Other Ascertainable Records

RCRA-NonGen: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA-NonGen list, as provided by EDR, and dated 11/12/2008 has revealed that there are 7 RCRA-NonGen sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SAV ON DRUG 3714	*3100 E NINETH ST*	*E 0 - 1/8 (0.041 mi.)*	*N58*	*88*

Lower Elevation	Address	Direction / Distance	Map ID	Page
BAY AREA PETROLEUM INC	*421 23RD AVE*	*WSW 0 - 1/8 (0.026 mi.)*	*L50*	*72*
MOORE AND SONS TRUCKING	*410 KENNEDY ST*	*WSW 0 - 1/8 (0.076 mi.)*	*87*	*131*

Lower Elevation	Address	Direction / Distance	Map ID	Page
F & F SURFACE GRINDING	*510 DERBY AVE*	*S 0 - 1/8 (0.099 mi.)*	*X103*	*157*
SHELL OIL CO OAKLAND PLANT	*315 DERBY AVE*	*S 0 - 1/8 (0.116 mi.)*	*Y114*	*177*
U C HOUSEHOLD SHIPPING CO	*333 LANCASTER ST*	*S 1/8 - 1/4 (0.222 mi.)*	*162*	*237*
OCEANIC BOATWORKS COMPANY INCO	*1899 DENNISON STREET*	*WNW 1/8 - 1/4 (0.240 mi.)*	*AP175*	*273*

CA BOND EXP. PLAN: Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

A review of the CA BOND EXP. PLAN list, as provided by EDR, and dated 01/01/1989 has revealed that there are 3 CA BOND EXP. PLAN sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
THE CLOROX COMPANY	850 42ND AVENUE	ESE 1/2 - 1 (0.709 mi.)	286	494

Lower Elevation	Address	Direction / Distance	Map ID	Page
PORT OF OAKLAND - EMBARCADERO	*DENNISON AND EMBARCADER*	*WNW 1/8 - 1/4 (0.238 mi.)*	*AP173*	*252*
EKOTEK LUBE (FORMER)	*4200 ALAMEDA AVENUE*	*SE 1/2 - 1 (0.603 mi.)*	*279*	*470*

Cortese: The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites). This listing is no longer updated by the state agency.

A review of the Cortese list, as provided by EDR, and dated 04/20/2009 has revealed that there are 3 Cortese sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
PORT OF OAKLAND - EMBARCADERO	*DENNISON AND EMBARCADER*	*WNW 1/8 - 1/4 (0.238 mi.)*	*AP173*	*252*
FORMER J. H. BAXTER FACILITY,	*2201 CLEMENT AVENUE*	*WSW 1/4 - 1/2 (0.435 mi.)*	*BN255*	*412*
ALAMEDA, NAVAL AND MARINE RESE	*2144 CLEMENT AVENUE*	*WSW 1/4 - 1/2 (0.483 mi.)*	*272*	*458*

HIST CORTESE: The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES].

A review of the HIST CORTESE list, as provided by EDR, and dated 04/01/2001 has revealed that there are 63 HIST CORTESE sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BANK OF AMERICA PROPERTIES INC	*630 29TH AVE*	*0 - 1/8 (0.000 mi.)*	*D5*	*8*
EBMUD	UNKNOWN 7TH ST / 29TH	0 - 1/8 (0.000 mi.)	F18	19
CALTRANS 29TH AVE	*1112 29TH AVE*	*0 - 1/8 (0.000 mi.)*	*I29*	*26*
SAV ON DRUG 3714	*3100 E NINETH ST*	*E 0 - 1/8 (0.041 mi.)*	*N58*	*88*
AN FO MANUFACTURING COMPANY	*3129 ELMWOOD AVE*	*ESE 0 - 1/8 (0.093 mi.)*	*W94*	*141*
EANDI METAL WORKS INC	*976 23RD AVE*	*N 0 - 1/8 (0.096 mi.)*	*U99*	*148*
GOODWILL INDUSTRIES	*1301 30TH AVE*	*ENE 1/8 - 1/4 (0.130 mi.)*	*117*	*179*
STATE SHINGLE	*880 FRUITVALE AVE*	*E 1/8 - 1/4 (0.179 mi.)*	*AD131*	*202*
OIL CHANGER #616	*3132 12TH ST E*	*E 1/8 - 1/4 (0.188 mi.)*	*AE143*	*214*
MELROSE FORD	*3050 E 14TH ST*	*ENE 1/8 - 1/4 (0.216 mi.)*	*AL158*	*229*
ST JOSEPH PROFESSIONAL CENTER	*2647 14TH ST E*	*N 1/8 - 1/4 (0.220 mi.)*	*AN160*	*235*
TRI CITY CLEANERS	*2560 14TH ST E*	*N 1/4 - 1/2 (0.259 mi.)*	*AR187*	*288*

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DELAWARE DEVELOPMENT COMPANY	*2530 14TH ST E*	*N 1/4 - 1/2 (0.274 mi.)*	*191*	*290*
STANDARD BRANDS PAINT	*2442 14TH ST E*	*N 1/4 - 1/2 (0.297 mi.)*	*202*	*303*
TSK AMERICAN CAN COMPAY	*3801 8TH ST E*	*ESE 1/4 - 1/2 (0.413 mi.)*	*BK245*	*400*
JOHN B HENRY ESTATE	*1726 PARK ST*	*SW 1/4 - 1/2 (0.419 mi.)*	*BM249*	*403*
EXXON REGAL	*1725 PARK ST*	*SW 1/4 - 1/2 (0.419 mi.)*	*BM250*	*404*
XTRA OIL COMPANY	*1701 PARK ST*	*SW 1/4 - 1/2 (0.433 mi.)*	*BM252*	*408*
CAVANAUGH MOTORS	*1700 PARK ST*	*SW 1/4 - 1/2 (0.436 mi.)*	*BM257*	*427*
ON TIME TOWING	*3800 WATTLING ST*	*ESE 1/4 - 1/2 (0.463 mi.)*	*266*	*437*
ALAMEDA FORD	*1650 PARK ST*	*SW 1/4 - 1/2 (0.481 mi.)*	*BR269*	*451*
GOOD CHEVROLET	*1630 PARK ST*	*SW 1/4 - 1/2 (0.496 mi.)*	*BR275*	*463*
GUY'S SERVICE STATION	*3820 SAN LEANDRO ST*	*E 1/4 - 1/2 (0.500 mi.)*	*277*	*469*

Lower Elevation	Address	Direction / Distance	Map ID	Page
HOLT VISUAL COMMUNICATIONS	*802 KENNEDY ST*	*0 - 1/8 (0.000 mi.)*	*A4*	*8*
OAKLAND PORT OF	*2700 7TH ST*	*0 - 1/8 (0.000 mi.)*	*H22*	*22*
FILLMORE MARKS PROPERTY	*534 23RD AVE*	*WSW 0 - 1/8 (0.005 mi.)*	*K37*	*52*
SARONI TOTAL FOOD	*727 KENNEDY ST*	*WSW 0 - 1/8 (0.005 mi.)*	*A39*	*55*
EXCHANGE LINEN SERVICE	*527 23RD AVE*	*WSW 0 - 1/8 (0.006 mi.)*	*K40*	*58*
BARSTAD & DONICHT, INC	*501 23RD AVE*	*WSW 0 - 1/8 (0.010 mi.)*	*K43*	*64*
BAY AREA DIABLO PETROLEUM COMP	*421 23RD AVE*	*WSW 0 - 1/8 (0.026 mi.)*	*L51*	*75*
RIGHT AWAY READY MIX INC	*435 23RD AVE*	*WSW 0 - 1/8 (0.028 mi.)*	*L52*	*78*
FIDELITY PACKAGING CORP	*646 KENNEDY ST*	*WSW 0 - 1/8 (0.030 mi.)*	*M53*	*79*
RHODES & JAMIESON BATCH P	333 KENNEDY	WSW 0 - 1/8 (0.053 mi.)	Q67	103
AMERICAN METALS	*955 KENNEDY*	*N 0 - 1/8 (0.056 mi.)*	*R69*	*104*
GLASCOCK AVE WAREHOUSE	*2901 GLASCOCK AVE*	*S 0 - 1/8 (0.082 mi.)*	*T90*	*134*
RIGHT AWAY READY MIX INC	*401 KENNEDY ST*	*WSW 0 - 1/8 (0.085 mi.)*	*V92*	*139*
ICONOCO CALIFORNIA INC	*303 DERBY AVE*	*S 0 - 1/8 (0.116 mi.)*	*Y111*	*169*
PETRO-STOP INC	*315 DERBY*	*S 0 - 1/8 (0.116 mi.)*	*Y112*	*174*
CONAGRA INC	2201 7TH	WSW 1/8 - 1/4 (0.182 mi.)	AF137	205
WEST COAST VENDING AND FOOD SE	*2124 LIVINGSTON*	*NNW 1/8 - 1/4 (0.191 mi.)*	*AI144*	*215*
DEL MONTE PLANT #26	*400 LANCASTER ST*	*S 1/8 - 1/4 (0.191 mi.)*	*AJ146*	*216*
KILPATRICK'S BAKERY INC	*2100 LIVINGSTON ST*	*NW 1/8 - 1/4 (0.199 mi.)*	*AI151*	*220*
ALAMEDA ELECTRIC	*2420 BLANDING AVE*	*SSW 1/8 - 1/4 (0.230 mi.)*	*AO166*	*241*
DOLORES STAUNDENRAUS	*2424 BLANDING AVE*	*SSW 1/8 - 1/4 (0.231 mi.)*	*AO168*	*245*
PORT OF OAKLAND - EMBARCADERO	*DENNISON AND EMBARCADER*	*WNW 1/8 - 1/4 (0.238 mi.)*	*AP173*	*252*
CHILDRENS HOSPITAL	*1050 22ND AVE*	*NNW 1/4 - 1/2 (0.259 mi.)*	*AT186*	*287*
PARK ST LANDING	2301 BLANDING	WSW 1/4 - 1/2 (0.277 mi.)	AU195	292
ALAMEDA COLLISION REPAIR INCOR	*1911 PARK STREET*	*SW 1/4 - 1/2 (0.291 mi.)*	*198*	*293*
OWENS BROCKWAY GLASS CONTAINER	*3600 ALAMEDA AVE*	*SSE 1/4 - 1/2 (0.318 mi.)*	*AZ208*	*307*
ALAMEDA BRIDGESIDE CENTER	*2691 BLANDING AVE*	*S 1/4 - 1/2 (0.349 mi.)*	*BC217*	*326*
RON GOODE RAMBLER & TOYOTA	*1825 PARK ST*	*SW 1/4 - 1/2 (0.350 mi.)*	*BD218*	*327*
SOUTHERN PACIFIC	12TH ST E. / 22ND AVE	N 1/4 - 1/2 (0.360 mi.)	BE220	353
CHEVRON	*1801 PARK ST*	*SW 1/4 - 1/2 (0.367 mi.)*	*BD225*	*359*
ALAMEDA AUTO REPAIR	*1800 PARK ST*	*SW 1/4 - 1/2 (0.367 mi.)*	*BD226*	*361*
CAMISA BROS ROOFING	*1901 BROADWAY*	*S 1/4 - 1/2 (0.368 mi.)*	*227*	*362*
ENGINE WORKS	*2241 CLEMENT*	*WSW 1/4 - 1/2 (0.382 mi.)*	*BF228*	*363*
RELIANCE SHEET & STRIP COMPANY	*2235 CLEMENT AVE*	*WSW 1/4 - 1/2 (0.387 mi.)*	*BF233*	*372*
ORIENTAL AUTO SALES	*2200 14TH ST E*	*N 1/4 - 1/2 (0.414 mi.)*	*BL247*	*401*
CLIFFORD E MAPES INC	*2001 VERSAILLES AVE*	*S 1/4 - 1/2 (0.423 mi.)*	*251*	*407*
ARCO	*2032 12TH ST E*	*NNW 1/4 - 1/2 (0.445 mi.)*	*BO260*	*431*
ALAMEDA USD CORP YARD	*2615 EAGLE*	*S 1/4 - 1/2 (0.452 mi.)*	*BP262*	*433*
WILLIAM WURZBACH COMPANY	*1200 20TH AVE*	*NNW 1/4 - 1/2 (0.464 mi.)*	*BO267*	*440*
LERNER COMPANY	*3675 ALAMEDA AVE*	*SE 1/4 - 1/2 (0.483 mi.)*	*BT273*	*461*

Notify 65: Notify 65 records contain facility notifications about any release that could impact drinking water and thereby expose the public to a potential health risk. The data come from the State Water Resources Control Board's Proposition 65 database.

A review of the Notify 65 list, as provided by EDR, and dated 10/21/1993 has revealed that there are 13 Notify 65 sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
LALO'S AUTOBODY REPAIR	2801 FOOTHILLL BLVD	NNE 1/2 - 1 (0.526 mi.)	278	470
PACIFIC BELL	***2112 FRUITVALE AVENUE***	***NE 1/2 - 1 (0.675 mi.)***	***282***	***486***
Not reported	1033 44TH AVENUE	ESE 1/2 - 1 (0.812 mi.)	289	499
DAVLIN PAINT COMPANY	***1401 14TH ST E***	***NNW 1/2 - 1 (0.870 mi.)***	***291***	***505***

Lower Elevation	Address	Direction / Distance	Map ID	Page
KNOWN	1755 EMBARCADECO EAST	NW 1/4 - 1/2 (0.331 mi.)	212	325
UNKNOWN	2235 CLEMENT AVENUE	WSW 1/4 - 1/2 (0.336 mi.)	213	325
SERVICE STATION	2200 EAST 12TH STREET	N 1/4 - 1/2 (0.348 mi.)	216	326
SENNA AUTOMOTIVE	2301 EAST 12TH STREET	N 1/4 - 1/2 (0.361 mi.)	BE224	359
BLYMYER ENGINEERS,INC.	1829 CLEMENT AVE.,	WSW 1/4 - 1/2 (0.440 mi.)	259	431
SHELL SELF SERVICE	630 HIGH STREET	SE 1/2 - 1 (0.642 mi.)	280	472
ROY HATTON PROJECT	***752 HIGH ST***	***ESE 1/2 - 1 (0.682 mi.)***	***284***	***491***
CROWLEY MARITIME CORP.	PAC. DRY DOCK REPAIR YA	NW 1/2 - 1 (0.883 mi.)	BU292	506
CROWLEY MARITIME CORPORATION	PAC. DRY DOCKS, YARDS 1	NW 1/2 - 1 (0.906 mi.)	BU293	507

DRYCLEANERS: A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaners' agents; linen supply; coin-operated laundries and cleaning; drycleaning plants except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

A review of the DRYCLEANERS list, as provided by EDR, and dated 05/06/2009 has revealed that there is 1 DRYCLEANERS site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
ROTO ROOTER	845 KENNEDY ST	N 0 - 1/8 (0.013 mi.)	45	67

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

A review of the Manufactured Gas Plants list, as provided by EDR, has revealed that there is 1

Manufactured Gas Plants site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
OAKLAND GAS LIGHT AND HEAT CO	CLEMENT AVE AND UNION S	WSW 1/2 - 1 (0.771 mi.)	287	495

EDR Historical Auto Stations: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

A review of the EDR Historical Auto Stations list, as provided by EDR, has revealed that there are 17 EDR Historical Auto Stations sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ALMEIDA WM	600 29TH AVE	0 - 1/8 (0.000 mi.)	F23	23
MC BROOM WM	2899 E 12TH ST	E 0 - 1/8 (0.063 mi.)	S80	125
HERMAN HARRY	2901 E 12TH ST	E 0 - 1/8 (0.064 mi.)	S81	126
BAKKE & NEILSON (THE AUTHORIZE	447 25TH AVE	N 0 - 1/8 (0.069 mi.)	83	127
KOHLES M A	2931 E 12TH ST	E 0 - 1/8 (0.076 mi.)	S86	131
HERMES H C	2778 E 12TH ST	N 0 - 1/8 (0.100 mi.)	105	159
TORRE EGISTO	776 FRUITVALE AVE	ESE 1/8 - 1/4 (0.132 mi.)	118	180
KOHLES M A	3058 E 12TH ST	E 1/8 - 1/4 (0.135 mi.)	120	181
HABAN H I	1420 29TH AVE	NE 1/8 - 1/4 (0.166 mi.)	126	198
HUSTON P M	1201 31ST AVE	E 1/8 - 1/4 (0.180 mi.)	AE133	204
ED S RADIATOR SERVICE	1014 FRUITVALE AVE	E 1/8 - 1/4 (0.194 mi.)	AK149	220
STANSBERRY W A	1058 FRUITVALE AVE	E 1/8 - 1/4 (0.201 mi.)	AK153	223
BULLOCK M A	2550 E 12TH ST	N 1/8 - 1/4 (0.201 mi.)	AM154	223
THOMPSON W B	1203 FRUITVALE AVE	E 1/8 - 1/4 (0.225 mi.)	164	241
FERREE E C	1307 FRUITVALE AVE	E 1/8 - 1/4 (0.241 mi.)	AQ179	277

Lower Elevation	Address	Direction / Distance	Map ID	Page
DUTCH H H	401 29TH AVE	SSW 0 - 1/8 (0.041 mi.)	O60	91
SHELL OIL CO OFFICE	315 DERBY AVE	S 1/8 - 1/4 (0.175 mi.)	AC129	202

EDR Historical Cleaners: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc.

A review of the EDR Historical Cleaners list, as provided by EDR, has revealed that there are 11 EDR Historical Cleaners sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
OAKLAND CALIFORNIA TOWEL CO	976 28TH AVE	0 - 1/8 (0.000 mi.)	24	23
HERLING ELEANOR	1404 28TH AVE	NNE 1/8 - 1/4 (0.167 mi.)	AB127	199
UNITED DRY CLEANERS	1232 FRUITVALE AVE	E 1/8 - 1/4 (0.239 mi.)	AQ174	273

Lower Elevation	Address	Direction / Distance	Map ID	Page
NEW PROCESS LAUNDRY CO OF OAKL	2639 E 9TH ST	0 - 1/8 (0.000 mi.)	C3	7

EXECUTIVE SUMMARY

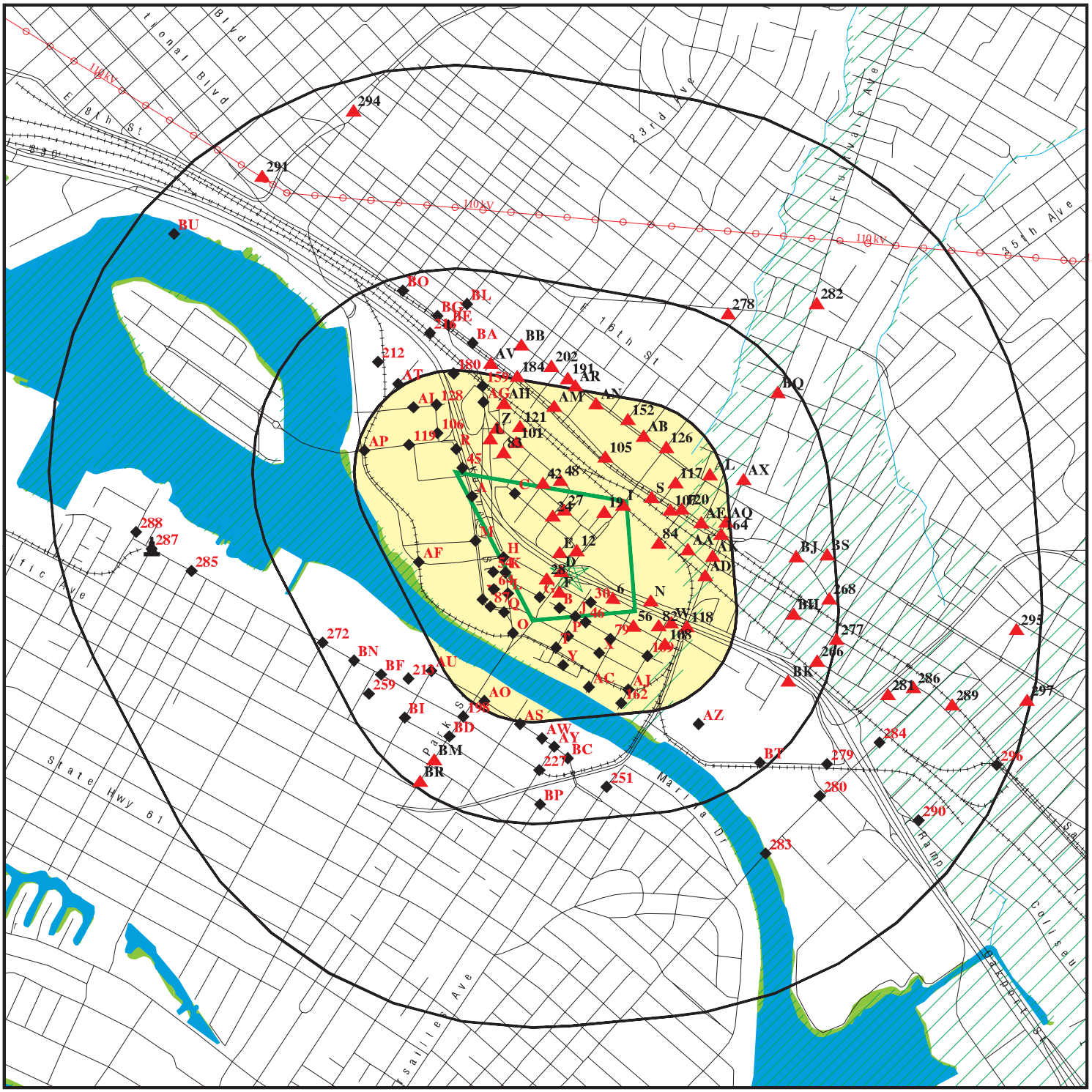
Lower Elevation	Address	Direction / Distance	Map ID	Page
NEW PROCESS LAUNDRY CO	2639 E 9TH PHONE FRUI	0 - 1/8 (0.000 mi.)	C9	12
NEW PROCESS LAUNDRY CO	2639 E 9TH TEL FRUITV	0 - 1/8 (0.000 mi.)	C15	17
CONTRA COSTA LAUNDRY & DRY CLE	527 23RD AVE	WSW 0 - 1/8 (0.006 mi.)	K41	63
PARKINSON G J	2928 CHAPMAN ST	S 0 - 1/8 (0.016 mi.)	46	68
OKA KAYE MRS	1077 23RD AVE	N 1/8 - 1/4 (0.181 mi.)	AG135	205
OKA HARRY	1079 23RD AVE	N 1/8 - 1/4 (0.181 mi.)	AG136	205
NATIONAL LAUNDRY	2431 BLANDING AVE	SSW 1/8 - 1/4 (0.231 mi.)	AO172	252

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
INTERNATIONAL TECHNOLOGY/TRAILER	HAZNET, CHMIRS, HIST CORTESE
NORMANDY PROJECT TRACT 44	HIST CORTESE
ESPOSITO PLATING COPORAT	HIST CORTESE
FORMER ORP BLDG 1 REMEDIATION PROJ	NPDES
SOUTHERN PACIFIC TRANSPORTATION CO	Alameda County CS
SOUTHERN PACIFIC TRANSPORT COMPANY	LUST, Alameda County CS
LAKE MERRITT PUMP STATION	SWEEPS UST
UNION PACIFIC	LUST, CHMIRS
NATIONAL LEAD CO	CERC-NFRAP
PORT OF OAKLAND	CERC-NFRAP
54 EMBARCADERO	CERC-NFRAP
BATAVIA PROPERTY	CERC-NFRAP
RUSSI COMMERCIAL PROPERTY	LUST
NORMANDY PROJECT TRACT 4495	LUST
WILANCO INC	LUST
VUKASIM PROPERTY	LUST
SOUTHERN PACIFIC	LUST
SOUTHERN PACIFIC TRANS COMPANY	LUST
EBMUD	LUST
BRAMALEA PACIFIC	LUST
OAK STREET TO 9TH AVENUE	VCP, ENVIROSTOR
I-880 @ 16TH AVE	HMIRS
29TH ST & GLASSCOCK AT (7-11 STORE	ERNS
I-880 AND 5TH AVE	ERNS
5TH AVENUE MARINA 499 EMBARKEDERO	ERNS
CORNER OF 101 ST. AVENUE AND E ST.	ERNS
E/B I-80 WEST OF GRAND AVENUE	ERNS
NB I-880 AT HIGH ST OFF RAMP	ERNS
SB I-880 AT 23ND ST. OFF RAMP	ERNS
N/B I-880 AT HEGENBERGER	ERNS
SB I-880 AT 16TH ST. OVERCROSSING	ERNS
INT I-880 & HIGH ST	ERNS
OAKLAND BAY BRIDGE CONSTRUCTION PR	ERNS
PORT OF OAKLAND 9TH AVENUE TERMIN	ERNS
AT THE END OF 6TH AVENUE	ERNS
OAKLAND TERMINAL RAILWAY PROPERTY	SLIC
UPTOWN THEATER DISTRICT	SLIC
303 & 315 DERBY AVENUE	SLIC
PORT OF OAKLAND NINTH AVENUE TERMI	SLIC
OAKLAND REDEVELOPMENT AGENCY	SLIC
URBAN PROMISE ACADEMY SITE	SCH, ENVIROSTOR
CHINATOWN REDEVELOPMENT - OAKLAND	ENVIROSTOR

OVERVIEW MAP - 2549972.1s



SITE NAME:	I-880/29th Avenue Interchange Project	CLIENT:	Ninyo & Moore
ADDRESS:	I-880/29th Avenue Oakland CA 94601	CONTACT:	Kris Larson
LAT/LONG:	37.7750 / 122.2333	INQUIRY #:	2549972.1s
		DATE:	July 24, 2009 12:51 pm

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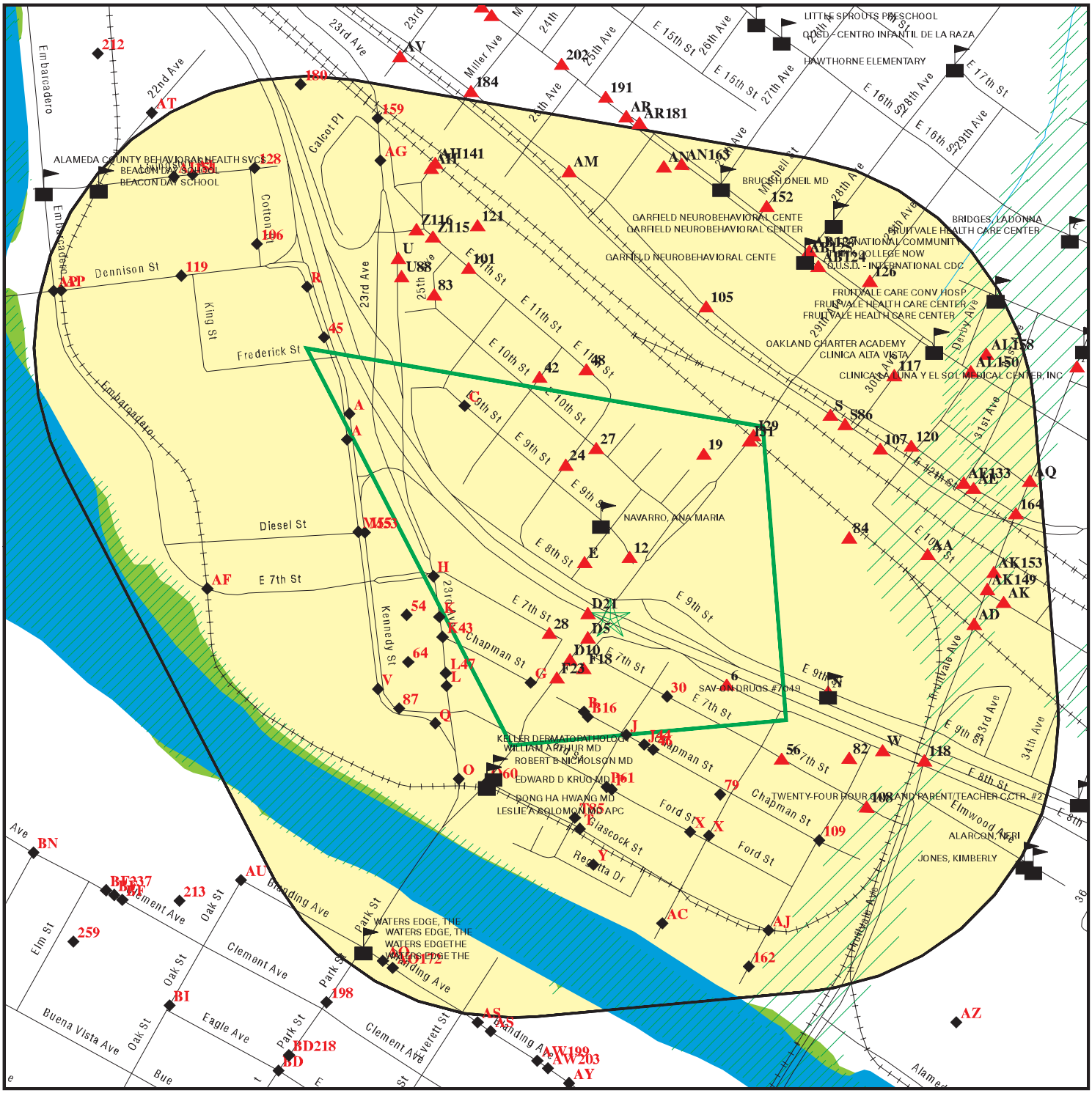
DETAIL MAP - 2549972.1s



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Oil & Gas pipelines

100-year flood zone

500-year flood zone

National Wetland Inventory

Areas of Concern

0 1/8 1/4 1/2 Miles

SITE NAME:	I-880/29th Avenue Interchange Project	CLIENT:	Ninyo & Moore
ADDRESS:	I-880/29th Avenue Oakland CA 94601	CONTACT:	Kris Larson
LAT/LONG:	37.7750 / 122.2333	INQUIRY #:	2549972.1s
		DATE:	July 24, 2009 12:52 pm

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MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
NPL LIENS		TP	NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.000	0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS		0.500	0	0	1	NR	NR	1
Federal CERCLIS NFRAP site List								
CERC-NFRAP		0.500	1	1	1	NR	NR	3
Federal RCRA CORRACTS facilities list								
CORRACTS		1.000	0	0	1	0	NR	1
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		0.500	0	0	1	NR	NR	1
Federal RCRA generators list								
RCRA-LQG		0.250	0	1	NR	NR	NR	1
RCRA-SQG		0.250	21	10	NR	NR	NR	31
RCRA-CESQG		0.250	0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
Federal ERNS list								
ERNS		TP	NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE		1.000	0	1	2	1	NR	4
State- and tribal - equivalent CERCLIS								
ENVIROSTOR		1.000	1	3	5	10	NR	19
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		0.500	0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST		0.500	20	14	42	NR	NR	76
SLIC		0.500	8	5	8	NR	NR	21
Alameda County CS		0.500	20	13	43	NR	NR	76

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST		0.500	0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST		0.250	5	1	NR	NR	NR	6
AST		0.250	0	0	NR	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP		0.500	1	1	1	NR	NR	3
INDIAN VCP		0.500	0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		0.500	0	0	2	NR	NR	2
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		0.500	0	0	0	NR	NR	0
ODI		0.500	0	0	0	NR	NR	0
WMUDS/SWAT		0.500	0	0	0	NR	NR	0
SWRCY		0.500	0	0	1	NR	NR	1
HAULERS		TP	NR	NR	NR	NR	NR	0
INDIAN ODI		0.500	0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		TP	NR	NR	NR	NR	NR	0
HIST Cal-Sites		1.000	0	1	1	1	NR	3
SCH		0.250	0	1	NR	NR	NR	1
Toxic Pits		1.000	0	0	0	0	NR	0
CDL		TP	NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
CA FID UST		0.250	24	7	NR	NR	NR	31
HIST UST		0.250	23	9	NR	NR	NR	32
SWEEPS UST		0.250	25	9	NR	NR	NR	34
Local Land Records								
LIENS 2		TP	NR	NR	NR	NR	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
LIENS		TP	NR	NR	NR	NR	NR	0
DEED		0.500	0	1	0	NR	NR	1
Records of Emergency Release Reports								
HMIRS		TP	NR	NR	NR	NR	NR	0
CHMIRS		TP	NR	NR	NR	NR	NR	0
LDS		TP	NR	NR	NR	NR	NR	0
MCS		TP	NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.250	5	2	NR	NR	NR	7

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOT OPS		TP	NR	NR	NR	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	0	0	0	NR	0
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
HIST FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
CA BOND EXP. PLAN		1.000	0	1	0	2	NR	3
NPDES		TP	NR	NR	NR	NR	NR	0
CA WDS		TP	NR	NR	NR	NR	NR	0
Cortese		0.500	0	1	2	NR	NR	3
HIST CORTESE		0.500	21	12	30	NR	NR	63
Notify 65		1.000	0	0	5	8	NR	13
DRYCLEANERS		0.250	1	0	NR	NR	NR	1
WIP		0.250	0	0	NR	NR	NR	0
HAZNET		TP	NR	NR	NR	NR	NR	0
EMI		TP	NR	NR	NR	NR	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
SCRD DRYCLEANERS		0.500	0	0	0	NR	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.000	0	0	0	1	NR	1
EDR Historical Auto Stations		0.250	7	10	NR	NR	NR	17
EDR Historical Cleaners		0.250	6	5	NR	NR	NR	11

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1 **HOLT VISUAL COMMUNICATION** **Alameda County CS** **S106661170**
802 KENNEDY ST **N/A**
< 1/8 **OAKLAND, CA 94606**
1 ft.

Site 1 of 6 in cluster A

Relative: CS:
Lower Status: Case Closed
Record Id: RO0001106
Actual: PE: 5602
17 ft.

B2 **SERVICE BRASS AND ALUMINUM FOU** **HIST UST** **U001599024**
2870 CHAPMAN ST **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 1 of 3 in cluster B

Relative: HIST UST:
Lower Region: STATE
Facility ID: 00000040618
Actual: Facility Type: Other
18 ft. Other Type: FOUNDRY
Total Tanks: 0001
Contact Name: JOHN WATSON
Telephone: 4152615733
Owner Name: SERVICE BRASS & ALUMINUM FOUND
Owner Address: 2870 CHAPMAN STREET
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: #1
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

C3 **NEW PROCESS LAUNDRY CO OF OAKLAND** **EDR Historical Cleaners** **1009139925**
2639 E 9TH ST **N/A**
< 1/8 **OAKLAND, CA**
1 ft.

Site 1 of 3 in cluster C

Relative: EDR Historical Cleaners:
Lower Name: NEW PROCESS LAUNDRY CO
Year: 1933
Actual: Type: LAUNDRIES-STEAM
21 ft.

Name: NEW PROCESS LAUNDRY CO OF OAKLAND
Year: 1943
Type: LAUNDRIES-STEAM

A4 **HOLT VISUAL COMMUNICATIONS** **LUST** **U003300296**
802 KENNEDY ST **HIST CORTESE** **N/A**
< 1/8 **OAKLAND, CA 94606**
1 ft.

Site 2 of 6 in cluster A

Relative:
Lower

Actual:
17 ft.

LUST:

Region:	STATE
Global Id:	T0600100712
Latitude:	37.777328
Longitude:	-122.236505
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1999-05-10 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0775
LOC Case Number:	Not reported
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 2HSCAW Cy07/15/1996

LUST:

Region:	2
Facility Id:	01-0775
Facility Status:	Preliminary site assessment underway
Case Number:	3092
How Discovered:	Tank Closure
Leak Cause:	UNK
Leak Source:	UNK
Date Leak Confirmed:	Not reported
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	Not reported
Preliminary Site Assesment Began:	10/28/1991
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0775

D5 **BANK OF AMERICA PROPERTIES INC** **HAZNET** **S103667456**
630 29TH AVE **HIST CORTESE** **N/A**
< 1/8 **OAKLAND, CA 94502**
1 ft.

Site 1 of 3 in cluster D

Relative:
Higher

Actual:
26 ft.

HAZNET:

Gepaid:	CAC001162984
Contact:	BANK OF AMERICA
Telephone:	4158638100
Facility Addr2:	Not reported
Mailing Name:	Not reported

BANK OF AMERICA PROPERTIES INC (Continued) **S103667456**

Mailing Address: 560 DAVIS ST 2ND FLR
Mailing City,St,Zip: SAN FRANCISCO, CA 941110000
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: 9.5910
Facility County: 1

Gepaid: CAC001162984
Contact: BANK OF AMERICA
Telephone: 4158638100
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 560 DAVIS ST 2ND FLR
Mailing City,St,Zip: SAN FRANCISCO, CA 941110000
Gen County: 1
TSD EPA ID: CAD009466392
TSD County: 7
Waste Category: Other empty containers 30 gallons or more
Disposal Method: Recycler
Tons: .5000
Facility County: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2298

---

6 **SAV ON DRUG NO 3714** **RCRA-SQG** **1001217349**
3000 E NINETH ST **CAR000032730**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Relative: Higher

Actual: 24 ft.

RCRA-SQG:
Date form received by agency: 10/14/1997
Facility name: SAV ON DRUG NO 3714
Facility address: 3000 E NINETH ST
OAKLAND, CA 94601
EPA ID: CAR000032730
Contact: JAMIE TARRANT
Contact address: P O BOX 26948
SALT LAKE CITY, UT 841260948
Contact country: US
Contact telephone: (801) 961-5780
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

SAV ON DRUG NO 3714 (Continued) **1001217349**

Owner/Operator Summary:
- Owner/operator name: AMERICAN DRUG STORES INC
- Owner/operator address: P O BOX 26948
  SALT LAKE CITY, UT 94126
- Owner/operator country: Not reported
- Owner/operator telephone: (801) 961-5779
- Legal status: Private
- Owner/Operator Type: Owner
- Owner/Op start date: Not reported
- Owner/Op end date: Not reported

Handler Activities Summary:
- U.S. importer of hazardous waste: Unknown
- Mixed waste (haz. and radioactive): Unknown
- Recycler of hazardous waste: No
- Transporter of hazardous waste: No
- Treater, storer or disposer of HW: No
- Underground injection activity: No
- On-site burner exemption: Unknown
- Furnace exemption: Unknown
- Used oil fuel burner: No
- Used oil processor: No
- User oil refiner: No
- Used oil fuel marketer to burner: No
- Used oil Specification marketer: No
- Used oil transfer facility: No
- Used oil transporter: No
- Off-site waste receiver: Commercial status unknown

Hazardous Waste Summary:
- Waste code: D000
- Waste name: Not Defined

- Waste code: D011
- Waste name: SILVER

- Violation Status: No violations found

A7 **HOLT GRAPHIC ARTS INC** **CA FID UST S101624342**
800 KENNEDY ST **SWEEPS UST N/A**
< 1/8 **OAKLAND, CA 94606**
1 ft.

Site 3 of 6 in cluster A

Relative: Lower

Actual: 17 ft.

CA FID UST:
- Facility ID: 01000898
- Regulated By: UTNKI
- Regulated ID: 00046516
- Cortese Code: Not reported
- SIC Code: Not reported
- Facility Phone: 4155885452
- Mail To: Not reported
- Mailing Address: 23 GREEN TREE CT
- Mailing Address 2: Not reported
- Mailing City,St,Zip: OAKLAND 94606
- Contact: Not reported
- Contact Phone: Not reported

HOLT GRAPHIC ARTS INC (Continued) **S101624342**

DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 46516
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-046516-000001
Actv Date: Not reported
Capacity: 500
Tank Use: EMPTY
Stg: PRODUCT
Content: REGULAR UNLE
Number Of Tanks: 1

A8 **HOLT GRAPHIC ARTS** **HIST UST** **U001599123**
800 KENNEDY ST **N/A**
< 1/8 **OAKLAND, CA 94606**
1 ft.

Site 4 of 6 in cluster A

Relative:
Lower

Actual:
17 ft.

HIST UST:
Region: STATE
Facility ID: 00000046516
Facility Type: Other
Other Type: Not reported
Total Tanks: 0001
Contact Name: Not reported
Telephone: 4155885452
Owner Name: EARLE F. HOLT
Owner Address: 23 GREEN TREE CT.
Owner City,St,Zip: LAFAYETTE, CA 94549

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None

C9 **NEW PROCESS LAUNDRY CO** **EDR Historical Cleaners** **1009140923**
2639 E 9TH PHONE FRUITVALE 0518 **N/A**
< 1/8 **OAKLAND, CA**
1 ft.

Site 2 of 3 in cluster C

Relative: EDR Historical Cleaners:
Lower Name: NEW PROCESS LAUNDRY CO
Year: 1928
Actual: Type: LAUNDRIES
21 ft.

D10 **LEMOINE COLD STORAGE** **LUST** **U003300457**
630 29TH AVE **Alameda County CS** **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 2 of 3 in cluster D

Relative: LUST:
Higher Region: STATE
Global Id: T0600102114
Actual: Latitude: 37.77475
37 ft. Longitude: -122.233587
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1996-12-04 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-2298
LOC Case Number: RO0000334
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2,s,c,a,G,R MTBE= ND in grab gw samples adjacent to former tank, need to ve06/21/199908/20/1999

LUST:
Region: 2
Facility Id: 01-2298
Facility Status: Leak being confirmed
Case Number: 6070
How Discovered: Tank Closure
Leak Cause: Corrosion
Leak Source: Tank
Date Leak Confirmed: 11/21/1996
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Pollution Characterization
Record Id: RO0000334
PE: 5602

E11
< 1/8
1 ft.

PORTWOOD SHELL
820 PORTWOOD AVE
OAKLAND, CA 94601

HIST UST **U001599021**
SWEEPS UST **N/A**

Site 1 of 3 in cluster E

Relative:
Higher

Actual:
22 ft.

HIST UST:

Region:	STATE
Facility ID:	00000010975
Facility Type:	Gas Station
Other Type:	Not reported
Total Tanks:	0003
Contact Name:	Not reported
Telephone:	4158376497
Owner Name:	SHELL OIL COMPANY
Owner Address:	P.O. BOX 4848
Owner City,St,Zip:	ANAHEIM, CA 92803
Tank Num:	001
Container Num:	1
Year Installed:	1972
Tank Capacity:	00010000
Tank Used for:	PRODUCT
Type of Fuel:	UNLEADED
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, 10
Tank Num:	002
Container Num:	2
Year Installed:	1972
Tank Capacity:	00008000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, 10
Tank Num:	003
Container Num:	3
Year Installed:	1972
Tank Capacity:	00010000
Tank Used for:	PRODUCT
Type of Fuel:	PREMIUM
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, 10

SWEEPS UST:

Status:	A
Comp Number:	10975
Number:	1
Board Of Equalization:	44-000074
Ref Date:	12-15-93
Act Date:	05-03-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	5508-61-SU-1
Swrcb Tank Id:	01-000-010975-000001
Actv Date:	12-15-93
Capacity:	10000
Tank Use:	M.V. FUEL

PORTWOOD SHELL (Continued) **U001599021**

Stg:	P
Content:	PRM UNLEADED
Number Of Tanks:	3
Status:	A
Comp Number:	10975
Number:	1
Board Of Equalization:	44-000074
Ref Date:	12-15-93
Act Date:	05-03-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	5508-61-RU-1
Swrcb Tank Id:	01-000-010975-000002
Actv Date:	12-15-93
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported
Status:	A
Comp Number:	10975
Number:	1
Board Of Equalization:	44-000074
Ref Date:	12-15-93
Act Date:	05-03-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	5508-61-PL-1
Swrcb Tank Id:	01-000-010975-000003
Actv Date:	12-15-93
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

---

12 **DEL MONTE-PLANT #37** **HIST UST** **U001598994**
2980 E. 9TH STREET **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Relative: Higher

Actual: 53 ft.

HIST UST:

Region:	STATE
Facility ID:	00000001368
Facility Type:	Other
Other Type:	WAREHOUSE
Total Tanks:	0000
Contact Name:	DAVE ROBINSON
Telephone:	4155350789
Owner Name:	DEL MONTE CORPORATION
Owner Address:	1 MARKET PLAZA
Owner City,St,Zip:	SAN FRANCISCO, CA 94119
Tank Num:	001
Container Num:	002
Year Installed:	Not reported

DEL MONTE-PLANT #37 (Continued) **U001598994**

Tank Capacity: 00006000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

E13 **PORTWOOD SHELL** **CA FID UST** **S101580366**
820 PORTWOOD **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 2 of 3 in cluster E

Relative:
Higher

Actual:
22 ft.

CA FID UST:
Facility ID: 01002592
Regulated By: UTNKA
Regulated ID: 00010975
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4158376497
Mail To: Not reported
Mailing Address: 820 PORTWOOD
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

E14 **SHELL SERVICE STATION** **RCRA-SQG** **1006805544**
820 PORTWOOD **FINDS** **CAR000129031**
< 1/8 **OAKLAND, CA 94601** **HAZNET**
1 ft.

Site 3 of 3 in cluster E

Relative:
Higher

Actual:
22 ft.

RCRA-SQG:
Date form received by agency: 09/26/2002
Facility name: SHELL SERVICE STATION
Facility address: 820 PORTWOOD
S A P 135696
OAKLAND, CA 94601
EPA ID: CAR000129031
Mailing address: P O BOX 2648
HOUSTON, TX 772522648
Contact: KYLE LANDRENEAU
Contact address: P O BOX 2648
HOUSTON, TX 772522648
Contact country: US
Contact telephone: (713) 353-2069
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of

SHELL SERVICE STATION (Continued) **1006805544**

hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: EQUILON ENTERPRISES LLC DBA
Owner/operator address: P O BOX 2648
HOUSTON, TX 77252
Owner/operator country: Not reported
Owner/operator telephone: (713) 353-2069
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D018
Waste name: BENZENE

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110013304922

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource

SHELL SERVICE STATION (Continued) **1006805544**

Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAR000129031
Contact:	NORA CORTEZ/ENVTL DATA ANALYST
Telephone:	2818742224
Facility Addr2:	S A P 135696
Mailing Name:	Not reported
Mailing Address:	12700 NORTHBOROUGH DRIVE
Mailing City,St,Zip:	Houston, TX 770672508
Gen County:	Alameda
TSD EPA ID:	CAD982444481
TSD County:	Alameda
Waste Category:	Other organic solids
Disposal Method:	Recycler
Tons:	0.02
Facility County:	1

Gepaid:	CAR000129031
Contact:	NORA CORTEZ/ENVTL DATA ANALYST
Telephone:	2818742224
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	12700 NORTHBOROUGH DRIVE
Mailing City,St,Zip:	Houston, TX 770672508
Gen County:	Alameda
TSD EPA ID:	CAD009466392
TSD County:	Contra Costa
Waste Category:	Other empty containers 30 gallons or more
Disposal Method:	Recycler
Tons:	4.3
Facility County:	Not reported

C15 **NEW PROCESS LAUNDRY CO** **EDR Historical Cleaners** **1009140320**
2639 E 9TH TEL FRUITVALE 518 **N/A**
< 1/8 **OAKLAND, CA**
1 ft.

Site 3 of 3 in cluster C

Relative:
Lower

Actual:
21 ft.

EDR Historical Cleaners:

Name:	NEW PROCESS LAUNDRY CO
Year:	1925
Type:	LAUNDRIES

B16 **ANDRADE WAREHOUSE** **CA FID UST** **S101624275**
2914 E 007TH ST **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 2 of 3 in cluster B

Relative:
Lower

Actual:
18 ft.

CA FID UST:

Facility ID:	01002208
Regulated By:	UTNKI
Regulated ID:	00049284
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4153390128
Mail To:	Not reported
Mailing Address:	1730 ARROWHEAD DR
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94601
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

SWEEPS UST:

Status:	Not reported
Comp Number:	49284
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-049284-000001
Actv Date:	Not reported
Capacity:	1
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	1

B17 **SERVICE BRASS AND ALUMINUM FOU** **CA FID UST** **S101624296**
2870 CHAPMAN ST **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 3 of 3 in cluster B

Relative:
Lower

Actual:
18 ft.

CA FID UST:

Facility ID:	01002182
Regulated By:	UTNKI
Regulated ID:	00040618
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4152615733
Mail To:	Not reported
Mailing Address:	2870 CHAPMAN ST
Mailing Address 2:	Not reported

SERVICE BRASS AND ALUMINUM FOU (Continued) **S101624296**

Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 40618
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-040618-000001
Actv Date: Not reported
Capacity: 1
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: 1

F18 **EBMUD** **HIST CORTESE** **S104233652**
UNKNOWN 7TH ST / 29TH AVE **N/A**
< 1/8 **OAKLAND, CA 94606**
1 ft.

Site 1 of 2 in cluster F

Relative: CORTESE:
Higher Region: CORTESE
Facility County Code: 1
Actual: Reg By: LTNKA
29 ft. Reg Id: 01-0541

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19 **SOUTH OAKLAND** **CA FID UST** **S101624297**
1112 029TH AVE **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

CA FID UST:
Relative: Facility ID: 01002831
Higher Regulated By: UTNKA
Regulated ID: 00068013
Actual: Cortese Code: Not reported
32 ft. SIC Code: Not reported
Facility Phone: 4155369601
Mail To: Not reported
Mailing Address: 1112 029TH AVE
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported

SOUTH OAKLAND (Continued) **S101624297**

Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

G20 **N. V. HEATHORN INC.** **CA FID UST** **S101624289**
2846 CHAPMAN ST **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 1 of 2 in cluster G

Relative:
Lower

Actual:
21 ft.

CA FID UST:
Facility ID: 01002197
Regulated By: UTNKI
Regulated ID: 00046398
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155342943
Mail To: Not reported
Mailing Address: 2846 CHAPMAN ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 46398
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-046398-000001
Actv Date: Not reported
Capacity: 1000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: 4

Status: Not reported
Comp Number: 46398
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported

N. V. HEATHORN INC. (Continued) **S101624289**

Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-046398-000002
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	Not reported

Status:	Not reported
Comp Number:	46398
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-046398-000003
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	DIESEL
Number Of Tanks:	Not reported

Status:	Not reported
Comp Number:	46398
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-046398-000004
Actv Date:	Not reported
Capacity:	500
Tank Use:	OIL
Stg:	WASTE
Content:	WASTE OIL
Number Of Tanks:	Not reported

D21 **DEL MONTE-PLANT #37** **CA FID UST S101624281**
2980 E 009TH ST **SWEEPS UST N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 3 of 3 in cluster D

Relative: Higher

Actual: 22 ft.

CA FID UST:

Facility ID:	01002080
Regulated By:	UTNKI
Regulated ID:	00001368
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155350789
Mail To:	Not reported

DEL MONTE-PLANT #37 (Continued) **S101624281**

Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 1368
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-001368-000001
Actv Date: Not reported
Capacity: 6000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: 1

H22 **OAKLAND PORT OF** **LUST S104396767**
2700 7TH ST **HIST CORTESE N/A**
< 1/8 **OAKLAND, CA 94607**
1 ft.

Site 1 of 2 in cluster H

Relative:
Lower

Actual:
15 ft.

LUST:
Region: STATE
Global Id: T0600101098
Latitude: 37.856836
Longitude: -122.292229
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1996-06-17 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-1195
LOC Case Number: RO0000059
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC HSCA This site was transferred to LOP on 12/6/95. Groundwater sample07/10/1996 IN A GRAB SAMPLE, 2.4 MG/L DIESEL RANGE AND ND FOR BTEX

LUST:
Region: 2
Facility Id: 01-1195

OAKLAND PORT OF (Continued) **S104396767**

Facility Status: Preliminary site assessment underway
Case Number: 5801
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 1/2/1965
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1195

Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0280

F23 **ALMEIDA WM** **EDR Historical Auto Stations** **1009014372**
600 29TH AVE **N/A**
< 1/8 **OAKLAND, CA**
1 ft.

Site 2 of 2 in cluster F

Relative:
Higher

Actual:
32 ft.

EDR Historical Auto Stations:
Name: SERPAS L P
Year: 1933
Type: GASOLINE AND OIL SERVICE STATIONS

Name: ALMEIDA WM
Year: 1943
Type: GASOLINE AND OIL SERVICE STATIONS

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24 **OAKLAND CALIFORNIA TOWEL CO** **EDR Historical Cleaners** **1009140322**
976 28TH AVE **N/A**
< 1/8 **OAKLAND, CA**
1 ft.

EDR Historical Cleaners:

Relative:
Higher

Actual:
26 ft.

Name: BORROUGHS ADDITIONAL TOWEL SYSTEM
Year: 1925
Type: LAUNDRIES

Name: OAKLAND CALIFORNIA TOWEL CO
Year: 1925
Type: LAUNDRIES

G25 **N. V. HEATHORN INC.** **HIST UST** **U001599011**
2846 CHAPMAN ST **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Site 2 of 2 in cluster G

Relative:
Lower

Actual:
21 ft.

HIST UST:

Region:	STATE
Facility ID:	00000046398
Facility Type:	Other
Other Type:	CONTRACTOR
Total Tanks:	0004
Contact Name:	Not reported
Telephone:	4155342943
Owner Name:	N. V. HEATHORN INC.
Owner Address:	2846 CHAPMAN ST.
Owner City,St,Zip:	OAKLAND, CA 94601

Tank Num:	001
Container Num:	1-RG
Year Installed:	Not reported
Tank Capacity:	00001000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Tank Construction:	10 gauge
Leak Detection:	None

Tank Num:	002
Container Num:	2-UG
Year Installed:	1975
Tank Capacity:	00001000
Tank Used for:	PRODUCT
Type of Fuel:	UNLEADED
Tank Construction:	10 gauge
Leak Detection:	None

Tank Num:	003
Container Num:	3-DF
Year Installed:	1975
Tank Capacity:	00001000
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Tank Construction:	10 gauge
Leak Detection:	None

Tank Num:	004
Container Num:	4-WO
Year Installed:	1981
Tank Capacity:	00000500
Tank Used for:	WASTE
Type of Fuel:	WASTE OIL
Tank Construction:	12 gauge
Leak Detection:	None

H26 **PORT OF OAKLAND** **Alameda County CS** **S105481920**
2700 7TH ST **N/A**
< 1/8 **OAKLAND, CA 94607**
1 ft.

Site 2 of 2 in cluster H

Relative: CS:
Lower Status: Preliminary site assessment workplan submitted
Record Id: RO0000059
Actual: PE: 5602
15 ft.

---

27 **ROADWAY EXPRESS** **RCRA-SQG** **1000819131**
2806 E 10TH ST **FINDS** **CAD983650995**
< 1/8 **OAKLAND, CA 94621**
1 ft.

RCRA-SQG:
Relative: Date form received by agency: 09/01/1996
Higher Facility name: ROADWAY EXPRESS
Facility address: 2806 E 10TH ST
Actual: OAKLAND, CA 94621
28 ft. EPA ID: CAD983650995
Mailing address: GORGE BLVD
AKRON, OH 44309
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: ROADWAY EXPRESS
Owner/operator address: 1077 GORGE BLVD
AKRON, OH 44309
Owner/operator country: Not reported
Owner/operator telephone: (216) 384-1717
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No

ROADWAY EXPRESS (Continued) **1000819131**

Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002886413

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28 **HANS AND GUNTER ROOFING COMPANY** **Alameda County CS** **S106880558**
2834 E 7TH ST **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Relative:
Higher

Actual:
22 ft.

CS:
Status: Pollution Characterization
Record Id: RO0002608
PE: 5602

Status: Leak being confirmed
Record Id: RO0002608
PE: 5602

I29 **CALTRANS 29TH AVE** **RCRA-SQG** **1000419507**
1112 29TH AVE **FINDS** **CAD982029324**
< 1/8 **OAKLAND, CA 94601** **HAZNET**
1 ft. **LUST**
Site 1 of 2 in cluster I **Alameda County CS**
SWEEPS UST
HIST CORTESE

Relative:
Higher

Actual:
35 ft.

RCRA-SQG:
Date form received by agency: 02/09/2004
Facility name: CALTRANS 29TH AVE
Facility address: 1112 29TH AVE
OAKLAND, CA 94601
EPA ID: CAD982029324
Mailing address: PO BOX 23660
OAKLAND, CA 946230660
Contact: NEIL LUNDGREN
Contact address: Not reported
Not reported
Contact country: Not reported

CALTRANS 29TH AVE (Continued) **1000419507**

Contact telephone: (510) 286-4492
Contact email: Not reported
EPA Region: 09
Land type: State
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: STATE OF CALIFORNIA
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: State
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1950
Owner/Op end date: Not reported

Owner/operator name: STATE OF CALIFORNIA
Owner/operator address: PO BOX 23660
OAKLAND, CA 94623
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: State
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1950
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Lamps

CALTRANS 29TH AVE (Continued) **1000419507**

Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: No

Historical Generators:
Date form received by agency: 02/09/2004
Facility name: CALTRANS 29TH AVE
Classification: Large Quantity Generator

Date form received by agency: 10/12/2000
Facility name: CALTRANS 29TH AVE
Site name: CALTRANS-29TH AVE
Classification: Large Quantity Generator

Date form received by agency: 09/01/1996
Facility name: CALTRANS 29TH AVE
Site name: CALTRANS DISTRICT 4
Classification: Small Quantity Generator

Hazardous Waste Summary:
Waste code: D007
Waste name: CHROMIUM

Waste code: D008
Waste name: LEAD

Biennial Reports:

Last Biennial Reporting Year: 2007

Annual Waste Handled:
Waste code: D008
Waste name: LEAD
Amount (Lbs): 7050

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 02/01/1994
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 03/31/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported

CALTRANS 29TH AVE (Continued) **1000419507**

Evaluation lead agency: State Contractor/Grantee

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002782052

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HAZNET:

Gepaid:	CAD982029324
Contact:	CALTRANS
Telephone:	9166574767
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	111 GRAND AVE 14TH FL
Mailing City,St,Zip:	OAKLAND, CA 946230000
Gen County:	1
TSD EPA ID:	CAD083166728
TSD County:	Stanislaus
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Tons:	3.1275
Facility County:	1

Gepaid:	CAD982029324
Contact:	CALTRANS
Telephone:	9166574767
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	111 GRAND AVE 14TH FL
Mailing City,St,Zip:	OAKLAND, CA 946230000
Gen County:	1
TSD EPA ID:	CAD980884183
TSD County:	Sacramento
Waste Category:	Not reported
Disposal Method:	Transfer Station
Tons:	10.1500
Facility County:	1

Gepaid:	CAD982029324
Contact:	CALTRANS
Telephone:	9166574767
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	111 GRAND AVE 14TH FL
Mailing City,St,Zip:	OAKLAND, CA 946230000
Gen County:	1
TSD EPA ID:	CAD980884183
TSD County:	Sacramento
Waste Category:	Off-specification, aged, or surplus organics

CALTRANS 29TH AVE (Continued) **1000419507**

Disposal Method: Transfer Station
Tons: 4.7955
Facility County: 1

Gepaid: CAD982029324
Contact: CALTRANS
Telephone: 9166574767
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 111 GRAND AVE 14TH FL
Mailing City,St,Zip: OAKLAND, CA 946230000
Gen County: 1
TSD EPA ID: CAD980884183
TSD County: Sacramento
Waste Category: Unspecified sludge waste
Disposal Method: Transfer Station
Tons: .7923
Facility County: 1

Gepaid: CAD982029324
Contact: CALTRANS
Telephone: 9166574767
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 111 GRAND AVE 14TH FL
Mailing City,St,Zip: OAKLAND, CA 946230000
Gen County: 1
TSD EPA ID: CAD980884183
TSD County: Sacramento
Waste Category: Waste oil and mixed oil
Disposal Method: Transfer Station
Tons: .0417
Facility County: 1

Click this hyperlink while viewing on your computer to access
139 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600101631
Latitude: 37.777358
Longitude: -122.229702
Case Type: LUST Cleanup Site
Status: Open - Verification Monitoring
Status Date: 1997-05-02 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-1763
LOC Case Number: RO0000397
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2,s,c,a,G MTBE=5600ppb in grab gw sample approximately 35' downgradient o07/23/1999MTBE IN MW3 11/00 2500PPB

CALTRANS 29TH AVE (Continued) **1000419507**

LUST:
Region: 2
Facility Id: 01-1763
Facility Status: Preliminary site assessment workplan submitted
Case Number: 2933
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 8/22/1996
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 9/27/2001
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Pollution Characterization
Record Id: RO0000397
PE: 5602

Status: Post remedial action monitoring
Record Id: RO0000397
PE: 5602

SWEEPS UST:
Status: Not reported
Comp Number: 68013
Number: Not reported
Board Of Equalization: 44-000763
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068013-000003
Actv Date: Not reported
Capacity: 1000
Tank Use: CHEMICAL
Stg: PRODUCT
Content: SOLVENT 51-L
Number Of Tanks: 1

Status: A
Comp Number: 68013
Number: 6
Board Of Equalization: 44-000763
Ref Date: 07-08-93
Act Date: 05-03-94
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: TSOA-03
Swrcb Tank Id: 01-000-068013-000001
Actv Date: 07-09-93
Capacity: 4000

CALTRANS 29TH AVE (Continued) **1000419507**

Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: 2

Status: A
Comp Number: 68013
Number: 6
Board Of Equalization: 44-000763
Ref Date: 07-08-93
Act Date: 05-03-94
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: TSOA-01
Swrcb Tank Id: 01-000-068013-000002
Actv Date: 07-09-93
Capacity: 2000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1763

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30 **ANDRADE WAREHOUSE** **HIST UST** **U001598986**
2914 E 7TH ST **N/A**
< 1/8 **OAKLAND, CA 94601**
1 ft.

Relative:
Lower

Actual:
21 ft.

HIST UST:
Region: STATE
Facility ID: 00000049284
Facility Type: Other
Other Type: MANUFACTURER
Total Tanks: 0001
Contact Name: MCNEILL MANUFACTURING COMPANY
Telephone: 4153390128
Owner Name: MARVIN ANDRADE
Owner Address: 1730 ARROWHEAD DRIVE
Owner City,St,Zip: OAKLAND, CA 94611

Tank Num: 001
Container Num: 101
Year Installed: 1976
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

I31 **DEL MONTE USA OAKLAND #37** **RCRA-SQG** **1000124544**
1100 29TH ST **FINDS** **CAD981167554**
< 1/8 **OAKLAND, CA 94601** **HAZNET**
1 ft. **CA FID UST**
Site 2 of 2 in cluster I **HIST UST**
SWEEPS UST

Relative:
Higher

Actual:
35 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	DEL MONTE USA OAKLAND #37
Facility address:	1100 29TH ST OAKLAND, CA 94601
EPA ID:	CAD981167554
Mailing address:	PO BOX 2377 OAKLAND, CA 94501
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NABISCO BRANDS INC
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown

DEL MONTE USA OAKLAND #37 (Continued) **1000124544**

Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Historical Generators:

Date form received by agency:	12/20/1985
Facility name:	DEL MONTE USA OAKLAND #37
Classification:	Large Quantity Generator

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002680377

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD981167554
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 2377
Mailing City,St,Zip:	OAKLAND, CA 945010000
Gen County:	1
TSD EPA ID:	CAD083166728
TSD County:	Stanislaus
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Tons:	65.8860
Facility County:	1

Gepaid:	CAD981167554
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 2377
Mailing City,St,Zip:	OAKLAND, CA 945010000
Gen County:	1
TSD EPA ID:	CAD083166728
TSD County:	Stanislaus
Waste Category:	Unspecified oil-containing waste

DEL MONTE USA OAKLAND #37 (Continued) **1000124544**

Disposal Method: Recycler
Tons: 8.3400
Facility County: 1

Gepaid: CAD981167554
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 2377
Mailing City,St,Zip: OAKLAND, CA 945010000
Gen County: 1
TSD EPA ID: CAD004771168
TSD County: San Francisco
Waste Category: Empty containers less than 30 gallons
Disposal Method: Recycler
Tons: .0500
Facility County: 1

CA FID UST:
Facility ID: 01002096
Regulated By: UTNKI
Regulated ID: 00006140
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155350789
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

HIST UST:
Region: STATE
Facility ID: 00000006140
Facility Type: Other
Other Type: WAREHOUSE
Total Tanks: 0000
Contact Name: NOEL O'CONNELL
Telephone: 4155350789
Owner Name: DEL MONTE CORP
Owner Address: 1 MARKET PLAZA
Owner City,St,Zip: SAN FRANCISCO, CA 95119

Tank Num: 001
Container Num: 001
Year Installed: Not reported
Tank Capacity: 00025000
Tank Used for: PRODUCT
Type of Fuel: DIESEL

DEL MONTE USA OAKLAND #37 (Continued) **1000124544**

Tank Construction: Not reported
Leak Detection: None

Tank Num: 002
Container Num: 003
Year Installed: Not reported
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

Tank Num: 003
Container Num: 004
Year Installed: Not reported
Tank Capacity: 00002000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

SWEEPS UST:
Status: Not reported
Comp Number: 6140
Number: Not reported
Board Of Equalization: 44-000089
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-006140-000001
Actv Date: Not reported
Capacity: 25000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: DIESEL
Number Of Tanks: 3

Status: Not reported
Comp Number: 6140
Number: Not reported
Board Of Equalization: 44-000089
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-006140-000002
Actv Date: Not reported
Capacity: 1000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: Not reported

Status: Not reported

DEL MONTE USA OAKLAND #37 (Continued) **1000124544**

Comp Number:	6140
Number:	Not reported
Board Of Equalization:	44-000089
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-006140-000003
Actv Date:	Not reported
Capacity:	2000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	Not reported

J32 **ESPOSITO PLATING & POLISHING CO** **RCRA-SQG** **1000342340**
2904 CHAPMAN ST. **FINDS** **CAD009174103**
< 1/8 **OAKLAND, CA 94601** **HAZNET**
1 ft. **RAATS**
Site 1 of 5 in cluster J **CERC-NFRAP**
HIST UST
Relative: **EMI**
Lower

Actual: RCRA-SQG:
19 ft.

Date form received by agency:	09/01/1996
Facility name:	ESPOSITO PLATING & POLISHING CO
Facility address:	2904-2908 CHAPMAN ST OAKLAND, CA 94601
EPA ID:	CAD009174103
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Land type:	Facility is not located on Indian land. Additional information is not known.
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	ESPOSITO PLATING CORP
Owner/operator address:	2904-2908 CHAPMAN ST OAKLAND, CA 94601
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 261-1147
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	ESPOSITO PLATING CORP

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Owner/operator address: 2904-2908 CHAPMAN ST
CITY NOT REPORTED, CA 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 261-1147
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 08/18/1980
Facility name: ESPOSITO PLATING & POLISHING CO
Classification: Large Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 01/24/1985
Date achieved compliance: 10/07/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/07/1985
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/07/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 01/24/1985

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/07/1992
Evaluation lead agency: State

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002147169

California - Hazardous Waste Tracking System - Datamart

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD009174103
Contact: JACK ESPOSITO
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2904 CHAPMAN ST # 2908
Mailing City,St,Zip: OAKLAND, CA 946012803
Gen County: 1
TSD EPA ID: IDD073114654
TSD County: 99
Waste Category: Other inorganic solid waste
Disposal Method: Disposal, Land Fill
Tons: .1000
Facility County: 1

Gepaid: CAD009174103
Contact: JACK ESPOSITO/OWNER
Telephone: 5102611147
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2904 CHAPMAN ST # 2908
Mailing City,St,Zip: OAKLAND, CA 946012803
Gen County: Alameda
TSD EPA ID: CAD008488025
TSD County: Los Angeles
Waste Category: Liquids with pH <UN-> 2 with metals
Disposal Method: H010

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Tons: 8.34
Facility County: Alameda

Gepaid: CAD009174103
Contact: JACK ESPOSITO/OWNER
Telephone: 5102611147
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2904 CHAPMAN ST # 2908
Mailing City,St,Zip: OAKLAND, CA 946012803
Gen County: Alameda
TSD EPA ID: CAD008488025
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: H141
Tons: 12.64
Facility County: Alameda

Gepaid: CAD009174103
Contact: JACK ESPOSITO/OWNER
Telephone: 5102611147
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2904 CHAPMAN ST # 2908
Mailing City,St,Zip: OAKLAND, CA 946012803
Gen County: Alameda
TSD EPA ID: CAD008488025
TSD County: Los Angeles
Waste Category: Liquids with nickel > 134 mg/l
Disposal Method: H010
Tons: 27.25
Facility County: Alameda

Gepaid: CAD009174103
Contact: JACK ESPOSITO/OWNER
Telephone: 5102611147
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2904 CHAPMAN ST # 2908
Mailing City,St,Zip: OAKLAND, CA 946012803
Gen County: Alameda
TSD EPA ID: CAD008488025
TSD County: Los Angeles
Waste Category: Aqueous solution with metals (restricted levels and Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc))
Disposal Method: H010
Tons: 13.34
Facility County: Alameda

Click this hyperlink while viewing on your computer to access
3 additional CA_HAZNET: record(s) in the EDR Site Report.

CERC-NFRAP:
Site ID: 0901193
Federal Facility: Not a Federal Facility

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

NPL Status: Not on the NPL
Non NPL Status: NFRAP

CERCLIS-NFRAP Site Contact Name(s):
Contact Name: Matt Mitguard
Contact Tel: (415) 972-3096
Contact Title: Site Assessment Manager (SAM)

Contact Name: Nuria Muniz
Contact Tel: (415) 972-3811
Contact Title: Site Assessment Manager (SAM)

CERCLIS-NFRAP Site Alias Name(s):
Alias Name: ESPOSITO PLATING & POLISHING CORP
Alias Address: Not reported
CA
Alias Name: JACK ESPOSITO (OWNER)
Alias Address: Not reported
CA
Site Description: Not reported

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 06/01/1986
Priority Level: Not reported

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 04/01/1987
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: 06/01/1986
Date Completed: 04/01/1987
Priority Level: NFRAP (No Futher Remedial Action Planned

HIST UST:
Region: STATE
Facility ID: 00000058852
Facility Type: Other
Other Type: METAL FINISHING
Total Tanks: 0003
Contact Name: JACK ESPOSITO
Telephone: 4152611147
Owner Name: ESPOSITO PLATING CORP.
Owner Address: 2904-08 CHAPMAN ST.
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 1
Year Installed: 1979
Tank Capacity: 00000000
Tank Used for: WASTE
Type of Fuel: Not reported
Tank Construction: Not reported

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Leak Detection: Visual

Tank Num: 002
Container Num: 2
Year Installed: 1979
Tank Capacity: 00000000
Tank Used for: WASTE
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: Visual

Tank Num: 003
Container Num: 3
Year Installed: 1979
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: 06
Tank Construction: Not reported
Leak Detection: None

EMI:

Year:	1996
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1998
County Code:	1

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1999
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2000
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0

ESPOSITO PLATING & POLISHING CO (Continued) **1000342340**

Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	2955
Air District Name:	BA
SIC Code:	3471
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

J33 **ESPOSITO PLATING CORPORATION** **VCP** **S102008197**
South **2904-2908 CHAPMAN STREET** **ENVIROSTOR** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.002 mi.
10 ft. **Site 2 of 5 in cluster J**

Relative:
Lower

Actual:
19 ft.

VCP:

Facility ID:	01340004
Site Type:	Voluntary Cleanup
Site Type Detail:	Voluntary Cleanup
Acres:	0.5
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP, CITY OF OAKLAND
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	PATRICK LEE
Supervisor:	Mark Piros
Division Branch:	Berkeley
Site Code:	201824
Assembly:	16
Senate:	09
Special Programs Code:	Not reported
Status:	Active
Status Date:	2008-05-22 00:00:00
Restricted Use:	NO
Funding:	Not reported
Lat/Long:	37.7735599413228 / -122.232804191302
Alias Name:	CAD009174103
Alias Type:	HWIS Identification Code
Alias Name:	CAD009174103
Alias Type:	EPA Identification Number
Alias Name:	01340004
Alias Type:	Envirostor ID Number
Alias Name:	ESPOSITO PLATING & POLISHING CORPORATION
Alias Type:	Alternate Name
Alias Name:	201824
Alias Type:	Project Code (Site Code)
Alias Name:	Not reported

ESPOSITO PLATING CORPORATION (Continued) **S102008197**

Alias Type: Project Code (Site Code)

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Records Search: Site listed in EPA Cerclis. Record shows that EPA reviewed State Preliminary Assessment and recommend No Further Action. DTSC status needs to be determined.DTSC signed the Voluntary Cleanup Agreement.FACILITY IDENTIFIED QUESTIONNAIRE SENT.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2008-11-04 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2009-05-12 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 1980-03-12 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2008-08-05 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2008-09-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Assessment Report
Completed Date: 1987-04-01 00:00:00

Confirmed: 30153,30027
Confirmed Description: Chromium VI
Confirmed Description: Trichloroethylene (TCE)
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30027, 30153
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported

ESPOSITO PLATING CORPORATION (Continued) **S102008197**

Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: METAL PLATING - OTHER

ENVIROSTOR:
Site Type: Voluntary Cleanup
Site Type Detailed: Voluntary Cleanup
Acres: 0.5
NPL: NO
Regulatory Agencies: SMBRP, CITY OF OAKLAND
Lead Agency: SMBRP
Program Manager: PATRICK LEE
Supervisor: Mark Piros
Division Branch: Berkeley
Facility ID: 01340004
Site Code: 201824
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Active
Status Date: 2008-05-22 00:00:00
Restricted Use: NO
Funding: Not reported
Latitude: 37.7735599413228
Longitude: -122.232804191302
Alias Name: CAD009174103
Alias Type: HWIS Identification Code
Alias Name: CAD009174103
Alias Type: EPA Identification Number
Alias Name: 01340004
Alias Type: Envirostor ID Number
Alias Name: ESPOSITO PLATING & POLISHING CORPORATION
Alias Type: Alternate Name
Alias Name: 201824
Alias Type: Project Code (Site Code)
Alias Name: Not reported
Alias Type: Project Code (Site Code)

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Records Search: Site listed in EPA Cerclis. Record shows that EPA reviewed State Preliminary Assessment and recommend No Further Action. DTSC status needs to be determined.DTSC signed the Voluntary Cleanup Agreement.FACILITY IDENTIFIED QUESTIONNAIRE SENT.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2008-11-04 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2009-05-12 00:00:00

ESPOSITO PLATING CORPORATION (Continued) **S102008197**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 1980-03-12 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2008-08-05 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2008-09-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Assessment Report
Completed Date: 1987-04-01 00:00:00

Confirmed: 30153,30027
Confirmed Description: Chromium VI
Confirmed Description: Trichloroethylene (TCE)
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30027, 30153
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: METAL PLATING - OTHER

J34 **VULCAN STEEL FOUNDRY** **CA FID UST** **S101624306**
South **2909 CHAPMAN ST** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.003 mi.
14 ft. **Site 3 of 5 in cluster J**

Relative:
Lower

Actual:
19 ft.

CA FID UST:
Facility ID: 01002074
Regulated By: UTNKI
Regulated ID: 00000731
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4152615305
Mail To: Not reported

VULCAN STEEL FOUNDRY (Continued) **S101624306**

Mailing Address: 2909 CHAPMAN ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 731
Number: Not reported
Board Of Equalization: 44-000010
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-000731-000001
Actv Date: Not reported
Capacity: 2500
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: 6

Status: Not reported
Comp Number: 731
Number: Not reported
Board Of Equalization: 44-000010
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-000731-000002
Actv Date: Not reported
Capacity: 2500
Tank Use: UNKNOWN
Stg: WASTE
Content: Not reported
Number Of Tanks: Not reported

Status: Not reported
Comp Number: 731
Number: Not reported
Board Of Equalization: 44-000010
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-000731-000003
Actv Date: Not reported

VULCAN STEEL FOUNDRY (Continued) **S101624306**

Capacity:	1
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	DIESEL
Number Of Tanks:	Not reported
Status:	Not reported
Comp Number:	731
Number:	Not reported
Board Of Equalization:	44-000010
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-000731-000004
Actv Date:	Not reported
Capacity:	1
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	Not reported
Status:	Not reported
Comp Number:	731
Number:	Not reported
Board Of Equalization:	44-000010
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-000731-000005
Actv Date:	Not reported
Capacity:	500
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	Not reported
Status:	Not reported
Comp Number:	731
Number:	Not reported
Board Of Equalization:	44-000010
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-000731-000006
Actv Date:	Not reported
Capacity:	1
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	DIESEL
Number Of Tanks:	Not reported

J35
South
< 1/8
0.003 mi.
14 ft.

VULCAN STEEL FOUNDRY
2909 CHAPMAN ST
OAKLAND, CA 94601

Site 4 of 5 in cluster J

HIST UST **U001599037**
N/A

Relative:
Lower

Actual:
19 ft.

HIST UST:

Region:	STATE
Facility ID:	00000000731
Facility Type:	Other
Other Type:	METAL CASTING
Total Tanks:	0006
Contact Name:	CRAIG DOUGLAS
Telephone:	4152615305
Owner Name:	VULCAN STEEL FOUNDRY
Owner Address:	2909 CHAPMAN STREET
Owner City,St,Zip:	OAKLAND, CA 94601
Tank Num:	001
Container Num:	1
Year Installed:	1982
Tank Capacity:	00001500
Tank Used for:	Not reported
Type of Fuel:	Not reported
Tank Construction:	Not reported
Leak Detection:	Stock Inventor
Tank Num:	002
Container Num:	2
Year Installed:	1982
Tank Capacity:	00002500
Tank Used for:	WASTE
Type of Fuel:	Not reported
Tank Construction:	Not reported
Leak Detection:	Stock Inventor
Tank Num:	003
Container Num:	3
Year Installed:	1941
Tank Capacity:	00000000
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Tank Construction:	Not reported
Leak Detection:	None
Tank Num:	004
Container Num:	4
Year Installed:	1940
Tank Capacity:	00000000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Tank Construction:	Not reported
Leak Detection:	None
Tank Num:	005
Container Num:	5
Year Installed:	1942
Tank Capacity:	00000500
Tank Used for:	PRODUCT

VULCAN STEEL FOUNDRY (Continued) **U001599037**

Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

Tank Num: 006
Container Num: 6
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: None

K36 **SAN FRANCISCO NEWS PAPER AGENC** **HIST UST** **U001599137**
WSW **534 23RD AVE** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.005 mi.
25 ft. **Site 1 of 5 in cluster K**

Relative:
Lower

Actual:
15 ft.

HIST UST:
Region: STATE
Facility ID: 00000064959
Facility Type: Other
Other Type: MAINTENANCE YARD
Total Tanks: 0001
Contact Name: NOLT TOWNSEND
Telephone: 4157777601
Owner Name: BANKERS & MARKS
Owner Address: 351 CALIFORNIA STREET
Owner City,St,Zip: SAN FRANCISCO, CA 94104

Tank Num: 001
Container Num: TANK # ONE
Year Installed: Not reported
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: Stock Inventor

K37 **FILLMORE MARKS PROPERTY** **HAZNET** **S100862037**
WSW **534 23RD AVE** **LUST** **N/A**
< 1/8 **OAKLAND, CA 94606** **Alameda County CS**
0.005 mi. **HIST CORTESE**
25 ft. **Site 2 of 5 in cluster K**

Relative:
Lower

Actual:
15 ft.

HAZNET:
Gepaid: CAL000232414
Contact: CAROL GOLDMAN/LAB MGR
Telephone: 5104367626
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 534 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: Not reported

FILLMORE MARKS PROPERTY (Continued) **S100862037**

TSD County: Alameda
Waste Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Not reported
Tons: 0.07
Facility County: Not reported

Gepaid: CAL000232414
Contact: CAROL GOLDMAN/LAB MGR
Telephone: 5104367626
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 534 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Alameda
Waste Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Tons: 0.08
Facility County: Not reported

Gepaid: CAL000232414
Contact: CAROL GOLDMAN/LAB MGR
Telephone: 5104367626
Facility Addr2: Not reported
Mailing Name: CAROL GOLDMAN/LAB MGR
Mailing Address: 534 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: CA0000084517
TSD County: Alameda
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: 0.07
Facility County: 1

Gepaid: CAL000232414
Contact: CAROL GOLDMAN/LAB MGR
Telephone: 5104367626
Facility Addr2: Not reported
Mailing Name: CAROL GOLDMAN/LAB MGR
Mailing Address: 534 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: CAD053044053
TSD County: Alameda
Waste Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Tons: 0.07
Facility County: 1

Click this hyperlink while viewing on your computer to access
-1 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600101689

FILLMORE MARKS PROPERTY (Continued) **S100862037**

Latitude: 37.774872
Longitude: -122.234781
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-10-18 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1823
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC HSCA 10/18/1996

LUST:
Region: 2
Facility Id: 01-1823
Facility Status: Case Closed
Case Number: 234
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: Tank
Date Leak Confirmed: 9/27/1993
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Case Closed
Record Id: RO0000798
PE: 5602

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1823

A38 **SARONI T.F.I.** **UST** **U003803359**
WSW **727 KENNEDY ST** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.005 mi.
29 ft. **Site 5 of 6 in cluster A**

Relative:
Lower

Actual:
17 ft.

UST:
Global ID: 5915
Latitude: 37.77741
Longitude: -122.23773

A39
WSW
< 1/8
0.005 mi.
29 ft.

SARONI TOTAL FOOD
727 KENNEDY ST
OAKLAND, CA 94606

Site 6 of 6 in cluster A

Database(s): HAZNET, LUST, CA FID UST, Alameda County CS, SWEEPS UST, HIST CORTESE

EDR ID Number: S101580305
EPA ID Number: N/A

Relative:
Lower

Actual:
17 ft.

HAZNET:

Gepaid:	CAC001462144
Contact:	SARONI TFI
Telephone:	5105355480
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	727 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946040000
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Aqueous solution with 10% or more total organic residues
Disposal Method:	Recycler
Tons:	.2584
Facility County:	1

Gepaid:	CAC001037840
Contact:	GLENN E DUNGAN
Telephone:	5102619670
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1918
Mailing City,St,Zip:	OAKLAND, CA 946041918
Gen County:	1
TSD EPA ID:	CAD043260702
TSD County:	San Mateo
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Tons:	4.1700
Facility County:	1

Gepaid:	CAC001037840
Contact:	GLENN E DUNGAN
Telephone:	5102619670
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1918
Mailing City,St,Zip:	OAKLAND, CA 946041918
Gen County:	1
TSD EPA ID:	CAD004771168
TSD County:	San Francisco
Waste Category:	Other empty containers 30 gallons or more
Disposal Method:	Recycler
Tons:	3.5000
Facility County:	1

Gepaid:	CAC001037840
Contact:	GLENN E DUNGAN
Telephone:	5102619670
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1918

SARONI TOTAL FOOD (Continued) **S101580305**

Mailing City,St,Zip: OAKLAND, CA 946041918
Gen County: 1
TSD EPA ID: CAL000048571
TSD County: Santa Clara
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: 15.3955
Facility County: 1

Gepaid: CAC001037840
Contact: GLENN E DUNGAN
Telephone: 5102619670
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1918
Mailing City,St,Zip: OAKLAND, CA 946041918
Gen County: 1
TSD EPA ID: CAL000048571
TSD County: Santa Clara
Waste Category: Waste oil and mixed oil
Disposal Method: Not reported
Tons: 8.0272
Facility County: 1

Click this hyperlink while viewing on your computer to access
2 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600101958
Latitude: 37.776588
Longitude: -122.237659
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-03-26 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2132
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2 03/26/1996

LUST:
Region: 2
Facility Id: 01-2132
Facility Status: Case Closed
Case Number: 3135
How Discovered: OM
Leak Cause: UNK
Leak Source: Piping
Date Leak Confirmed: 1/26/1996
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported

SARONI TOTAL FOOD (Continued) **S101580305**

Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01002468
Regulated By: UTNKA
Regulated ID: Not reported
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4152618683
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94606
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Case Closed
Record Id: RO0000631
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 232
Number: 1
Board Of Equalization: 44-002982
Ref Date: 09-21-93
Act Date: 05-02-94
Created Date: 03-18-91
Tank Status: A
Owner Tank Id: 0001
Swrcb Tank Id: 01-000-000232-000001
Actv Date: 09-21-93
Capacity: 8010
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: 2

Status: A
Comp Number: 232
Number: 1
Board Of Equalization: 44-002982
Ref Date: 09-21-93
Act Date: 05-02-94
Created Date: 03-18-91
Tank Status: A

SARONI TOTAL FOOD (Continued) **S101580305**

Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-000232-000002
Actv Date: 02-11-93
Capacity: 7000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2132

K40 **EXCHANGE LINEN SERVICE** **RCRA-SQG** **1000239508**
WSW **527 23RD AVE** **FINDS** **CAD982503625**
< 1/8 **OAKLAND, CA 94606** **HAZNET**
0.006 mi. **LUST**
30 ft. **Site 3 of 5 in cluster K** **HIST UST**
EMI
Relative: **Alameda County CS**
Lower **SWEEPS UST**
HIST CORTESE

Actual:
15 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: EXCHANGE LINEN SERVICE
Facility address: 527 23RD AVE
OAKLAND, CA 94606
EPA ID: CAD982503625
Mailing address: 23RD AVE
OAKLAND, CA 94606
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: EXCHANGE LINEN SERVICE
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

EXCHANGE LINEN SERVICE (Continued) **1000239508**

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110001190719

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD982503625
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 527 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAL000027741
TSD County: 5
Waste Category: Asbestos-containing waste
Disposal Method: Not reported
Tons: 29.4980

EXCHANGE LINEN SERVICE (Continued) **1000239508**

Facility County: 1

Gepaid: CAD982503625
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 527 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAL000027741
TSD County: 5
Waste Category: Asbestos-containing waste
Disposal Method: Disposal, Land Fill
Tons: 63.2100
Facility County: 1

LUST:
Region: STATE
Global Id: T0600100995
Latitude: 37.774776
Longitude: -122.234963
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-09-12 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1078
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 1HSCAWG Cr09/12/1996

LUST:
Region: 2
Facility Id: 01-1078
Facility Status: Case Closed
Case Number: 215
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 6/29/1993
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

HIST UST:
Region: STATE
Facility ID: 00000066581
Facility Type: Other

EXCHANGE LINEN SERVICE (Continued) **1000239508**

Other Type: LINEN SUPPLY
Total Tanks: 0001
Contact Name: Not reported
Telephone: 4152613360
Owner Name: EXCHANGE LINEN SERVICE OF CALI
Owner Address: 1575 INDIANA STREET
Owner City,St,Zip: SAN FRANCISCO, CA 94107

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Unkown inches
Leak Detection: None

EMI:

Year:	1987
County Code:	1
Air Basin:	SF
Facility ID:	2419
Air District Name:	BA
SIC Code:	7213
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	1
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1990
County Code:	1
Air Basin:	SF
Facility ID:	2419
Air District Name:	BA
SIC Code:	7213
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	1
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2007
County Code:	20
Air Basin:	SJV
Facility ID:	2419
Air District Name:	SJU

EXCHANGE LINEN SERVICE (Continued) **1000239508**

SIC Code:	5541
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.0072785168943878106
Reactive Organic Gases Tons/Yr:	.007249753708004954
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

CS:

Status:	Case Closed
Record Id:	RO0000952
PE:	5602

SWEEPS UST:

Status:	Not reported
Comp Number:	66581
Number:	Not reported
Board Of Equalization:	44-000730
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-066581-000001
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	2

Status:	Not reported
Comp Number:	66581
Number:	Not reported
Board Of Equalization:	44-000730
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-066581-000002
Actv Date:	Not reported
Capacity:	550
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA

EXCHANGE LINEN SERVICE (Continued) **1000239508**

Reg Id: 2419

Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1078

K41 **CONTRA COSTA LAUNDRY & DRY CLEANERS** **EDR Historical Cleaners** **1009141349**
WSW **527 23RD AVE** **N/A**
< 1/8 **OAKLAND, CA**
0.006 mi.
30 ft. **Site 4 of 5 in cluster K**

Relative:
Lower

Actual:
15 ft.

EDR Historical Cleaners:
Name: CONTRA COSTA LAUNDRY CO
Year: 1933
Type: LAUNDRIES-STEAM

Name: CONTRA COSTA LAUNDRY & DRY CLEANERS
Year: 1943
Type: LAUNDRIES-STEAM

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42 **ROADWAY EXPRESS,INC** **SLIC** **S106235277**
North **1125 27TH AVE** **N/A**
< 1/8 **OAKLAND, CA**
0.010 mi.
55 ft.

Relative:
Higher

Actual:
26 ft.

SLIC:
Region: STATE
Facility Status: **Open - Inactive**
Status Date: 2009-06-03 00:00:00
Global Id: SLT2O142148
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.778635
Longitude: -122.232947
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: SLT2O142148
File Location: Not reported
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

SLIC:
Region: 2
Facility ID: SLT2O142148
Facility Status: Leak being confirmed
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported

ROADWAY EXPRESS,INC (Continued) **S106235277**

Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

K43 **BARSTAD & DONICHT, INC** **HAZNET** **S102809817**
WSW **501 23RD AVE** **HIST CORTESE** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.010 mi.
55 ft. **Site 5 of 5 in cluster K**

Relative:
Lower

Actual:
14 ft.

HAZNET:

Gepaid:	CAL000011973
Contact:	DEACTIVATED VQ96 DONALD CADY
Telephone:	5103570777
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	501 23RD AVE
Mailing City,St,Zip:	OAKLAND, CA 946065306
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Alameda
Waste Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Tons:	0.12
Facility County:	Not reported

Gepaid:	CAL000011973
Contact:	DEACTIVATED VQ96 DONALD CADY
Telephone:	5103570777
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	501 23RD AVE
Mailing City,St,Zip:	OAKLAND, CA 946065306
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Santa Clara
Waste Category:	Waste oil and mixed oil
Disposal Method:	Transfer Station
Tons:	0.01
Facility County:	Not reported

Gepaid:	CAL000011973
Contact:	ANN DELUCCHI
Telephone:	5103570777
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	501 23RD AVE
Mailing City,St,Zip:	OAKLAND, CA 946065306
Gen County:	1
TSD EPA ID:	CAT000646117
TSD County:	Kings
Waste Category:	Other organic solids
Disposal Method:	Disposal, Land Fill
Tons:	.2125
Facility County:	1

BARSTAD & DONICHT, INC (Continued) **S102809817**

Gepaid: CAL000011973
Contact: ANN DELUCCHI
Telephone: 5103570777
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 501 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946065306
Gen County: 1
TSD EPA ID: CAT000613893
TSD County: Los Angeles
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Tons: .0495
Facility County: 1

Gepaid: CAL000011973
Contact: ANN DELUCCHI
Telephone: 5103570777
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 501 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946065306
Gen County: 1
TSD EPA ID: CAT000613893
TSD County: Los Angeles
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Not reported
Tons: .0135
Facility County: 1

Click this hyperlink while viewing on your computer to access
4 additional CA_HAZNET: record(s) in the EDR Site Report.

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 2683

J44 **SEATCO OFFICE SERVICES** **RCRA-SQG 1000396716**
South **2921 CHAPMAN ST** **FINDS CAD981169170**
< 1/8 **OAKLAND, CA 94601**
0.011 mi.
56 ft. **Site 5 of 5 in cluster J**

Relative:
Lower

Actual:
18 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: SEATCO OFFICE SERVICES
Facility address: 2921 CHAPMAN ST
OAKLAND, CA 94601
EPA ID: CAD981169170
Mailing address: CHAPMAN ST
OAKLAND, CA 94601
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported

SEATCO OFFICE SERVICES (Continued) **1000396716**

Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: THOMAS SMITH
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 03/20/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported

SEATCO OFFICE SERVICES (Continued) **1000396716**

Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002680938

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

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45 **ROTO ROOTER** **DRYCLEANERS** **S109520562**
North **845 KENNEDY ST** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.013 mi.
66 ft.

Relative:
Lower

Actual:
21 ft.

CLEANERS:
EPA Id: CAL000306011
NAICS Code: 81149
NAICS Description: Other Personal and Household Goods Repair and Maintenance
SIC Code: 7219
Create Date: 4/27/2006 1:15:00 PM
Facility Active: Yes
Inactive Date: Not reported
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 845 KENNEDY ST
Mailing Address 2: Not reported
Mailing State: CA
Mailing Zip: 946065329
Region Code: 2
Owner Name: SANACT INC
Owner Address: 333 N CANYON PKWY STE 221
Owner Address 2: Not reported
Owner Telephone: 9256054300
Contact Name: MADISON TODD
Contact Address: 845 KENNEDY ST
Contact Address 2: Not reported
Contact Telephone: 5105356800
SIC Description: Not reported

46
South
< 1/8
0.016 mi.
85 ft.

PARKINSON G J
2928 CHAPMAN ST
OAKLAND, CA

EDR Historical Cleaners **1009140950**
N/A

Relative:
Lower

Actual:
18 ft.

EDR Historical Cleaners:

Name:	PARKINSON G J
Year:	1943
Type:	LAUNDRIES-HAND

L47
WSW
< 1/8
0.023 mi.
122 ft.

B & J FORKLIFT INC
430 23RD AVE
OAKLAND, CA 94606
Site 1 of 5 in cluster L

CA FID UST **S101580221**
SWEEPS UST **N/A**

Relative:
Lower

Actual:
14 ft.

CA FID UST:

Facility ID:	01002068
Regulated By:	UTNKI
Regulated ID:	Not reported
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	5105364241
Mail To:	Not reported
Mailing Address:	430 23RD AVE
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94606
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

SWEEPS UST:

Status:	Not reported
Comp Number:	251
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-000251-000001
Actv Date:	Not reported
Capacity:	500
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	1

48
North
< 1/8
0.025 mi.
130 ft.

LUCASEY MANUFACTURING CORP
2744 E 11TH ST
OAKLAND, CA 94601

RCRA-SQG **1000455731**
FINDS **CAD982430894**
HAZNET
Alameda County CS

Relative:
Higher

Actual:
29 ft.

RCRA-SQG:

Date form received by agency:	09/18/1990
Facility name:	LUCASEY MANUFACTURING CORP
Facility address:	2744 E 11TH ST OAKLAND, CA 94601
EPA ID:	CAD982430894
Mailing address:	P O BOX 14023 OAKLAND, CA 94614
Contact:	ENVIRONMENTAL MANAGER
Contact address:	2744 E 11TH ST OAKLAND, CA 94601
Contact country:	US
Contact telephone:	(415) 534-1437
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	JOE LUCASEY
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown

LUCASEY MANUFACTURING CORP (Continued) **1000455731**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002810290

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HAZNET:
Gepaid: CAD982430894
Contact: LUCASEY MFG CORP
Telephone: 5105341435
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 14023
Mailing City,St,Zip: OAKLAND, CA 946142023
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Not reported
Tons: .7500
Facility County: 1

Gepaid: CAD982430894
Contact: LUCASEY MFG CORP
Telephone: 5105341435
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 14023
Mailing City,St,Zip: OAKLAND, CA 946142023
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .2502
Facility County: 1

Gepaid: CAD982430894
Contact: LUCASEY MFG CORP

LUCASEY MANUFACTURING CORP (Continued) **1000455731**

Telephone: 5105341435
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 14023
Mailing City,St,Zip: OAKLAND, CA 946142023
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: .3336
Facility County: 1

Gepaid: CAD982430894
Contact: LUCASEY MFG CORP
Telephone: 5105341435
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 14023
Mailing City,St,Zip: OAKLAND, CA 946142023
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: Disposal, Other
Tons: .1250
Facility County: 1

Gepaid: CAD982430894
Contact: JIM HAMPTON/PRODUCTION MGR
Telephone: 5105341435
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 14023
Mailing City,St,Zip: OAKLAND, CA 946142023
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Disposal, Land Fill
Tons: 0.20
Facility County: Not reported

Click this hyperlink while viewing on your computer to access
7 additional CA_HAZNET: record(s) in the EDR Site Report.

CS:
Status: Pollution Characterization
Record Id: RO0002902
PE: 5502

Status: Preliminary site assessment underway
Record Id: RO0002902
PE: 5502

L49 **OAKLAND CARDLOCK** **UST** **U003804915**
WSW **421 23RD AVE** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.026 mi.
137 ft. **Site 2 of 5 in cluster L**

Relative: UST:
Lower
Global ID: 4987
Latitude: 37.77393
Actual: Longitude: -122.23604
13 ft.

L50 **BAY AREA PETROLEUM INC** **FINDS** **1000102311**
WSW **421 23RD AVE** **HAZNET** **CAD053045811**
< 1/8 **OAKLAND, CA 94606** **RCRA-NonGen**
0.026 mi.
137 ft. **Site 3 of 5 in cluster L**

Relative: FINDS:
Lower
Other Pertinent Environmental Activity Identified at Site

Actual: Registry ID: 110002649206
13 ft.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD053045811
Contact:	CARLH TAFT AND DONALD B SILIGO
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 12217
Mailing City,St,Zip:	OAKLAND, CA 046040000
Gen County:	1
TSD EPA ID:	CAL000161743
TSD County:	Santa Clara
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Transfer Station
Tons:	2.0850
Facility County:	1

Gepaid:	CAD053045811
Contact:	CARLH TAFT AND DONALD B SILIGO
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 12217
Mailing City,St,Zip:	OAKLAND, CA 046040000
Gen County:	1
TSD EPA ID:	CAD059494310
TSD County:	Santa Clara
Waste Category:	Other organic solids
Disposal Method:	Disposal, Other
Tons:	.2500

BAY AREA PETROLEUM INC (Continued) **1000102311**

Facility County: 1

Gepaid: CAD053045811
Contact: CARLH TAFT AND DONALD B SILIGO
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 12217
Mailing City,St,Zip: OAKLAND, CA 046040000
Gen County: 1
TSD EPA ID: CAL000161743
TSD County: Santa Clara
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 1.7097
Facility County: 1

Gepaid: CAD053045811
Contact: CARLH TAFT AND DONALD B SILIGO
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 12217
Mailing City,St,Zip: OAKLAND, CA 046040000
Gen County: 1
TSD EPA ID: CAL000161743
TSD County: Santa Clara
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: .9174
Facility County: 1

Gepaid: CAD053045811
Contact: CARLH TAFT AND DONALD B SILIGO
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 12217
Mailing City,St,Zip: OAKLAND, CA 046040000
Gen County: 1
TSD EPA ID: CAL000161743
TSD County: Santa Clara
Waste Category: Other organic solids
Disposal Method: Transfer Station
Tons: 2.7000
Facility County: 1

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

RCRA-NonGen:
Date form received by agency: 08/18/1980
Facility name: BAY AREA PETROLEUM INC
Facility address: 421 23RD AVE
OAKLAND, CA 94606
EPA ID: CAD053045811
Mailing address: PO BOX 12217

BAY AREA PETROLEUM INC (Continued) **1000102311**

OAKLAND, CA 04604
Contact: ENVIRONMENTAL MANAGER
Contact address: 421 23RD AVE
OAKLAND, CA 94606
Contact country: US
Contact telephone: (415) 534-4517
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: CARLH TAFT AND DONALD B SILIGO
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

L51 **BAY AREA DIABLO PETROLEUM COMPANY** **HAZNET** **S103952025**
WSW **421 23RD AVE** **LUST** **N/A**
< 1/8 **OAKLAND, CA 94606** **Alameda County CS**
0.026 mi. **SWEEPS UST**
137 ft. **Site 4 of 5 in cluster L** **HIST CORTESE**

Relative:
Lower

Actual:
13 ft.

HAZNET:

Gepaid:	CAC001409136
Contact:	GOLDEN GATE PETROLEUM
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1001 GALAXY WAY #308
Mailing City,St,Zip:	CONCORD, CA 945200000
Gen County:	1
TSD EPA ID:	CAD009466392
TSD County:	7
Waste Category:	Other empty containers 30 gallons or more
Disposal Method:	Recycler
Tons:	26.6125
Facility County:	1

Gepaid:	CAL000318920
Contact:	JONATHAN KETCHUM
Telephone:	9252282222
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	501 SHELL AVE
Mailing City,St,Zip:	MARTINEZ, CA 945531357
Gen County:	Alameda
TSD EPA ID:	TXD077603371
TSD County:	99
Waste Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	H141
Tons:	0.62
Facility County:	Alameda

Gepaid:	CAL000318920
Contact:	JONATHAN KETCHUM
Telephone:	9252282222
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	501 SHELL AVE
Mailing City,St,Zip:	MARTINEZ, CA 945531357
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Not reported
Waste Category:	Unspecified oil-containing waste
Disposal Method:	H141
Tons:	0.2
Facility County:	Alameda

LUST:

Region:	STATE
Global Id:	T0600102218
Latitude:	37.773779
Longitude:	-122.236
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment

BAY AREA DIABLO PETROLEUM COMPANY (Continued) **S103952025**

Status Date: 1998-08-17 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-2408
LOC Case Number: RO0000395
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2,h,s,c,a,G MTBE=13,000 ppb in MW3 approximately 30' downgradient of site.A04/01/199904/23/1999

LUST:
Region: 2
Facility Id: 01-2408
Facility Status: Leak being confirmed
Case Number: 191
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 8/19/1998
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Pollution Characterization
Record Id: RO0000395
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 300191
Number: 1
Board Of Equalization: 44-002364
Ref Date: 07-15-93
Act Date: 04-15-94
Created Date: 04-15-94
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-300191-000001
Actv Date: 07-15-93
Capacity: 8000
Tank Use: M.V. FUEL
Stg: P
Content: PRM UNLEADED
Number Of Tanks: 5

Status: A
Comp Number: 300191
Number: 1
Board Of Equalization: 44-002364

BAY AREA DIABLO PETROLEUM COMPANY (Continued) **S103952025**

Ref Date:	07-15-93
Act Date:	04-15-94
Created Date:	04-15-94
Tank Status:	A
Owner Tank Id:	2
Swrcb Tank Id:	01-000-300191-000002
Actv Date:	07-15-93
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

Status:	A
Comp Number:	300191
Number:	1
Board Of Equalization:	44-002364
Ref Date:	07-15-93
Act Date:	04-15-94
Created Date:	04-15-94
Tank Status:	A
Owner Tank Id:	3
Swrcb Tank Id:	01-000-300191-000003
Actv Date:	07-15-93
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	PLUS UNLEADE
Number Of Tanks:	Not reported

Status:	A
Comp Number:	300191
Number:	1
Board Of Equalization:	44-002364
Ref Date:	07-15-93
Act Date:	04-15-94
Created Date:	04-15-94
Tank Status:	A
Owner Tank Id:	4
Swrcb Tank Id:	01-000-300191-000004
Actv Date:	07-15-93
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	DIESEL
Number Of Tanks:	Not reported

Status:	A
Comp Number:	300191
Number:	1
Board Of Equalization:	44-002364
Ref Date:	07-15-93
Act Date:	04-15-94
Created Date:	04-15-94
Tank Status:	A
Owner Tank Id:	5
Swrcb Tank Id:	01-000-300191-000005

BAY AREA DIABLO PETROLEUM COMPANY (Continued) **S103952025**

Actv Date: 07-15-93
Capacity: 12000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2408

L52 **RIGHT AWAY READY MIX INC** **HAZNET** **S103659466**
WSW **435 23RD AVE** **LUST** **N/A**
< 1/8 **OAKLAND, CA 94606** **HIST CORTESE**
0.028 mi.
147 ft. **Site 5 of 5 in cluster L**

Relative:
Lower

Actual:
13 ft.

HAZNET:
Gepaid: CAL000135822
Contact: BERNERD LEONG
Telephone: 5105320510
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 435 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946065304
Gen County: 1
TSD EPA ID: CA0000084517
TSD County: Sacramento
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Tons: .0360
Facility County: 1

LUST:
Region: STATE
Global Id: T0600101141
Latitude: 37.77394
Longitude: -122.234838
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1990-09-05 00:00:00
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1242
LOC Case Number: Not reported
File Location: Not reported
Potential Media Affect: Soil
Potential Contaminats of Concern: Diesel
Site History: Not reported

LUST:
Region: 2
Facility Id: 01-1242

RIGHT AWAY READY MIX INC (Continued) **S103659466**

Facility Status: Case Closed
Case Number: 01-1242
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1242

M53 **FIDELITY PACKAGING CORP** **RCRA-SQG** **1000204542**
WSW **646 KENNEDY ST** **FINDS** **CAD981421068**
< 1/8 **OAKLAND, CA 94606** **HAZNET**
0.030 mi. **LUST**
157 ft. **Site 1 of 2 in cluster M** **Alameda County CS**
HIST CORTESE

Relative:
Lower

Actual:
14 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: FIDELITY PACKAGING CORP
Facility address: 646 KENNEDY ST
OAKLAND, CA 94606
EPA ID: CAD981421068
Mailing address: 2107 LIVINGSTON ST
OAKLAND, CA 94606
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator

FIDELITY PACKAGING CORP (Continued) **1000204542**

Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: FIDELITY PACKAGING CORP
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 06/19/1986
Facility name: FIDELITY PACKAGING CORP
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110009536118

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD981421068
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported

FIDELITY PACKAGING CORP (Continued) **1000204542**

Mailing Name: Not reported
Mailing Address: 2107 LIVINGSTON ST
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAD044429835
TSD County: Los Angeles
Waste Category: Alkaline solution without metals (pH > 12.5)
Disposal Method: Disposal, Other
Tons: .0110
Facility County: 1

Gepaid: CAD981421068
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2107 LIVINGSTON ST
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAD008252405
TSD County: Los Angeles
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: Not reported
Tons: 3.9615
Facility County: 1

Gepaid: CAD981421068
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2107 LIVINGSTON ST
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAD008252405
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: Recycler
Tons: .5000
Facility County: 1

Gepaid: CAD981421068
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2107 LIVINGSTON ST
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAD044429835
TSD County: Los Angeles
Waste Category: Liquids with pH <UN-> 2
Disposal Method: Disposal, Other
Tons: .0050
Facility County: 1

Gepaid: CAD981421068

FIDELITY PACKAGING CORP (Continued) **1000204542**

Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2107 LIVINGSTON ST
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CAD044429835
TSD County: Los Angeles
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: Disposal, Other
Tons: .0300
Facility County: 1

Click this hyperlink while viewing on your computer to access
12 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600100572
Latitude: 37.775825
Longitude: -122.236146
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2000-07-10 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0621
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2HSCAW Suitable for case closure if RP would give us the UST closure r01/21/1998

LUST:
Region: 2
Facility Id: 01-0621
Facility Status: Case Closed
Case Number: 3123
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 3/20/1992
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: 1/21/1998
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Case Closed
Record Id: RO0000984

FIDELITY PACKAGING CORP (Continued) **1000204542**

PE: 5602

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0621

54
WSW
< 1/8
0.030 mi.
161 ft.

VACANT LOT **CA FID UST** **S101629609**
534 023RD AVE **SWEEPS UST** **N/A**
OAKLAND, CA 94606

Relative:
Lower

Actual:
13 ft.

CA FID UST:
Facility ID: 01002806
Regulated By: UTNKA
Regulated ID: 00064959
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4157777601
Mail To: Not reported
Mailing Address: 534 023RD AVE
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94606
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

SWEEPS UST:
Status: Not reported
Comp Number: 64959
Number: Not reported
Board Of Equalization: 44-000699
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-064959-000001
Actv Date: Not reported
Capacity: 10000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: REG UNLEADED
Number Of Tanks: 1

M55 WSW < 1/8 0.035 mi. 184 ft. **EMPIRE PAPER CO**
655 KENNEDY ST
OAKLAND, CA 94606
Site 2 of 2 in cluster M

Database(s): RCRA-SQG, FINDS, HAZNET
EDR ID Number: 1000886195
EPA ID Number: CA0000133108

Relative: Lower

Actual: 14 ft.

RCRA-SQG:

Date form received by agency:	02/11/1994
Facility name:	EMPIRE PAPER CO
Facility address:	655 KENNEDY ST OAKLAND, CA 94606
EPA ID:	CA0000133108
Mailing address:	KENNEDY ST OAKLAND, CA 94606
Contact:	MATTHEW MEIXELL
Contact address:	655 KENNEDY ST OAKLAND, CA 94606
Contact country:	US
Contact telephone:	(510) 534-0306
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	EMPIRE PAPER CO
Owner/operator address:	655 KENNEDY ST OAKLAND, CA 94606
Owner/operator country:	Not reported
Owner/operator telephone:	(510) 534-0306
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Violation Status: No violations found

EMPIRE PAPER CO (Continued) **1000886195**

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002613262

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAL000115380
Contact:	PHIL LEAL
Telephone:	5105342700
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	655 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946065325
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Santa Clara
Waste Category:	Liquids with pH <UN-> 2 with metals
Disposal Method:	Disposal, Other
Tons:	0.20
Facility County:	Not reported

Gepaid:	CAL000115380
Contact:	HENRY F SCARPELLI
Telephone:	5105342700
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	655 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946065325
Gen County:	1
TSD EPA ID:	CAD059494310
TSD County:	Santa Clara
Waste Category:	Liquids with pH <UN-> 2 with metals
Disposal Method:	Disposal, Other
Tons:	0.7
Facility County:	1

Gepaid:	CAL000115380
Contact:	HENRY F SCARPELLI
Telephone:	5105342700
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	655 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946065325
Gen County:	1
TSD EPA ID:	CAD003963592
TSD County:	Santa Clara
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler

EMPIRE PAPER CO (Continued) **1000886195**

Tons: .3127
Facility County: 1

Gepaid: CAL000115380
Contact: MATTHEW MAXELL
Telephone: 5105342700
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 655 KENNEDY ST
Mailing City,St,Zip: OAKLAND, CA 946065325
Gen County: Alameda
TSD EPA ID: CAD059494310
TSD County: Alameda
Waste Category: Liquids with pH <UN-> 2 with metals
Disposal Method: Treatment, Tank
Tons: 0.4
Facility County: 1

Gepaid: CAL000115380
Contact: HENRY F SCARPELLI
Telephone: 5105342700
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 655 KENNEDY ST
Mailing City,St,Zip: OAKLAND, CA 946065325
Gen County: 1
TSD EPA ID: CAD059494310
TSD County: Santa Clara
Waste Category: Liquids with pH <UN-> 2 with metals
Disposal Method: Treatment, Tank
Tons: .5500
Facility County: 1

Click this hyperlink while viewing on your computer to access
2 additional CA_HAZNET: record(s) in the EDR Site Report.

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56 **ALAMEDA COUNTY MOSQUITO ABATE.** **HIST UST** **U001598984**
South **3024 E 7TH ST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.035 mi.
184 ft.

Relative:
Higher

Actual:
22 ft.

HIST UST:
Region: STATE
Facility ID: 00000035009
Facility Type: Other
Other Type: PUBLIC AGENCY
Total Tanks: 0003
Contact Name: FRED ROBERTS, MANAGER
Telephone: 4155337321
Owner Name: ALAMEDA COUNTY MOSQUITO ABATEM
Owner Address: 3024 E. 7TH ST.
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 12
Year Installed: Not reported
Tank Capacity: 00000550

ALAMEDA COUNTY MOSQUITO ABATE. (Continued) **U001598984**

Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 002
Container Num: 13
Year Installed: Not reported
Tank Capacity: 00000550
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: Not reported

Tank Num: 003
Container Num: 14
Year Installed: Not reported
Tank Capacity: 00000550
Tank Used for: WASTE
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: Not reported

N57 **PLANT #237** **HIST UST** **U001599017**
East **3100 E 9TH ST** **Alameda County CS** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.041 mi.
214 ft. **Site 1 of 3 in cluster N**

Relative:
Higher

Actual:
26 ft.

HIST UST:
Region: STATE
Facility ID: 00000000653
Facility Type: Other
Other Type: CAN MFG.
Total Tanks: 0000
Contact Name: AB BRUM
Telephone: 4155324236
Owner Name: DEL MONTE CORPORATION
Owner Address: ONE MARKET PLAZA
Owner City,St,Zip: SAN FRANCISCO, CA 94119

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00006000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: Visual

CS:
Status: Case Transferred
Record Id: RO0000472
PE: 5602

Status: Post remedial action monitoring
Record Id: RO0000472

PLANT #237 (Continued) **U001599017**

PE: 5602

Status: Case Transferred
Record Id: RO0002898
PE: 5602

N58 **SAV ON DRUG 3714** **FINDS 1000124533**
East **3100 E NINETH ST** **LUST CAD009165796**
< 1/8 **OAKLAND, CA 94601** **RCRA-NonGen**
0.041 mi. **HIST CORTESE**
214 ft. **Site 2 of 3 in cluster N**

Relative: Higher

FINDS:
Other Pertinent Environmental Activity Identified at Site

Actual: 26 ft.

Registry ID: 110001169039

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

LUST:
Region: STATE
Global Id: T0600100438
Latitude: 37.7752
Longitude: -122.231516
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1995-10-30 00:00:00
Lead Agency: Not reported
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0482
LOC Case Number: Not reported
File Location: Regional Board
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Heating Oil / Fuel Oil
Site History: Not reported

LUST:
Region: 2
Facility Id: 01-0482
Facility Status: Preliminary site assessment underway
Case Number: 846
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported

SAV ON DRUG 3714 (Continued) **1000124533**

Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 6/1/1986
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

RCRA-NonGen:
Date form received by agency: 10/14/1997
Facility name: SAV ON DRUG 3714
Facility address: 3100 E NINETH ST
OAKLAND, CA 94601
EPA ID: CAD009165796
Contact: JAMIE TARRANT
Contact address: P O BOX 26948
SALT LAKE CITY, UT 84126
Contact country: US
Contact telephone: (801) 961-5780
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: SAV ON DRUG 3714
Owner/operator address: 3100 E NINETH ST
OAKLAND, CA 94601
Owner/operator country: Not reported
Owner/operator telephone: (510) 532-0100
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: FHHGFH
Owner/operator address: FDHHHH
FGSGGSS, CA 99999
Owner/operator country: Not reported
Owner/operator telephone: (999) 999-9999
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No

SAV ON DRUG 3714 (Continued) **1000124533**

Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 01/17/1997
Facility name: SAV ON DRUG 3714
Classification: Small Quantity Generator

Date form received by agency: 09/01/1996
Facility name: SAV ON DRUG 3714
Classification: Large Quantity Generator

Date form received by agency: 02/25/1994
Facility name: SAV ON DRUG 3714
Site name: CALIF-WASH CAN CORP
Classification: Large Quantity Generator

Date form received by agency: 01/20/1992
Facility name: SAV ON DRUG 3714
Site name: DEL MONTE FOODS #237
Classification: Large Quantity Generator

Date form received by agency: 04/02/1990
Facility name: SAV ON DRUG 3714
Site name: DEL MONTE PLANT #237
Classification: Large Quantity Generator

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 10/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0482

N59 **DEL MONTE PLANT #37** **LUST** **S108241329**
East **3100 9TH** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.041 mi.
214 ft. **Site 3 of 3 in cluster N**

Relative:
Higher

Actual:
26 ft.

LUST:
Region: STATE
Global Id: T06019745070
Latitude: 37.774009

DEL MONTE PLANT #37 (Continued) **S108241329**

Longitude:	-122.229646
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	2005-01-11 00:00:00
Lead Agency:	SAN FRANCISCO BAY RWQCB (REGION 2)
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	Not reported
LOC Case Number:	Not reported
File Location:	Regional Board
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Heating Oil / Fuel Oil
Site History:	Not reported

O60 **DUTCH H H** **EDR Historical Auto Stations** **1009014581**
SSW **401 29TH AVE** **N/A**
< 1/8 **OAKLAND, CA**
0.041 mi.
216 ft. **Site 1 of 6 in cluster O**

Relative:
Lower

Actual:
12 ft.

EDR Historical Auto Stations:

Name:	MC AVOY L J
Year:	1928
Type:	GASOLINE AND OIL SERVICE STATIONS
Name:	DUTCH H H
Year:	1933
Type:	GASOLINE AND OIL SERVICE STATIONS

P61 **ANALYSTS INCORPORATED** **RCRA-SQG** **1000293766**
South **2910 FORD ST** **FINDS** **CAD981389232**
< 1/8 **OAKLAND, CA 94601** **CA FID UST**
0.046 mi. **HIST UST**
243 ft. **Site 1 of 3 in cluster P** **SWEEPS UST**

Relative:
Lower

Actual:
16 ft.

RCRA-SQG:

Date form received by agency:	03/29/2002
Facility name:	ANALYSTS, INC.
Facility address:	2910 FORD STREET OAKLAND, CA 94601
EPA ID:	CAD981389232
Contact:	JOHN T ALLEN
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	(510) 536-5914
Contact email:	JOHNALLEN@ANALYSTSINC.COM
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

ANALYSTS INCORPORATED (Continued) **1000293766**

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: Unknown
Transporter of hazardous waste: Unknown
Treater, storer or disposer of HW: No
Underground injection activity: Unknown
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 03/29/2002
Facility name: ANALYSTS, INC.
Classification: Large Quantity Generator

Date form received by agency: 10/12/2000
Facility name: ANALYSTS, INC.
Classification: Large Quantity Generator

Date form received by agency: 03/04/1999
Facility name: ANALYSTS, INC.
Site name: ANALYSTS INC.
Classification: Large Quantity Generator

Date form received by agency: 09/01/1996
Facility name: ANALYSTS, INC.
Site name: ANALYSTS INC
Classification: Large Quantity Generator

Date form received by agency: 03/04/1996
Facility name: ANALYSTS, INC.
Site name: ANALYSTS INC.
Classification: Large Quantity Generator

Date form received by agency: 03/29/1994
Facility name: ANALYSTS, INC.
Site name: ANALYSTS INC.
Classification: Large Quantity Generator

Date form received by agency: 03/23/1992
Facility name: ANALYSTS, INC.
Site name: ANALYSTS, INC
Classification: Large Quantity Generator

Date form received by agency: 06/30/1991
Facility name: ANALYSTS, INC.
Site name: ANALYSTS, INC
Classification: Large Quantity Generator

ANALYSTS INCORPORATED (Continued) **1000293766**

Date form received by agency: 02/21/1986
Facility name: ANALYSTS, INC.
Site name: ANALYSTS INC
Classification: Large Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: F - GST
Area of violation: Generators - Pre-transport
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/11/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/11/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/11/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - GST
Area of violation: Generators - Pre-transport
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/12/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported

ANALYSTS INCORPORATED (Continued) **1000293766**

Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/12/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - GTG
Area of violation: Generators - Pre-transport
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 02/11/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/12/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - GTG
Area of violation: Generators - Pre-transport
Date violation determined: 01/10/2002
Date achieved compliance: 08/13/2002
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/12/2002
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA

ANALYSTS INCORPORATED (Continued) **1000293766**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 01/10/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 08/13/2002
Evaluation lead agency: EPA

Evaluation date: 01/10/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 08/13/2002
Evaluation lead agency: EPA

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110000831422

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

CA FID UST:
Facility ID: 01002789
Regulated By: UTNKA
Regulated ID: 00060871
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155365914
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

HIST UST:
Region: STATE
Facility ID: 00000060871
Facility Type: Other
Other Type: PETROLEUM TESTING

ANALYSTS INCORPORATED (Continued) **1000293766**

Total Tanks: 0002
Contact Name: J. ALLEN
Telephone: 4155365914
Owner Name: VULCAN FOUNDRY
Owner Address: 2910 FORD ST.
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: 06
Tank Construction: Not reported
Leak Detection: None

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: 06
Tank Construction: Not reported
Leak Detection: None

SWEEPS UST:
Status: A
Comp Number: 60871
Number: 9
Board Of Equalization: 44-000630
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-060871-000001
Actv Date: 07-01-85
Capacity: Not reported
Tank Use: M.V. FUEL
Stg: P
Content: UNKNOWN
Number Of Tanks: 2

Status: A
Comp Number: 60871
Number: 9
Board Of Equalization: 44-000630
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 2
Swrcb Tank Id: 01-000-060871-000002
Actv Date: 07-01-85
Capacity: Not reported
Tank Use: M.V. FUEL
Stg: P

ANALYSTS INCORPORATED (Continued) **1000293766**

Content: UNKNOWN
Number Of Tanks: Not reported

P62 **GILRO STAMPING CO.** **RCRA-SQG** **1000366355**
South **2915-37 FORD ST** **FINDS** **CAD064151905**
< 1/8 **OAKLAND, CA 94601**
0.049 mi.
257 ft. **Site 2 of 3 in cluster P**

Relative:
Lower

Actual:
16 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: GILRO STAMPING CO.
Facility address: 2915-37 FORD ST
OAKLAND, CA 94601
EPA ID: CAD064151905
Mailing address: 1400 EDDY AVENUE
ROCKFORD, IL 61101
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: ATWOOD VACUUM MACHINE CO.
Owner/operator address: 1400 EDDY AVENUE
CITY NOT REPORTED, IL 99999
Owner/operator country: Not reported
Owner/operator telephone: (815) 877-5771
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: ATWOOD VACUUM MACHINE CO.
Owner/operator address: 1400 EDDY AVENUE
ROCKFORD, IL 61101
Owner/operator country: Not reported
Owner/operator telephone: (815) 877-5771
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No

GILRO STAMPING CO. (Continued) **1000366355**

Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Historical Generators:

Date form received by agency:	08/14/1980
Facility name:	GILRO STAMPING CO.
Classification:	Large Quantity Generator

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site

Registry ID: 110001184806

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

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P63 **ATWOOD INDUSTRIES INC** **SLIC** **S101641538**
South **2915 FORD ST** **N/A**
< 1/8 **OAKLAND, CA 94607**
0.049 mi.
257 ft. **Site 3 of 3 in cluster P**

Relative:
Lower

Actual:
16 ft.

SLIC:

Region:	STATE
Facility Status:	**Open - Inactive**
Status Date:	2009-06-04 00:00:00
Global Id:	SLT2O172275
Lead Agency:	SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number:	Not reported
Latitude:	37.7729
Longitude:	-122.232459
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	SLT2O172275
File Location:	Not reported

ATWOOD INDUSTRIES INC (Continued) **S101641538**

Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

SLIC:
Region: 2
Facility ID: SLT2O172275
Facility Status: Leak being confirmed
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

64
WSW
< 1/8
0.049 mi.
258 ft.

SAN FRANCISCO NEWSPAPER AGENCY **HIST UST** **U001599138**
534-23RD AVENUE **N/A**
OAKLAND, CA 94606

Relative:
Lower

Actual:
13 ft.

HIST UST:
Region: STATE
Facility ID: 00000020375
Facility Type: Other
Other Type: NEWSPAPER
Total Tanks: 0001
Contact Name: JOSE A. DUARTE
Telephone: 4155352610
Owner Name: CHRONICLE PUBLISHING CO.
Owner Address: 925 MISSION STREET
Owner City,St,Zip: SAN FRANCISCO, CA 94103

Tank Num: 001
Container Num: 01
Year Installed: Not reported
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: 1/4 inches
Leak Detection: Pressure Test

Q65
WSW
< 1/8
0.053 mi.
279 ft.

RHODES & JAMIESON BATCH PLANT
333 KENNEDY ST
OAKLAND, CA 94612

Site 1 of 3 in cluster Q

Relative: Lower

Actual: 11 ft.

LUST **S109284015**
N/A

LUST:

Region:	STATE
Global Id:	T0600101137
Latitude:	37.7735
Longitude:	-122.235184
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	1985-11-30 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-1238
LOC Case Number:	Not reported
File Location:	Not reported
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Diesel
Site History:	Not reported

Q66
WSW
< 1/8
0.053 mi.
280 ft.

SEA POWER MARINE
333 KENNEDY ST
OAKLAND, CA 94606

Site 2 of 3 in cluster Q

Relative: Lower

Actual: 11 ft.

RCRA-SQG **1004676328**
FINDS **CAR000083915**
HAZNET

RCRA-SQG:

Date form received by agency:	10/03/2000
Facility name:	SEA POWER MARINE
Facility address:	333 KENNEDY ST OAKLAND, CA 94606
EPA ID:	CAR000083915
Contact:	SHARAN HAMEISTER
Contact address:	333 KENNEDY ST OAKLAND, CA 94606
Contact country:	US
Contact telephone:	(510) 533-9290
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	SEA POWER MARINE CORP
Owner/operator address:	333 KENNEDY ST OAKLAND, CA 94606
Owner/operator country:	Not reported
Owner/operator telephone:	(510) 533-9290
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported

SEA POWER MARINE (Continued) **1004676328**

Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Hazardous Waste Summary:

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Waste code: D039
Waste name: TETRACHLOROETHYLENE

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site

Registry ID: 110012250955

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SEA POWER MARINE (Continued) **1004676328**

HAZNET:

Gepaid:	CAR000083915
Contact:	--
Telephone:	5105339290
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	333 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	0.33
Facility County:	Not reported

Gepaid:	CAR000083915
Contact:	--
Telephone:	5105339290
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	333 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	0.28
Facility County:	Not reported

Gepaid:	CAR000083915
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	333 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	0
TSD EPA ID:	CA0000084517
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	.0917
Facility County:	0

Gepaid:	CAL000219928
Contact:	IRVING & GREGORY ALAMEDA
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	333 KENNEDY ST
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	1
TSD EPA ID:	CAD028409019
TSD County:	Los Angeles
Waste Category:	Off-specification, aged, or surplus organics

SEA POWER MARINE (Continued) **1004676328**

Disposal Method: Transfer Station
Tons: .6880
Facility County: 1

Gepaid: CAR000083915
Contact: Not reported
Telephone: 5105339290
Facility Addr2: Not reported
Mailing Name: SHARAN HAMEISTER
Mailing Address: 333 KENNEDY ST
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: CA0000084517
TSD County: Alameda
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: 0.06
Facility County: 1

Click this hyperlink while viewing on your computer to access additional CA_HAZNET: detail in the EDR Site Report.

Q67 **RHODES & JAMIESON BATCH P** **HIST CORTESE** **S102435840**
WSW **333 KENNEDY** **N/A**
< 1/8 **OAKLAND, CA**
0.053 mi.
280 ft. **Site 3 of 3 in cluster Q**

Relative:
Lower

Actual:
11 ft.

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1238

R68 **EARTHGRAINS BAKING COMPANY** **LUST** **S107619909**
North **955 KENNEDY** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.056 mi.
298 ft. **Site 1 of 6 in cluster R**

Relative:
Lower

Actual:
21 ft.

LUST:
Region: STATE
Global Id: T0600177342
Latitude: 37.779047
Longitude: -122.239086
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 2007-05-17 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
LOC Case Number: RO0002569
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel

EARTHGRAINS BAKING COMPANY (Continued) **S107619909**

Site History: Not reported

R69 **AMERICAN METALS** **HAZNET** **S100938242**
North **955 KENNEDY** **CHMIRS** **N/A**
< 1/8 **OAKLAND, CA 94606** **HIST CORTESE**
0.056 mi.
298 ft. **Site 2 of 6 in cluster R**

Relative:
Lower

Actual:
21 ft.

HAZNET:

Gepaid:	CAL000014825
Contact:	KILPATRICKS BAKERIES
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	955 KENNEDY
Mailing City,St,Zip:	OAKLAND, CA 946100000
Gen County:	1
TSD EPA ID:	CAD980887418
TSD County:	1
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	.3753
Facility County:	1

Gepaid:	CAL000014825
Contact:	KILPATRICKS BAKERIES
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	955 KENNEDY
Mailing City,St,Zip:	OAKLAND, CA 946100000
Gen County:	1
TSD EPA ID:	CAT080031628
TSD County:	Kern
Waste Category:	Waste oil and mixed oil
Disposal Method:	Recycler
Tons:	.1292
Facility County:	1

Gepaid:	CAL000014825
Contact:	KILPATRICKS BAKERIES
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	955 KENNEDY
Mailing City,St,Zip:	OAKLAND, CA 946100000
Gen County:	1
TSD EPA ID:	CAD053044053
TSD County:	1
Waste Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Tons:	.8667
Facility County:	1

Gepaid:	CAL000014825
Contact:	KILPATRICKS BAKERIES
Telephone:	0000000000
Facility Addr2:	Not reported

AMERICAN METALS (Continued) **S100938242**

Mailing Name: Not reported
Mailing Address: 955 KENNEDY
Mailing City,St,Zip: OAKLAND, CA 946100000
Gen County: 1
TSD EPA ID: CAD053044053
TSD County: 1
Waste Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Not reported
Tons: .1750
Facility County: 1

Gepaid: CAL000014825
Contact: KILPATRICKS BAKERIES
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 955 KENNEDY
Mailing City,St,Zip: OAKLAND, CA 946100000
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: .8340
Facility County: 1

Click this hyperlink while viewing on your computer to access
7 additional CA_HAZNET: record(s) in the EDR Site Report.

CHMIRS:
OES Incident Number: 00-0418
OES notification: 1/28/200002:03:17 PM
OES Date: Not reported
OES Time: Not reported
Incident Date: Not reported
Date Completed: Not reported
Property Use: Not reported
Agency Id Number: Not reported
Agency Incident Number: Not reported
Time Notified: Not reported
Time Completed: Not reported
Surrounding Area: Not reported
Estimated Temperature: Not reported
Property Management: Not reported
Special Studies 1: Not reported
Special Studies 2: Not reported
Special Studies 3: Not reported
Special Studies 4: Not reported
Special Studies 5: Not reported
Special Studies 6: Not reported
More Than Two Substances Involved?: Not reported
Resp Agncy Personel # Of Decontaminated: Not reported
Responding Agency Personel # Of Injuries: Not reported
Responding Agency Personel # Of Fatalities: Not reported
Others Number Of Decontaminated: Not reported
Others Number Of Injuries: Not reported
Others Number Of Fatalities: Not reported

AMERICAN METALS (Continued) **S100938242**

Vehicle Make/year:	Not reported
Vehicle License Number:	Not reported
Vehicle State:	Not reported
Vehicle Id Number:	Not reported
CA/DOT/PUC/ICC Number:	Not reported
Company Name:	Not reported
Reporting Officer Name/ID:	Not reported
Report Date:	Not reported
Comments:	Not reported
Facility Telephone:	Not reported
Waterway Involved:	No
Waterway:	Not reported
Spill Site:	Not reported
Cleanup By:	Foss Environmental
Containment:	Not reported
What Happened:	Not reported
Type:	Not reported
Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	2000
Agency:	CURA Emergency Service
Incident Date:	1/28/200012:00:00 AM
Admin Agency:	City of Oakland Fire Department
Amount:	Not reported
Contained:	Yes
Site Type:	Road
E Date:	Not reported
Substance:	Diesel
Quantity Released:	Not reported
BBLS:	0
Cups:	0
CUFT:	0
Gallons:	30
Grams:	0
Pounds:	0
Liters:	0
Ounces:	0
Pints:	0
Quarts:	0
Sheen:	0
Tons:	0
Unknown:	0
Description:	Not reported
Evacuations:	0
Number of Injuries:	0
Number of Fatalities:	0
Description:	Truck hit road hazard, severed fuel cross-over line.

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0863

R70 **KILPATRICK'S BAKERY INC GARAGE** **LUST** **S103878890**
North **955 KENNEDY ST** **NPDES** **N/A**
< 1/8 **OAKLAND, CA 94606** **Alameda County CS**
0.056 mi. **CA WDS**
298 ft. **Site 3 of 6 in cluster R**

Relative:
Lower

Actual:
21 ft.

LUST:

Region:	STATE
Global Id:	T0600100797
Latitude:	37.778954
Longitude:	-122.237258
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1996-04-17 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0863
LOC Case Number:	Not reported
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Diesel
Site History:	LUFT Con. LC 3HSCAWG 103/04/1996

LUST:

Region:	2
Facility Id:	01-0863
Facility Status:	Case Closed
Case Number:	1124
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	Not reported
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	1/5/1993
Preliminary Site Assesment Began:	Not reported
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	10/11/1989
Date Post Remedial Action Monitoring Began:	Not reported

NPDES:

Npdes Number:	Not reported
Facility Status:	Active
Agency Id:	14373
Region:	2
Regulatory Measure Id:	180723
Order No:	Not reported
Order No Of General Order:	97-03-DWQ
Regulatory Measure Type:	Storm water industrial
Place Id:	263400
WDID:	2 01I003309
Program Type:	INDSTW
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	4/3/1992
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Earthgrains

KILPATRICK'S BAKERY INC GARAGE (Continued) **S103878890**

Discharge Address: 955 Kennedy Street
Discharge Address2: Not reported
Discharge City: Oakland
Discharge State: CA
Discharge Zip: 94604

CS:
Status: Case Closed
Record Id: RO0000758
PE: 5602

Status: Leak being confirmed
Record Id: RO0002569
PE: 5602

Status: Pollution Characterization
Record Id: RO0002569
PE: 5602

Status: Preliminary site assessment workplan submitted
Record Id: RO0002569
PE: 5602

Status: Preliminary site assessment underway
Record Id: RO0002569
PE: 5602

CA WDS:
Facility ID: San Francisco Bay 01I003309
Facility Type: Not reported
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number: CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion: 2
Facility Telephone: Not reported
Facility Contact: Not reported
Agency Name: EARTHGRAINS
Agency Address: Not reported
Agency City,St,Zip: 0
Agency Contact: Not reported
Agency Telephone: Not reported
Agency Type: Not reported
SIC Code: 0
SIC Code 2: Not reported
Primary Waste: Not reported
Primary Waste Type: Not reported
Secondary Waste: Not reported
Secondary Waste Type: Not reported
Design Flow: 0
Baseline Flow: 0
Reclamation: Not reported
POTW: Not reported
Treat To Water: Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be

KILPATRICK'S BAKERY INC GARAGE (Continued) **S103878890**

considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.

Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

R71 **THE EARTHGRAINS CO.** **UST** **U003805110**
North **955 KENNEDY ST** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.056 mi.
298 ft. **Site 4 of 6 in cluster R**

Relative:
Lower

Actual:
21 ft.

UST:
Global ID: 4313
Latitude: 37.77939
Longitude: -122.23833

R72 **KILPATRICKS BAKERIES INC** **RCRA-SQG** **1000905134**
North **955 KENNEDY ST** **FINDS** **CA0000344051**
< 1/8 **OAKLAND, CA 94606** **CA FID UST**
0.056 mi. **SWEEPS UST**
298 ft. **Site 5 of 6 in cluster R**

Relative:
Lower

Actual:
21 ft.

RCRA-SQG:
Date form received by agency: 06/03/1994
Facility name: KILPATRICKS BAKERIES INC
Facility address: 955 KENNEDY ST
OAKLAND, CA 946065331
EPA ID: CA0000344051
Mailing address: P O BOX 2093
OAKLAND, CA 946042093
Contact: JONATHAN HEARNS
Contact address: P O BOX 2093
OAKLAND, CA 946042093
Contact country: US
Contact telephone: (510) 436-5350
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: CAMPBELL TAGGART INC
Owner/operator address: P O BOX 1830
ST LOUIS, MO 63118
Owner/operator country: Not reported
Owner/operator telephone: (314) 259-7000
Legal status: Private

KILPATRICKS BAKERIES INC (Continued) **1000905134**

Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110010486330

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

California - Hazardous Waste Tracking System - Datamart

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance

KILPATRICKS BAKERIES INC (Continued) **1000905134**

information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and its Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

CA FID UST:

Facility ID:	01000978
Regulated By:	UTNKA
Regulated ID:	00000801
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4154365350
Mail To:	Not reported
Mailing Address:	955 KENNEDY ST
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94606
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Active

SWEEPS UST:

Status:	A
Comp Number:	801
Number:	9
Board Of Equalization:	44-000011
Ref Date:	07-01-85
Act Date:	Not reported
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	13
Swrcb Tank Id:	01-000-000801-000001
Actv Date:	07-01-85
Capacity:	5000
Tank Use:	M.V. FUEL
Stg:	P
Content:	LEADED
Number Of Tanks:	8

Status:	A
Comp Number:	801
Number:	9
Board Of Equalization:	44-000011
Ref Date:	07-01-85
Act Date:	Not reported

KILPATRICKS BAKERIES INC (Continued) **1000905134**

Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-000801-000002
Actv Date: 07-01-85
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 801
Number: 9
Board Of Equalization: 44-000011
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 2
Swrcb Tank Id: 01-000-000801-000003
Actv Date: 07-01-85
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 801
Number: 9
Board Of Equalization: 44-000011
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 3
Swrcb Tank Id: 01-000-000801-000004
Actv Date: 07-01-85
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 801
Number: 9
Board Of Equalization: 44-000011
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 4
Swrcb Tank Id: 01-000-000801-000005
Actv Date: 07-01-85
Capacity: 10000

KILPATRICKS BAKERIES INC (Continued) **1000905134**

Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 801
Number: 9
Board Of Equalization: 44-000011
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 5
Swrcb Tank Id: 01-000-000801-000006
Actv Date: 07-01-85
Capacity: 8000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 801
Number: 9
Board Of Equalization: 44-000011
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 6
Swrcb Tank Id: 01-000-000801-000007
Actv Date: 07-01-85
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: LEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 801
Number: 9
Board Of Equalization: 44-000011
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 12
Swrcb Tank Id: 01-000-000801-000008
Actv Date: 07-01-85
Capacity: 1000
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: Not reported

R73
North
< 1/8
0.056 mi.
298 ft.

KILPATRICK'S BAKERY
955 KENNEDY ST
OAKLAND, CA 94606

Site 6 of 6 in cluster R

HIST UST **U001599126**
N/A

Relative:
Lower

Actual:
21 ft.

HIST UST:

Region:	STATE
Facility ID:	00000000801
Facility Type:	Not reported
Other Type:	Not reported
Total Tanks:	0001
Contact Name:	JOE PATANIA
Telephone:	4154365350
Owner Name:	RAY GALLAGHER'S
Owner Address:	2100 LIVINGTON STREET
Owner City,St,Zip:	OAKLAND, CA 94606
Tank Num:	001
Container Num:	0013
Year Installed:	Not reported
Tank Capacity:	00005000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor, Pressure Test
Tank Num:	001
Container Num:	0001
Year Installed:	1977
Tank Capacity:	00010000
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor
Tank Num:	002
Container Num:	0002
Year Installed:	1977
Tank Capacity:	00010000
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor
Tank Num:	003
Container Num:	0003
Year Installed:	1977
Tank Capacity:	00010000
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Tank Construction:	1/4 inches
Leak Detection:	Stock Inventor
Tank Num:	004
Container Num:	0004
Year Installed:	1977
Tank Capacity:	00010000
Tank Used for:	PRODUCT

KILPATRICK'S BAKERY (Continued) **U001599126**

Type of Fuel: DIESEL
Tank Construction: 1/4 inches
Leak Detection: Stock Inventor

Tank Num: 005
Container Num: 0005
Year Installed: 1967
Tank Capacity: 00008000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: 1/4 inches
Leak Detection: Stock Inventor, Pressure Test

Tank Num: 006
Container Num: 0006
Year Installed: 1967
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: 1/4 inches
Leak Detection: Stock Inventor, Pressure Test

Tank Num: 007
Container Num: 00012
Year Installed: 1967
Tank Capacity: 00001000
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: 1/4 inches
Leak Detection: Stock Inventor, Pressure Test

O74 **OAKLAND YARD** **HIST UST** **U001599133**
WSW **333 23RD AVE** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.057 mi.
302 ft. **Site 2 of 6 in cluster O**

Relative:
Lower

Actual:
11 ft.

HIST UST:
Region: STATE
Facility ID: 00000001098
Facility Type: Other
Other Type: CO. VEHICLE FUEL STA
Total Tanks: 0002
Contact Name: LARRY COMBS
Telephone: 4154559000
Owner Name: RHODES JAMIESON
Owner Address: 501 EL CHARRO ROAD
Owner City,St,Zip: PLEASANTON, CA 94566

Tank Num: 001
Container Num: OD-001
Year Installed: 1966
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: None

OAKLAND YARD (Continued) **U001599133**

Tank Num: 002
Container Num: OG-002
Year Installed: 1966
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Stock Inventor

O75 **CHEVRON** **HAZNET** **S105030473**
WSW **333 23RD AVE** **SLIC** **N/A**
< 1/8 **OAKLAND, CA 94606** **NPDES**
0.057 mi. **Alameda County CS**
302 ft. **Site 3 of 6 in cluster O** **CA WDS**

Relative:
Lower

Actual:
11 ft.

HAZNET:
Gepaid: CAL000317878
Contact: ROB ALDENHUYSEN
Telephone: 9259896664
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1544 STANLEY BLVD
Mailing City,St,Zip: PLEASANTON, CA 945666308
Gen County: Alameda
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: H135
Tons: 0.05
Facility County: Alameda

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 2001-08-14 00:00:00
Global Id: T0600191516
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.772775
Longitude: -122.235802
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01S0218
File Location: Not reported
Potential Media Affected: Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern: Diesel
Site History: Not reported

SLIC:
Region: 2
Facility ID: 01S0218
Facility Status: Case Closed
Date Closed: 8/14/2001
Local Case #: Not reported
How Discovered: Tank Closure
Leak Cause: UNK

CHEVRON (Continued) **S105030473**

Leak Source: UNK
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: 10/31/1985
Date Pollution Characterization Began: 8/14/1987
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

NPDES:
Npdes Number: Not reported
Facility Status: Active
Agency Id: Not reported
Region: 2
Regulatory Measure Id: 180852
Order No: Not reported
Order No Of General Order: 97-03-DWQ
Regulatory Measure Type: Storm water industrial
Place Id: 246473
WDID: 2 01I009438
Program Type: INDSTW
Adoption Date Of Regulatory Measure: Not reported
Effective Date Of Regulatory Measure: 11/23/1992
Expiration Date Of Regulatory Measure: Not reported
Termination Date Of Regulatory Measure: Not reported
Discharge Name: Not reported
Discharge Address: Not reported
Discharge Address2: Not reported
Discharge City: Not reported
Discharge State: Not reported
Discharge Zip: Not reported

CS:
Status: Case Closed
Record Id: RO0002493
PE: 5502

CA WDS:
Facility ID: San Francisco Bay 01I009438
Facility Type: Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number: CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion: 2
Facility Telephone: 5105332109
Facility Contact: LARRY WORTHING
Agency Name: OAKLAND READY MIX
Agency Address: 333 23RD AVENUE
Agency City,St,Zip: OAKLAND 94606
Agency Contact: LARRY WORTHING

CHEVRON (Continued) **S105030473**

Agency Telephone:	5105332109
Agency Type:	Private
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	The facility is not a POTW.
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.
Facility ID:	20 1S009438
Facility Type:	Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion:	2
Facility Telephone:	5105332109
Facility Contact:	LARRY WORTHING
Agency Name:	OAKLAND READY MIX
Agency Address:	333 23RD AVENUE
Agency City,St,Zip:	OAKLAND 94606
Agency Contact:	LARRY WORTHING
Agency Telephone:	5105332109
Agency Type:	Private
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	The facility is not a POTW.
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared

CHEVRON (Continued) **S105030473**

to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.

Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

O76 **RMC LONESTAR** **UST 1004440848**
WSW **333 23RD AVE** **EMI N/A**
< 1/8 **OAKLAND, CA 94606**
0.057 mi.
302 ft. **Site 4 of 6 in cluster O**

Relative:
Lower

Actual:
11 ft.

UST:
Global ID: 4519
Latitude: 37.77282
Longitude: -122.23586

EMI:

Year:	1987
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1990
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

RMC LONESTAR (Continued) **1004440848**

Year:	1995
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	1
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1996
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	1
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	1
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1998
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3273

RMC LONESTAR (Continued) **1004440848**

Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	1
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1999
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	2
Part. Matter 10 Micrometers & Smllr Tons/Yr:	2

Year:	2000
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	2
Part. Matter 10 Micrometers & Smllr Tons/Yr:	2

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Y
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0

RMC LONESTAR (Continued) **1004440848**

NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	22
Part. Matter 10 Micrometers & Smllr Tons/Yr:	20
Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	22
Part. Matter 10 Micrometers & Smllr Tons/Yr:	20
Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	22
Part. Matter 10 Micrometers & Smllr Tons/Yr:	20
Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	2743
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	20.402
Part. Matter 10 Micrometers & Smllr Tons/Yr:	18.07264

O77 **CHEVRON #20-6142 / RMC LONESTAR** **SLIC** **S108245930**
SW **333 23RD** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.058 mi.
308 ft. **Site 5 of 6 in cluster O**

Relative:
Lower

Actual:
11 ft.

SLIC:

Region:	STATE
Facility Status:	**Completed - Case Closed**
Status Date:	2001-08-15 00:00:00
Global Id:	T06019703562
Lead Agency:	ALAMEDA COUNTY LOP
Lead Agency Case Number:	Not reported
Latitude:	37.772918
Longitude:	-122.236472
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	Not reported
File Location:	Local Agency
Potential Media Affected:	Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern:	Not reported
Site History:	LUFT Con. LC

O78 **RMC LONESTAR** **CA FID UST** **S101629608**
SW **333 023RD AVE** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.059 mi.
311 ft. **Site 6 of 6 in cluster O**

Relative:
Lower

Actual:
11 ft.

CA FID UST:

Facility ID:	01002519
Regulated By:	UTNKA
Regulated ID:	00001098
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4154559000
Mail To:	Not reported
Mailing Address:	P O BOX
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94606
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Active

SWEEPS UST:

Status:	A
Comp Number:	1098
Number:	3
Board Of Equalization:	44-002167
Ref Date:	06-17-93
Act Date:	12-17-93
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	1D

RMC LONESTAR (Continued) **S101629608**

Swrcb Tank Id: 01-000-001098-000001
Actv Date: 07-01-85
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: 2

Status: A
Comp Number: 1098
Number: 3
Board Of Equalization: 44-002167
Ref Date: 06-17-93
Act Date: 12-17-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 0G-002
Swrcb Tank Id: 01-000-001098-000002
Actv Date: 07-01-85
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

---

79 **ALAMEDA COUNTY MOSQUITO ABATE.** **CA FID UST** **S101624274**
South **3024 E 007TH ST** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.062 mi.
330 ft.

Relative:
Lower

Actual:
17 ft.

CA FID UST:
Facility ID: 01002172
Regulated By: UTNKI
Regulated ID: 00035009
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155337321
Mail To: Not reported
Mailing Address: 3024 E 007TH ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 35009
Number: Not reported
Board Of Equalization: 44-000365
Ref Date: Not reported
Act Date: Not reported

ALAMEDA COUNTY MOSQUITO ABATE. (Continued) **S101624274**

Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-035009-000001
Actv Date:	Not reported
Capacity:	550
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	3

Status:	Not reported
Comp Number:	35009
Number:	Not reported
Board Of Equalization:	44-000365
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-035009-000002
Actv Date:	Not reported
Capacity:	550
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	Not reported

Status:	Not reported
Comp Number:	35009
Number:	Not reported
Board Of Equalization:	44-000365
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-035009-000003
Actv Date:	Not reported
Capacity:	550
Tank Use:	UNKNOWN
Stg:	WASTE
Content:	Not reported
Number Of Tanks:	Not reported

S80 **MC BROOM WM** **EDR Historical Auto Stations** **1009013831**
East **2899 E 12TH ST** **N/A**
< 1/8 **OAKLAND, CA**
0.063 mi.
334 ft. **Site 1 of 3 in cluster S**

Relative:
Higher

Actual:
40 ft.

EDR Historical Auto Stations:

Name:	DUPOUEY JOHN
Year:	1933
Type:	GASOLINE AND OIL SERVICE STATIONS
Name:	MC BROOM WM
Year:	1943

MC BROOM WM (Continued) **1009013831**

Type: GASOLINE AND OIL SERVICE STATIONS

S81 **HERMAN HARRY** **EDR Historical Auto Stations** **1009011202**
East **2901 E 12TH ST** **N/A**
< 1/8 **OAKLAND, CA**
0.064 mi.
337 ft. **Site 2 of 3 in cluster S**

Relative:
Higher

Actual:
40 ft.

EDR Historical Auto Stations:

Name:	CALIFORNIA SERVICE STATION
Year:	1928
Type:	GASOLINE AND OIL SERVICE STATIONS
Name:	HERMAN HARRY
Year:	1933
Type:	GASOLINE AND OIL SERVICE STATIONS

---

82 **PLANT #237** **CA FID UST** **S101624292**
ESE **3100 E 009TH ST** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.068 mi.
358 ft.

Relative:
Higher

Actual:
23 ft.

CA FID UST:

Facility ID:	01002070
Regulated By:	UTNKI
Regulated ID:	00000653
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155324236
Mail To:	Not reported
Mailing Address:	P O BOX
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94601
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

SWEEPS UST:

Status:	Not reported
Comp Number:	653
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-000653-000001
Actv Date:	Not reported
Capacity:	6000
Tank Use:	UNKNOWN

PLANT #237 (Continued) **S101624292**

Stg: PRODUCT
Content: Not reported
Number Of Tanks: 1

83
North
< 1/8
0.069 mi.
363 ft.

BAKKE & NEILSON (THE AUTHORIZED HAYNES SHOP) **EDR Historical Auto Stations** **1009013327**
447 25TH AVE **N/A**
OAKLAND, CA

Relative:
Higher

Actual:
23 ft.

EDR Historical Auto Stations:
Name: BAKKE & NEILSON (THE AUTHORIZED HAYNES SHOP)
Year: 1925
Type: AUTOMOBILE REPAIRERS

84
East
< 1/8
0.071 mi.
376 ft.

T-GAS **CA FID UST** **S101580239**
3132 E 012TH ST **SWEEPS UST** **N/A**
OAKLAND, CA 94601

Relative:
Higher

Actual:
35 ft.

CA FID UST:
Facility ID: 01002236
Regulated By: UTNKI
Regulated ID: 00057643
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155320339
Mail To: Not reported
Mailing Address: 3132 E 012TH ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 57643
Number: Not reported
Board Of Equalization: 44-000564
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-057643-000001
Actv Date: Not reported
Capacity: 10000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: REG UNLEADED

T-GAS (Continued) **S101580239**

Number Of Tanks:	3
Status:	Not reported
Comp Number:	57643
Number:	Not reported
Board Of Equalization:	44-000564
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-057643-000002
Actv Date:	Not reported
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	Not reported
Status:	Not reported
Comp Number:	57643
Number:	Not reported
Board Of Equalization:	44-000564
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-057643-000003
Actv Date:	Not reported
Capacity:	1
Tank Use:	OIL
Stg:	WASTE
Content:	WASTE OIL
Number Of Tanks:	Not reported

T85 **CONSOLIDATED ENGINEERING LABS** **RCRA-SQG** **1000383956**
South **415 PETERSON ST** **FINDS** **CAD982499725**
< 1/8 **OAKLAND, CA 94601** **HAZNET**
0.072 mi.
378 ft. **Site 1 of 3 in cluster T**

Relative:
Lower

Actual:
14 ft.

RCRA-SQG:

Date form received by agency:	02/22/1990
Facility name:	CONSOLIDATED ENGINEERING LABS
Facility address:	415 PETERSON ST OAKLAND, CA 94601
EPA ID:	CAD982499725
Mailing address:	PETERSON ST OAKLAND, CA 94601
Contact:	ENVIRONMENTAL MANAGER
Contact address:	415 PETERSON ST OAKLAND, CA 94601
Contact country:	US
Contact telephone:	(415) 533-0333
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator

CONSOLIDATED ENGINEERING LABS (Continued) **1000383956**

Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	CROOP ENTERPRISES INC
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002833202

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and

CONSOLIDATED ENGINEERING LABS (Continued) **1000383956**

corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD982499725
Contact:	CONSOLIDATED ENGINEERING LABS
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	415 PETERSON ST
Mailing City,St,Zip:	OAKLAND, CA 946012117
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method:	Not reported
Tons:	.4170
Facility County:	1

Gepaid:	CAD982499725
Contact:	CONSOLIDATED ENGINEERING LABS
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	415 PETERSON ST
Mailing City,St,Zip:	OAKLAND, CA 946012117
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method:	Recycler
Tons:	1.6680
Facility County:	1

Gepaid:	CAD982499725
Contact:	DEACT NON-DELIV PER 95 FEES PH
Telephone:	--
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	415 PETERSON ST
Mailing City,St,Zip:	OAKLAND, CA 946012117
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Alameda
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Tons:	0.22
Facility County:	Not reported

Gepaid:	CAD982499725
Contact:	DEACT NON-DELIV PER 95 FEES PH
Telephone:	--
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	415 PETERSON ST

CONSOLIDATED ENGINEERING LABS (Continued) **1000383956**

Mailing City,St,Zip: OAKLAND, CA 946012117
Gen County: Alameda
TSD EPA ID: CAD028409019
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: H061
Tons: 0.41
Facility County: Alameda

Gepaid: CAD982499725
Contact: DEACT NON-DELIV PER 95 FEES PH
Telephone: --
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 415 PETERSON ST
Mailing City,St,Zip: OAKLAND, CA 946012117
Gen County: Alameda
TSD EPA ID: CAD982444481
TSD County: San Bernardino
Waste Category: Unspecified oil-containing waste
Disposal Method: H141
Tons: 0.45
Facility County: Alameda

Click this hyperlink while viewing on your computer to access
13 additional CA_HAZNET: record(s) in the EDR Site Report.

S86 **KOHLES M A** **EDR Historical Auto Stations** **1009014350**
East **2931 E 12TH ST** **N/A**
< 1/8 **OAKLAND, CA**
0.076 mi.
400 ft. **Site 3 of 3 in cluster S**

Relative:
Higher

Actual:
40 ft.

EDR Historical Auto Stations:
Name: KOHLES M A
Year: 1928
Type: AUTOMOBILE REPAIRING AND SERVICE STATIONS

---

87 **MOORE AND SONS TRUCKING** **FINDS** **1000985075**
WSW **410 KENNEDY ST** **RCRA-NonGen** **CAR000001859**
< 1/8 **OAKLAND, CA 94606**
0.076 mi.
401 ft.

Relative:
Lower

Actual:
11 ft.

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002905394

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

MOORE AND SONS TRUCKING (Continued) **1000985075**

RCRA-NonGen:
Date form received by agency: 08/06/1996
Facility name: MOORE AND SONS TRUCKING
Facility address: 410 KENNEDY ST
OAKLAND, CA 94606
EPA ID: CAR000001859
Mailing address: P O BOX 24302
OAKLAND, CA 946234302
Contact: CRAIG MOORE
Contact address: P O BOX 24302
OAKLAND, CA 946234302
Contact country: US
Contact telephone: (510) 533-8031
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: LOYAL MOORE
Owner/operator address: 236 CAMPBELL ST
SAN FRANCISCO, CA 94134
Owner/operator country: Not reported
Owner/operator telephone: (415) 467-7532
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

U88 **FLEMING COMPANIES** **CA FID UST** **S101624284**
North **2530 E 011TH ST** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.080 mi.
423 ft. **Site 1 of 3 in cluster U**

Relative:
Higher

Actual:
27 ft.

CA FID UST:

Facility ID:	01002132
Regulated By:	UTNKI
Regulated ID:	00015863
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4154982610
Mail To:	Not reported
Mailing Address:	2530 E 011TH ST
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94601
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

SWEEPS UST:

Status:	Not reported
Comp Number:	15863
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-015863-000001
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	1

T89 **GLASCOCK PROPERTIES (TOXICS)** **SLIC** **S108245981**
South **2901 GLASCOCK** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.082 mi.
433 ft. **Site 2 of 3 in cluster T**

Relative:
Lower

Actual:
14 ft.

SLIC:

Region:	STATE
Facility Status:	**Completed - Case Closed**
Status Date:	1994-08-24 00:00:00
Global Id:	T06019782456
Lead Agency:	ALAMEDA COUNTY LOP
Lead Agency Case Number:	Not reported
Latitude:	37.772234
Longitude:	-122.233928
Case Type:	Cleanup Program Site

GLASCOCK PROPERTIES (TOXICS) (Continued) **S108245981**

Case Worker: Not reported
Local Agency: Not reported
RB Case Number: Not reported
File Location: Local Agency
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

T90 **GLASCOCK AVE WAREHOUSE** **LUST** **U003300232**
South **2901 GLASCOCK AVE** **Alameda County CS** **N/A**
< 1/8 **OAKLAND, CA 94601** **HIST CORTESE**
0.082 mi.
433 ft. **Site 3 of 3 in cluster T**

Relative:
Lower

Actual:
14 ft.

LUST:
Region: STATE
Global Id: T0600101809
Latitude: 37.771788
Longitude: -122.232653
Case Type: LUST Cleanup Site
Status: Open - Verification Monitoring
Status Date: 2004-03-01 00:00:00
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1956
LOC Case Number: Not reported
File Location: Not reported
Potential Media Affect: Soil
Potential Contaminats of Concern: Diesel
Site History: Not reported

LUST:
Region: 2
Facility Id: 01-1956
Facility Status: Preliminary site assessment underway
Case Number: 1138
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 8/5/1994
Preliminary Site Assesment Began: 1/2/1965
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: 3/1/2004

CS:
Status: Case Transferred
Record Id: RO0000437
PE: 5602

Status: Case Closed
Record Id: RO0002842
PE: 5502

GLASCOCK AVE WAREHOUSE (Continued) **U003300232**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1956

V91 **RIGHT AWAY REDY MIX INC** **FINDS 1004443570**
WSW **401 KENNEDY STREET** **UST N/A**
< 1/8 **OAKLAND, CA 94606** **EMI**
0.085 mi.
449 ft. **Site 1 of 3 in cluster V**

Relative:
Lower

FINDS:
Other Pertinent Environmental Activity Identified at Site

Actual:
11 ft.

Registry ID: 110001169468

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

UST:
Global ID: 4720
Latitude: 37.77439
Longitude: -122.23723

EMI:

Year:	1987
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	22
Part. Matter 10 Micrometers & Smllr Tons/Yr:	3

Year:	1990
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0

RIGHT AWAY REDY MIX INC (Continued) **1004443570**

Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	22
Part. Matter 10 Micrometers & Smllr Tons/Yr:	11
Year:	1995
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	18
Part. Matter 10 Micrometers & Smllr Tons/Yr:	9
Year:	1996
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	18
Part. Matter 10 Micrometers & Smllr Tons/Yr:	9
Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	18
Part. Matter 10 Micrometers & Smllr Tons/Yr:	9

RIGHT AWAY REDY MIX INC (Continued) **1004443570**

Year:	1998
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	35
Part. Matter 10 Micrometers & Smllr Tons/Yr:	18

Year:	1999
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	18
Part. Matter 10 Micrometers & Smllr Tons/Yr:	9

Year:	2000
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	18
Part. Matter 10 Micrometers & Smllr Tons/Yr:	9

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273

RIGHT AWAY REDY MIX INC (Continued) **1004443570**

Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	15
Part. Matter 10 Micrometers & Smllr Tons/Yr:	8

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	14
Part. Matter 10 Micrometers & Smllr Tons/Yr:	7

Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	16
Part. Matter 10 Micrometers & Smllr Tons/Yr:	8

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0

RIGHT AWAY REDY MIX INC (Continued) **1004443570**

NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	16.055
Part. Matter 10 Micrometers & Smllr Tons/Yr:	8.03464
Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	11.223
Part. Matter 10 Micrometers & Smllr Tons/Yr:	5.6157
Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	1095
Air District Name:	BA
SIC Code:	3273
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	17.143
Part. Matter 10 Micrometers & Smllr Tons/Yr:	8.57906

V92 **RIGHT AWAY READY MIX INC** **LUST** **1000593721**
WSW **401 KENNEDY ST** **CA FID UST** **N/A**
< 1/8 **OAKLAND, CA 94606** **Alameda County CS**
0.085 mi. **SWEEPS UST**
449 ft. **Site 2 of 3 in cluster V** **HIST CORTESE**

Relative:
Lower

Actual:
11 ft.

LUST:

Region:	STATE
Global Id:	T0600101140
Latitude:	37.7735
Longitude:	-122.235536
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1994-06-29 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-1241
LOC Case Number:	Not reported

RIGHT AWAY READY MIX INC (Continued) **1000593721**

File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel
Site History: LUFT Con. LC 3HSCAWG 06/29/1994

LUST:
Region: 2
Facility Id: 01-1241
Facility Status: Case Closed
Case Number: 2974
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 1/24/1992
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01001360
Regulated By: UTNKA
Regulated ID: 00008763
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155361900
Mail To: Not reported
Mailing Address: 410 KENNEDY ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94606
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Case Closed
Record Id: RO0000870
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 8763
Number: 9
Board Of Equalization: 44-000121
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A

RIGHT AWAY READY MIX INC (Continued) **1000593721**

Owner Tank Id: 100
Swrcb Tank Id: 01-000-008763-000001
Actv Date: 07-01-85
Capacity: 12000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1241

V93 **RIGHT AWAY REDY MIX, INC.** **HIST UST** **U001599136**
WSW **401 KENNEDY ST** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.085 mi.
449 ft. **Site 3 of 3 in cluster V**

Relative: Lower

Actual: 11 ft.

HIST UST:
Region: STATE
Facility ID: 00000008763
Facility Type: Other
Other Type: CONCRETE
Total Tanks: 0001
Contact Name: GEOFFREY HENRIKSON
Telephone: 4155361900
Owner Name: RIGHT AWAY REDY MIX, INC.
Owner Address: 410 KENNEDY STREET
Owner City,St,Zip: OAKLAND, CA 94606

Tank Num: 001
Container Num: 100
Year Installed: 1982
Tank Capacity: 00012000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

W94 **AN FO MANUFACTURING COMPANY** **HAZNET** **1000590082**
ESE **3129 ELMWOOD AVE** **LUST** **N/A**
< 1/8 **OAKLAND, CA 94601** **NPDES**
0.093 mi. **CA WDS**
491 ft. **Site 1 of 2 in cluster W** **HIST CORTESE**

Relative: Higher

Actual: 24 ft.

HAZNET:
Gepaid: CAL000171224
Contact: CHRISTINA ROSEFIELD GEN MGR
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 7311
Mailing City,St,Zip: OAKLAND, CA 946010000

AN FO MANUFACTURING COMPANY (Continued) **1000590082**

Gen County: Alameda
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: H141
Tons: 0.22
Facility County: Alameda

Gepaid: CAL000171224
Contact: CHRISTINA ROSEFIELD GEN MGR
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 7311
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Laboratory waste chemicals
Disposal Method: H141
Tons: 0.11
Facility County: Alameda

Gepaid: CAL000171224
Contact: CHRISTINA ROSEFIELD GEN MGR
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 7311
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Off-specification, aged, or surplus inorganics
Disposal Method: H141
Tons: 0.17
Facility County: Alameda

Gepaid: CAL000171224
Contact: CHRISTINA ROSEFIELD GEN MGR
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 7311
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: AZD009015389
TSD County: 99
Waste Category: Laboratory waste chemicals
Disposal Method: H141
Tons: 0.02
Facility County: Alameda

Gepaid: CAL000171224
Contact: CHRISTINA ROSEFIELD GEN MGR
Telephone: 5105322275
Facility Addr2: Not reported

AN FO MANUFACTURING COMPANY (Continued) **1000590082**

Mailing Name: Not reported
Mailing Address: PO BOX 7311
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CAT080014079
TSD County: Contra Costa
Waste Category: Pesticides and other waste associated with pesticide production
Disposal Method: H141
Tons: 0.1
Facility County: Alameda

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600102007
Latitude: 37.772965
Longitude: -122.228812
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1998-06-22 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2184
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Kerosene
Site History: LUFT Con. LC 2HSCA 06/22/199802/18/1997

LUST:
Region: 2
Facility Id: 01-2184
Facility Status: Case Closed
Case Number: 54
How Discovered: Tank Closure
Leak Cause: Corrosion
Leak Source: Tank
Date Leak Confirmed: 11/12/1996
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: 10/17/1997

NPDES:
Npdes Number: Not reported
Facility Status: Active
Agency Id: 1682
Region: 2
Regulatory Measure Id: 180878
Order No: Not reported

AN FO MANUFACTURING COMPANY (Continued) **1000590082**

Order No Of General Order:	97-03-DWQ
Regulatory Measure Type:	Storm water industrial
Place Id:	205665
WDID:	2 01I010346
Program Type:	INDSTW
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	7/20/1993
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	An Fo Manufacturing
Discharge Address:	PO Box 7311
Discharge Address2:	Not reported
Discharge City:	Oakland
Discharge State:	CA
Discharge Zip:	94601

CA WDS:

Facility ID:	San Francisco Bay 01I010346
Facility Type:	Not reported
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion:	2
Facility Telephone:	Not reported
Facility Contact:	Not reported
Agency Name:	AN-FO MANUFACTURING
Agency Address:	Not reported
Agency City,St,Zip:	0
Agency Contact:	Not reported
Agency Telephone:	Not reported
Agency Type:	Not reported
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	Not reported
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

CORTESE:

AN FO MANUFACTURING COMPANY (Continued) **1000590082**

Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2184

W95 **AN-FO MANUFACTURING CO.** **HAZNET** **S103651925**
ESE **3129 ELMWOOD AVE** **Alameda County CS** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.093 mi.
491 ft. **Site 2 of 2 in cluster W**

Relative:
Higher

Actual:
24 ft.

HAZNET:
Gepaid: CAC001109336
Contact: AN-FO MANUFACTURING
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3129 ELMWOOD AVE
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: 1
TSD EPA ID: CAD009466392
TSD County: 7
Waste Category: Other empty containers 30 gallons or more
Disposal Method: Recycler
Tons: 2.0000
Facility County: 1

Gepaid: CAC001109336
Contact: AN-FO MANUFACTURING
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3129 ELMWOOD AVE
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: Disposal, Other
Tons: .4587
Facility County: 1

Gepaid: CAC001109336
Contact: AN-FO MANUFACTURING
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3129 ELMWOOD AVE
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Disposal, Other
Tons: .2293
Facility County: 1

Gepaid: CAC001109336

AN-FO MANUFACTURING CO. (Continued) **S103651925**

Contact: AN-FO MANUFACTURING
Telephone: 5105322275
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3129 ELMWOOD AVE
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Unspecified alkaline solution
Disposal Method: Recycler
Tons: 1.6054
Facility County: 1

Click this hyperlink while viewing on your computer to access
-1 additional CA_HAZNET: record(s) in the EDR Site Report.

CS:
Status: Case Closed
Record Id: RO0000713
PE: 5602

X96 **INDUSTRIAL STEAM** **CA FID UST** **S101624287**
South **2985 FORD ST** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.094 mi.
497 ft. **Site 1 of 6 in cluster X**

Relative:
Lower

Actual:
16 ft.

CA FID UST:
Facility ID: 01002221
Regulated By: UTNKI
Regulated ID: 00052603
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4152618737
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 52603
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported

INDUSTRIAL STEAM (Continued) **S101624287**

Swrcb Tank Id: 01-000-052603-000001
Actv Date: Not reported
Capacity: 1000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: 1

X97 **FORMER INDUSTRIAL STEAM PROPERTY** **SLIC** **S106487252**
South **2985 FORD STREET** **N/A**
< 1/8 **OAKLAND, CA**
0.094 mi.
497 ft. **Site 2 of 6 in cluster X**

Relative:
Lower

Actual:
16 ft.

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 2004-09-23 00:00:00
Global Id: SL0600139792
Lead Agency: Not reported
Lead Agency Case Number: Not reported
Latitude: 37.771816
Longitude: -122.232162
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01S0591
File Location: Not reported
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

X98 **INDUSTRIAL STEAM** **HIST UST** **U001599005**
South **2985 FORD ST** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.094 mi.
497 ft. **Site 3 of 6 in cluster X**

Relative:
Lower

Actual:
16 ft.

HIST UST:
Region: STATE
Facility ID: 00000052603
Facility Type: Other
Other Type: Not reported
Total Tanks: 0001
Contact Name: JIM MORRIS
Telephone: 4152618737
Owner Name: INDUSTRIAL STEAM, INC
Owner Address: 2985 FORD ST
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: REGULAR

INDUSTRIAL STEAM (Continued) **U001599005**

Tank Construction: Not reported
Leak Detection: None

U99 **EANDI METAL WORKS INC** **HAZNET S101624341**
North **976 23RD AVE** **LUST N/A**
< 1/8 **OAKLAND, CA 94606** **CA FID UST**
0.096 mi. **EMI**
508 ft. **Site 2 of 3 in cluster U** **SWEEPS UST**
HIST CORTESE

Relative:
Higher

Actual:
26 ft.

HAZNET:

Gepaid:	CAL000019207
Contact:	JEFFERY M EANDI/VP
Telephone:	5105328311
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	976 23RD AVE
Mailing City,St,Zip:	OAKLAND, CA 946065011
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	0.02
Facility County:	Not reported

Gepaid:	CAL000019207
Contact:	JEFFERY M EANDI/VP
Telephone:	5105328311
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	976 23RD AVE
Mailing City,St,Zip:	OAKLAND, CA 946065011
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Alameda
Waste Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Tons:	0.25
Facility County:	Not reported

Gepaid:	CAL000019207
Contact:	JEFFERY M EANDI/VP
Telephone:	5105328311
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	976 23RD AVE
Mailing City,St,Zip:	OAKLAND, CA 946065011
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Alameda
Waste Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Tons:	0.19
Facility County:	Not reported

Gepaid:	CAL000019207
Contact:	JEFFERY M EANDI/VP

EANDI METAL WORKS INC (Continued) **S101624341**

Telephone: 5105328311
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 976 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946065011
Gen County: Alameda
TSD EPA ID: CAD053044053
TSD County: Alameda
Waste Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Tons: 0.15
Facility County: 1

Gepaid: CAL000019207
Contact: EANDI METAL WORKS
Telephone: 5105328311
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 976 23RD AVE
Mailing City,St,Zip: OAKLAND, CA 946065011
Gen County: 1
TSD EPA ID: CAD053044053
TSD County: 1
Waste Category: Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method: Transfer Station
Tons: .1166
Facility County: 1

Click this hyperlink while viewing on your computer to access additional CA_HAZNET: detail in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600100858
Latitude: 37.779721
Longitude: -122.23553
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1992-05-27 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
LOC Case Number: RO0000029
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2HSCA MTBE=250 4/25/9606/25/1997

LUST:
Region: 2
Facility Id: 01-0933
Facility Status: Preliminary site assessment underway
Case Number: 34
How Discovered: Tank Closure
Leak Cause: UNK

EANDI METAL WORKS INC (Continued) **S101624341**

Leak Source: UNK
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 7/13/1992
Preliminary Site Assesment Began: 1/2/1965
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01000658
Regulated By: UTNKI
Regulated ID: 00064757
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155328311
Mail To: Not reported
Mailing Address: 976 23RD AVE
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94606
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

EMI:
Year: 1987
County Code: 1
Air Basin: SF
Facility ID: 3409
Air District Name: BA
SIC Code: 3441
Air District Name: BAY AREA AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 3
Reactive Organic Gases Tons/Yr: 3
Carbon Monoxide Emissions Tons/Yr: 0
NOX - Oxides of Nitrogen Tons/Yr: 0
SOX - Oxides of Sulphur Tons/Yr: 0
Particulate Matter Tons/Yr: 0
Part. Matter 10 Micrometers & Smllr Tons/Yr: 0

Year: 1990
County Code: 1
Air Basin: SF
Facility ID: 3409
Air District Name: BA
SIC Code: 3441
Air District Name: BAY AREA AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported

EANDI METAL WORKS INC (Continued) **S101624341**

Total Organic Hydrocarbon Gases Tons/Yr:	3
Reactive Organic Gases Tons/Yr:	3
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1993
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1995
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	3
Reactive Organic Gases Tons/Yr:	3
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1996
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	3
Reactive Organic Gases Tons/Yr:	3
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0

EANDI METAL WORKS INC (Continued) **S101624341**

Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	3
Reactive Organic Gases Tons/Yr:	3
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1998
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	4
Reactive Organic Gases Tons/Yr:	4
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1999
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	2000
County Code:	1
Air Basin:	SF
Facility ID:	3409

EANDI METAL WORKS INC (Continued) **S101624341**

Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2

EANDI METAL WORKS INC (Continued) **S101624341**

Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2.346
Reactive Organic Gases Tons/Yr:	2.3176134
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2.521
Reactive Organic Gases Tons/Yr:	2.4904959
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	3409
Air District Name:	BA
SIC Code:	3441
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2.739
Reactive Organic Gases Tons/Yr:	2.7058581
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

EANDI METAL WORKS INC (Continued) **S101624341**

SWEEPS UST:

Status:	Not reported
Comp Number:	64757
Number:	Not reported
Board Of Equalization:	44-000697
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-064757-000001
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	2

Status:	Not reported
Comp Number:	64757
Number:	Not reported
Board Of Equalization:	44-000697
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-064757-000002
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	DIESEL
Number Of Tanks:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0933

U100 **EANDI METAL WORKS, INC.** **HIST UST** **U001599121**
North **976 23RD AVE** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.096 mi.
508 ft. **Site 3 of 3 in cluster U**

Relative:
Higher

Actual:
26 ft.

HIST UST:

Region:	STATE
Facility ID:	00000064757
Facility Type:	Other
Other Type:	CONSTRUCTION
Total Tanks:	0002
Contact Name:	DARRELL DAVISSON
Telephone:	4155328311
Owner Name:	EANDI METAL WORKS, INC.
Owner Address:	976 23RD AVENUE

EANDI METAL WORKS, INC. (Continued) **U001599121**

Owner City,St,Zip: OAKLAND, CA 94606

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: 10 unknown
Leak Detection: Pressure Test

Tank Num: 002
Container Num: TWO
Year Installed: 1981
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: 10 gauge
Leak Detection: Stock Inventor

101
North
< 1/8
0.098 mi.
518 ft.

FLEMING COMPANIES **HIST UST** **U001599002**
2530 E 11TH ST **N/A**
OAKLAND, CA 94601

Relative:
Higher

Actual:
26 ft.

HIST UST:
Region: STATE
Facility ID: 00000015863
Facility Type: Other
Other Type: COMPANY AUTOS
Total Tanks: 0000
Contact Name: PAT PHILLIPS
Telephone: 4154982610
Owner Name: RONALD T. DREISBACH
Owner Address: P.O. BOX 7509
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Stock Inventor

X102 **F&F PRECISION GRINDING** **SLIC** **S108245962**
South **510 DERBY** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.099 mi.
523 ft. **Site 4 of 6 in cluster X**

Relative: **Lower**

Actual: **16 ft.**

SLIC:

Region:	STATE
Facility Status:	**Completed - Case Closed**
Status Date:	2008-04-11 00:00:00
Global Id:	T06019786231
Lead Agency:	ALAMEDA COUNTY LOP
Lead Agency Case Number:	RO0002866
Latitude:	37.77211
Longitude:	-122.23133
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	Not reported
File Location:	Local Agency
Potential Media Affected:	Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern:	Diesel, Gasoline, Nickel
Site History:	Not reported

X103 **F & F SURFACE GRINDING** **FINDS** **1000113772**
South **510 DERBY AVE** **RCRA-NonGen** **CAD003984077**
< 1/8 **OAKLAND, CA 94601**
0.099 mi.
525 ft. **Site 5 of 6 in cluster X**

Relative: **Lower**

Actual: **16 ft.**

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002629451

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

RCRA-NonGen:

Date form received by agency:	07/30/1980
Facility name:	F & F SURFACE GRINDING
Facility address:	510 DERBY AVE OAKLAND, CA 94601
EPA ID:	CAD003984077
Mailing address:	DERBY AVE OAKLAND, CA 94601
Contact:	ENVIRONMENTAL MANAGER
Contact address:	510 DERBY AVE OAKLAND, CA 94601
Contact country:	US
Contact telephone:	(415) 533-6311
Contact email:	Not reported
EPA Region:	09
Classification:	Non-Generator

F & F SURFACE GRINDING (Continued) **1000113772**

Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: F&F SURFACE GRINDING INC
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

X104 **F&F PRECISION GRINDING** **Alameda County CS** **S106965139**
South **510 DERBY AVE** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.099 mi.
525 ft. **Site 6 of 6 in cluster X**

Relative:
Lower

Actual:
16 ft.

CS:
Status: Case Closed
Record Id: RO0002866
PE: 5502

Status: Pollution Characterization
Record Id: RO0002866
PE: 5502

F&F PRECISION GRINDING (Continued) **S106965139**

Status: Leak being confirmed
Record Id: RO0002866
PE: 5502

105
North
< 1/8
0.100 mi.
529 ft.

HERMES H C **EDR Historical Auto Stations** **1009012341**
2778 E 12TH ST **N/A**
OAKLAND, CA

Relative:
Higher

Actual:
39 ft.

EDR Historical Auto Stations:
Name: HERMES H C
Year: 1943
Type: AUTOMOBILE REPAIRING

106
NNW
< 1/8
0.106 mi.
559 ft.

WISCO ENVELOPE CO **RCRA-SQG** **1004677478**
1021 COTTON ST **CAR000097766**
OAKLAND, CA 94606

Relative:
Lower

Actual:
17 ft.

RCRA-SQG:
Date form received by agency: 06/04/2001
Facility name: WISCO ENVELOPE CO
Facility address: 1021 COTTON ST
OAKLAND, CA 94606
EPA ID: CAR000097766
Contact: JIM ELLSTROM
Contact address: 1021 COTTON ST
OAKLAND, CA 94606
Contact country: US
Contact telephone: (510) 536-1204
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: MAIL WELL
Owner/operator address: 23 INVERNESS WY STE 160
ENGLEWOOD, CO 80112
Owner/operator country: Not reported
Owner/operator telephone: (303) 790-8023
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown

WISCO ENVELOPE CO (Continued) **1004677478**

Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Hazardous Waste Summary:

Waste code:	D001
Waste name:	IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
Waste code:	D018
Waste name:	BENZENE
Waste code:	D039
Waste name:	TETRACHLOROETHYLENE
Waste code:	D040
Waste name:	TRICHLOROETHYLENE
Violation Status:	No violations found

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107 **BLUE DOG / HARDING DEVELOPMENT** **SLIC** **S109516942**
East **3001-3007 E 12TH ST** **Alameda County CS** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.106 mi.
560 ft.

Relative:
Higher

Actual:
41 ft.

SLIC:

Region:	STATE
Facility Status:	**Open - Site Assessment**
Status Date:	2007-06-26 00:00:00
Global Id:	T10000001070
Lead Agency:	ALAMEDA COUNTY LOP
Lead Agency Case Number:	RO0002960
Latitude:	37.7772107486221
Longitude:	-122.228940725327
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	Not reported
File Location:	Not reported
Potential Media Affected:	Not reported
Potential Contaminants of Concern:	Not reported

BLUE DOG / HARDING DEVELOPMENT (Continued) **S109516942**

Site History: Not reported

CS:
Status: Preliminary site assessment underway
Record Id: RO0002960
PE: 5502

108
SE
< 1/8
0.109 mi.
573 ft.

GOLD SEAL PLATING
3125 EAST 7TH STREET
OAKLAND, CA 94601

RCRA-SQG **1000183985**
FINDS **CAD981689607**
HAZNET
CA WDS

Relative:
Higher

Actual:
22 ft.

RCRA-SQG:
Date form received by agency: 02/28/2002
Facility name: GOLD SEAL PLATING
Facility address: 3125 EAST 7TH STREET
OAKLAND, CA 94601
EPA ID: CAD981689607
Contact: GREG SPENCER
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: (510) 536-6533
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: Unknown
Transporter of hazardous waste: Unknown
Treater, storer or disposer of HW: No
Underground injection activity: Unknown
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: Unknown
Used oil processor: Unknown
User oil refiner: Unknown
Used oil fuel marketer to burner: Unknown
Used oil Specification marketer: Unknown
Used oil transfer facility: Unknown
Used oil transporter: Unknown
Off-site waste receiver: Commercial status unknown

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: Unknown
Generated waste on-site: Unknown

GOLD SEAL PLATING (Continued) **1000183985**

Waste type: Lamps
Accumulated waste on-site: Unknown
Generated waste on-site: Unknown

Waste type: Pesticides
Accumulated waste on-site: Unknown
Generated waste on-site: Unknown

Waste type: Thermostats
Accumulated waste on-site: Unknown
Generated waste on-site: Unknown

Historical Generators:
Date form received by agency: 02/28/2002
Facility name: GOLD SEAL PLATING
Classification: Small Quantity Generator

Date form received by agency: 10/12/2000
Facility name: GOLD SEAL PLATING
Classification: Large Quantity Generator

Date form received by agency: 03/04/1999
Facility name: GOLD SEAL PLATING
Classification: Large Quantity Generator

Date form received by agency: 03/12/1996
Facility name: GOLD SEAL PLATING
Classification: Large Quantity Generator

Date form received by agency: 03/21/1994
Facility name: GOLD SEAL PLATING
Site name: SQUIRKENWORKS
Classification: Large Quantity Generator

Date form received by agency: 02/25/1992
Facility name: GOLD SEAL PLATING
Classification: Large Quantity Generator

Date form received by agency: 12/01/1986
Facility name: GOLD SEAL PLATING
Classification: Not a generator, verified

Hazardous Waste Summary:
Waste code: 122
Waste name: 122

Waste code: 181
Waste name: 181

Waste code: 212
Waste name: 212

Waste code: 711
Waste name: 711

Waste code: 792

GOLD SEAL PLATING (Continued) **1000183985**

Waste name: 792

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Waste code: D003
Waste name: A MATERIAL IS CONSIDERED TO BE A REACTIVE HAZARDOUS WASTE IF IT IS NORMALLY UNSTABLE, REACTS VIOLENTLY WITH WATER, GENERATES TOXIC GASES WHEN EXPOSED TO WATER OR CORROSIVE MATERIALS, OR IF IT IS CAPABLE OF DETONATION OR EXPLOSION WHEN EXPOSED TO HEAT OR A FLAME. ONE EXAMPLE OF SUCH WASTE WOULD BY WASTE GUNPOWDER.

Waste code: D007
Waste name: CHROMIUM

Waste code: D010
Waste name: SELENIUM

Waste code: D011
Waste name: SILVER

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 05/01/1998
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110000844686

California - Hazardous Waste Tracking System - Datamart

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

GOLD SEAL PLATING (Continued) **1000183985**

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD981689607
Contact:	GARRY BENNETT
Telephone:	5105226450
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	3125 E 7TH ST
Mailing City,St,Zip:	OAKLAND, CA 946012835
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	Recycler
Tons:	.2293
Facility County:	1

Gepaid:	CAD981689607
Contact:	GARRY BENNETT
Telephone:	5105226450
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	3125 E 7TH ST
Mailing City,St,Zip:	OAKLAND, CA 946012835
Gen County:	1
TSD EPA ID:	NVD980895338
TSD County:	99
Waste Category:	Other inorganic solid waste
Disposal Method:	Disposal, Land Fill
Tons:	4.1000
Facility County:	1

Gepaid:	CAD981689607
Contact:	GARRY BENNETT
Telephone:	5105226450
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	3125 E 7TH ST
Mailing City,St,Zip:	OAKLAND, CA 946012835
Gen County:	1
TSD EPA ID:	NVD980895338
TSD County:	99
Waste Category:	Liquids with pH <UN-> 2 with metals
Disposal Method:	Treatment, Tank
Tons:	2.2934
Facility County:	1

Gepaid:	CAD981689607
Contact:	GARRY BENNETT
Telephone:	5105226450

GOLD SEAL PLATING (Continued) **1000183985**

Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3125 E 7TH ST
Mailing City,St,Zip: OAKLAND, CA 946012835
Gen County: 1
TSD EPA ID: CAD069138899
TSD County: Santa Clara
Waste Category: Other inorganic solid waste
Disposal Method: Recycler
Tons: .0750
Facility County: 1

Gepaid: CAD981689607
Contact: GARRY BENNETT
Telephone: 5105226450
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3125 E 7TH ST
Mailing City,St,Zip: OAKLAND, CA 946012835
Gen County: 1
TSD EPA ID: NVD980895338
TSD County: 99
Waste Category: Liquids with nickel > 134 mg/l
Disposal Method: Treatment, Tank
Tons: 1.3761
Facility County: 1

Click this hyperlink while viewing on your computer to access
78 additional CA_HAZNET: record(s) in the EDR Site Report.

CA WDS:
Facility ID: San Francisco Bay 01I009225
Facility Type: Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number: CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion: 2
Facility Telephone: Not reported
Facility Contact: Not reported
Agency Name: GOLD SEAL PLATING
Agency Address: 3125 E. 7th St.
Agency City,St,Zip: Oakland 94512
Agency Contact: Gary Spencer
Agency Telephone: 5105366533
Agency Type: Private
SIC Code: 0
SIC Code 2: Not reported
Primary Waste: Not reported
Primary Waste Type: Not reported
Secondary Waste: Not reported
Secondary Waste Type: Not reported

GOLD SEAL PLATING (Continued) **1000183985**

Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	Not reported
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.
Facility ID:	San Francisco Bay 01I009225
Facility Type:	Not reported
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion:	2
Facility Telephone:	Not reported
Facility Contact:	Not reported
Agency Name:	SQUIRKENWORKS INC
Agency Address:	Not reported
Agency City,St,Zip:	0
Agency Contact:	Not reported
Agency Telephone:	Not reported
Agency Type:	Not reported
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	Not reported
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

109
SSE
< 1/8
0.115 mi.
606 ft.

JOHNSON PROPELLER CO
603 LANCASTER ST
OAKLAND, CA 94601

RCRA-SQG
FINDS

1000320813
CAD009173956

Relative:
Lower

Actual:
20 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	JOHNSON PROPELLER CO
Facility address:	603 LANCASTER ST OAKLAND, CA 94601
EPA ID:	CAD009173956
Mailing address:	LANCASTER ST OAKLAND, CA 94601
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	GARY JOHNSON
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown

JOHNSON PROPELLER CO (Continued) **1000320813**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002635854

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Y110 **PETRO-STOP, INC.** **HIST UST** **U001599016**
South **315 DERBY AVE** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.116 mi.
613 ft. **Site 1 of 5 in cluster Y**

Relative:
Lower

Actual:
13 ft.

HIST UST:
Region: STATE
Facility ID: 00000004098
Facility Type: Other
Other Type: FUEL TERMINAL
Total Tanks: 0002
Contact Name: D. BARRON
Telephone: 4155324112
Owner Name: PETRO-STOP, INC.
Owner Address: 315 DERBY AVE.
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Visual, Stock Inventor, Vapor Sniff Well, Groundwater Monitoring Well

Tank Num: 002
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00012000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported

PETRO-STOP, INC. (Continued) **U001599016**

Leak Detection: Visual, Stock Inventor, Vapor Sniff Well, Groundwater Monitoring Well

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Y111 **ICONOCO CALIFORNIA INC** **RCRA-SQG** **1000318052**
South **303 DERBY AVE** **FINDS** **CAD981436009**
< 1/8 **OAKLAND, CA 94601** **HAZNET**
0.116 mi. **LUST**
613 ft. **Site 2 of 5 in cluster Y** **HIST CORTESE**

Relative:
Lower

Actual:
13 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	ICONOCO CALIFORNIA INC
Facility address:	303 DERBY AVE OAKLAND, CA 94601
EPA ID:	CAD981436009
Mailing address:	DERBY AVE OAKLAND, CA 94601
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	WEBER JOHN
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No

ICONOCO CALIFORNIA INC (Continued) **1000318052**

Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002704707

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD981436009
Contact: JOHN E. WEBER
Telephone: 5102611900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 303 DERBY AVE
Mailing City,St,Zip: OAKLAND, CA 946012808
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Tons: .2293
Facility County: 1

Gepaid: CAD981436009
Contact: MELINDA SILVA, OFFCE MGR.
Telephone: 5102611900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 4700 COLISEUM WAY
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: AZR000005454
TSD County: Alameda
Waste Category: Polychlorinated biphenyls and material containing PCB’s
Disposal Method: Not reported
Tons: 2.75
Facility County: 1

ICONOCO CALIFORNIA INC (Continued) **1000318052**

Gepaid: CAD981436009
Contact: MELINDA SILVA, OFFCE MGR.
Telephone: 5102611900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 4700 COLISEUM WAY
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CAD028409019
TSD County: Alameda
Waste Category: Other organic solids
Disposal Method: Transfer Station
Tons: 0.1
Facility County: 1

Gepaid: CAD981436009
Contact: MELINDA SILVA, OFFCE MGR.
Telephone: 5102611900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 4700 COLISEUM WAY
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CAL000190080
TSD County: Alameda
Waste Category: Asbestos-containing waste
Disposal Method: Disposal, Land Fill
Tons: 16.85
Facility County: 1

Gepaid: CAD981436009
Contact: JOHN E. WEBER
Telephone: 5102611900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 303 DERBY AVE
Mailing City,St,Zip: OAKLAND, CA 946012808
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Tons: .2293
Facility County: 1

Click this hyperlink while viewing on your computer to access
2 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0607501006
Latitude: 37.730811
Longitude: -122.457724
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-08-14 00:00:00
Lead Agency: SAN FRANCISCO COUNTY LOP

ICONOCO CALIFORNIA INC (Continued) **1000318052**

Case Worker: Not reported
Local Agency: SAN FRANCISCO COUNTY LOP
RB Case Number: 38-1114
LOC Case Number: 10672
File Location: Not reported
Potential Media Affect: Soil
Potential Contaminats of Concern: Heating Oil / Fuel Oil
Site History: Not reported

LUST:
Region: 2
Facility Id: 38-1114
Facility Status: Case Closed
Case Number: 10672
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

LUST:
Region: SAN FRANCISCO
Facility ID: 38-1114
Facility Status: Case Closed
Case Number: 10672
Case Type: Soil only
Release Date: 8/13/1996
Discovered Date: 11/8/1996
Substance: Heater Fuel
Substance Qty: Not reported
How Discovered: Not reported
How Stopped: Not reported
Report Date: 8/13/1996
Case Closed: 8/14/1996
Closed Date: 8/14/1996
Leak Source: Not reported
Leak Cause: Not reported
Leak Confirmed: Not reported
Entered Date: 8/14/1996
Number of Wells: Not reported
Regional Board: San Francisco Bay Region
Local Agency: 38000
Lead Agency: Local Agency
Program: LOP
Responsible Party: Not reported
RP Address: Not reported
Operator: Not reported
Staff Initial: VP
Facility Staff: AL
Cross Street: YERBA BUENA

ICONOCO CALIFORNIA INC (Continued) **1000318052**

NOR Date:	8/14/1996
MTBE Current:	Not reported
MTBE Current Date:	Not reported
MTBE:	NRQ
Maximum MTBE Soil:	Not reported
Maximum MTBE GW:	Not reported
MTBE DATE:	Not reported
Review Date:	Not reported
Workplan Submitted:	Not reported
Assessment Underway:	Not reported
Pollution Characterization:	Not reported
Corrective Action Plan:	Not reported
Remediation Underway:	Not reported
Monitoring Begun:	Not reported
Funding:	Federal
Interim Remediation:	Not reported
Priority:	Not reported
Abatement:	Not reported
Enforcement Type:	NOR
Enforcement Due Date:	Not reported
Basin:	Westside Basin
Beneficial Use:	Yes
Lat/Long:	Not reported
CUFID:	Not reported
Suspended:	No
Stopped Date:	Not reported
Free Product:	No
Depth to Grnd Wtr:	Not reported
Gradient:	Not reported
Benzene:	Not reported
Primary Substance:	Fuel Oils Nos. 1 -
Enforcement Type:	Not reported
Amount of Free Produce:	Not reported
Benzene Test:	Not reported
Maximum Soil GW:	Not reported
Max Soil Concentration:	Not reported
TPH Tested:	Not reported
Max TPH GW:	Not reported
Max TPH Soil:	Not reported
TPH Date:	Not reported
Block:	Not reported
Lot:	Not reported
Notify:	False
TPH Current:	Not reported
TPH Current Date:	Not reported
Grnd Wtr Qualifier:	Not reported
Soil Qualifier:	Not reported
Comments:	Not reported
Summary:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	38
Reg By:	LTNKA
Reg Id:	38-1114

Y112 **PETRO-STOP INC** **CA FID UST** **S101624291**
South **315 DERBY** **SWEEPS UST** **N/A**
< 1/8 **OAKLAND, CA 94601** **HIST CORTESE**
0.116 mi.
613 ft. **Site 3 of 5 in cluster Y**

Relative:
Lower

Actual:
13 ft.

CA FID UST:

Facility ID:	01001508
Regulated By:	UTNKA
Regulated ID:	00004098
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155324112
Mail To:	Not reported
Mailing Address:	315 DERBY
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94601
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Active

SWEEPS UST:

Status:	A
Comp Number:	4098
Number:	9
Board Of Equalization:	44-000060
Ref Date:	07-01-85
Act Date:	Not reported
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	2
Swrcb Tank Id:	01-000-004098-000001
Actv Date:	07-01-85
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	2

Status:	A
Comp Number:	4098
Number:	9
Board Of Equalization:	44-000060
Ref Date:	07-01-85
Act Date:	Not reported
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	1
Swrcb Tank Id:	01-000-004098-000002
Actv Date:	07-01-85
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	DIESEL
Number Of Tanks:	Not reported

PETRO-STOP INC (Continued) **S101624291**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1394

Y113 **SIMMONS TERMINAL CORP** **RCRA-SQG** **1000301608**
South **315 DERBY AVE** **HIST UST** **CAD980737845**
< 1/8 **OAKLAND, CA 94601**
0.116 mi.
613 ft. **Site 4 of 5 in cluster Y**

Relative:
Lower

Actual:
13 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: SIMMONS TERMINAL CORP
Facility address: 315 DERBY AVE
OAKLAND, CA 94601
EPA ID: CAD980737845
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: SIMMONS OIL CORP
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown

SIMMONS TERMINAL CORP (Continued) **1000301608**

Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 10/04/1982
Facility name: SIMMONS TERMINAL CORP
Classification: Large Quantity Generator

Violation Status: No violations found

HIST UST:
Region: STATE
Facility ID: 00000014306
Facility Type: Other
Other Type: LIGHT OIL, BULK TERM
Total Tanks: 0002
Contact Name: GIRARD GONYEAU
Telephone: 4155841390
Owner Name: SIMMONS TERMINAL CORPORATION
Owner Address: 315 DERBY AVENUE
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00000500
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Visual, Stock Inventor, Groundwater Monitoring Well

Tank Num: 002
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000280
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Visual, Stock Inventor, Groundwater Monitoring Well

Y114 **SHELL OIL CO OAKLAND PLANT** **FINDS** **1000288015**
South **315 DERBY AVE** **RCRA-NonGen** **CAD000631200**
< 1/8 **OAKLAND, CA 94601**
0.116 mi.
613 ft. **Site 5 of 5 in cluster Y**

Relative:
Lower

FINDS:
Other Pertinent Environmental Activity Identified at Site

Actual:
13 ft.

Registry ID: 110002628513

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

RCRA-NonGen:

Date form received by agency:	08/14/1980
Facility name:	SHELL OIL CO OAKLAND PLANT
Facility address:	315 DERBY AVE OAKLAND, CA 94601
EPA ID:	CAD000631200
Mailing address:	1801 MARINA VISTA MARTINEZ, CA 94553
Contact:	SHARON BLANTON
Contact address:	315 DERBY AVE OAKLAND, CA 94601
Contact country:	US
Contact telephone:	(415) 228-6440
Contact email:	Not reported
EPA Region:	09
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	SHELL OIL COMPANY
Owner/operator address:	P O BOX 4848 ANAHEIM, CA 92803
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported
Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

SHELL OIL CO OAKLAND PLANT (Continued) **1000288015**

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

Z115 **EANDI METAL WORKS INC** **Alameda County CS** **S106880527**
North **2440 E 11TH ST** **N/A**
< 1/8 **OAKLAND, CA 94606**
0.121 mi.
638 ft. **Site 1 of 2 in cluster Z**

Relative:
Higher

Actual:
23 ft.

CS:
Status: Pollution Characterization
Record Id: RO0000029
PE: 5602

Z116 **HEITZ TRUCKING INC** **CA FID UST** **S101580398**
North **1125 MILLER PO BOX 6607 AVE** **N/A**
< 1/8 **OAKLAND, CA 94601**
0.125 mi.
659 ft. **Site 2 of 2 in cluster Z**

Relative:
Higher

Actual:
22 ft.

CA FID UST:
Facility ID: 01002776
Regulated By: UTNKA
Regulated ID: 00059474
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4154364445
Mail To: Not reported
Mailing Address: 1155 5TH ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

117
ENE
1/8-1/4
0.130 mi.
685 ft.

GOODWILL INDUSTRIES
1301 30TH AVE
OAKLAND, CA 94601

LUST
Alameda County CS
HIST CORTESE

S105025314
N/A

Relative:
Higher

Actual:
44 ft.

LUST:

Region:	STATE
Global Id:	T0600101959
Latitude:	37.778192
Longitude:	-122.228827
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1996-02-07 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-2133
LOC Case Number:	Not reported
File Location:	Local Agency
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Waste Oil / Motor / Hydraulic / Lubricating
Site History:	LUFT Con. LC 2SCA 02/05/1996

LUST:

Region:	2
Facility Id:	01-2133
Facility Status:	Case Closed
Case Number:	5551
How Discovered:	Tank Closure
Leak Cause:	UNK
Leak Source:	UNK
Date Leak Confirmed:	1/26/1996
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	Not reported
Preliminary Site Assesment Began:	Not reported
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CS:

Status:	Case Closed
Record Id:	RO0000762
PE:	5602

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-2133

118
ESE
1/8-1/4
0.132 mi.
699 ft.

TORRE EGISTO
776 FRUITVALE AVE
OAKLAND, CA

EDR Historical Auto Stations **1009014399**
N/A

Relative:
Higher

Actual:
25 ft.

EDR Historical Auto Stations:
Name: TORRE EGISTO
Year: 1933
Type: GASOLINE AND OIL SERVICE STATIONS

119
WNW
1/8-1/4
0.133 mi.
702 ft.

HASLETT COMPANY
1991 DENNISON STREET
OAKLAND, CA 94606

RCRA-SQG **1000281828**
FINDS **CAD007968118**

Relative:
Lower

Actual:
15 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: HASLETT COMPANY
Facility address: 1991 DENNISON STREET
OAKLAND, CA 94606
EPA ID: CAD007968118
Mailing address: PO BOX 12243
OAKLAND, CA 94604
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: HASLETT COMPANY
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

HASLETT COMPANY (Continued) **1000281828**

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 08/18/1980
Facility name: HASLETT COMPANY
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002630305

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

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120 East 1/8-1/4 0.135 mi. 711 ft.

KOHLES M A
3058 E 12TH ST
OAKLAND, CA

EDR Historical Auto Stations **1009011721**
N/A

Relative: Higher

Actual: 42 ft.

EDR Historical Auto Stations:
Name: TIMES GARAGE
Year: 1928
Type: AUTOMOBILE REPAIRING AND SERVICE STATIONS

Name: KOHLES M A
Year: 1943
Type: AUTOMOBILE REPAIRING

121 North 1/8-1/4 0.138 mi. 729 ft.

US HUD OAKLAND CITY OF HOUSING AUTHORITY
1180 25TH AVENUE
OAKLAND, CA 94601

RCRA-SQG 1000277302
FINDS CA7860090045
CERC-NFRAP

Relative: Higher

Actual: 25 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	USHUD OAKLAND CITY OF HOUSING AUTHORITY
Facility address:	1180 25TH AVENUE OAKLAND, CA 94601
EPA ID:	CA7860090045
Mailing address:	1619 HARRISON ST OAKLAND, CA 94612
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Federal
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	HOUSING AUTHORITY OF THE CITY-OAKLAND CA
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Federal
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown

US HUD OAKLAND CITY OF HOUSING AUTHORITY (Continued) **1000277302**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 04/16/1981
Facility name: USHUD OAKLAND CITY OF HOUSING AUTHORITY
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002625767

Not reported

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

CERC-NFRAP:
Site ID: 0903434
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP

CERCLIS-NFRAP Site Contact Name(s):
Contact Name: Matt Mitguard
Contact Tel: (415) 972-3096
Contact Title: Site Assessment Manager (SAM)

Contact Name: Nuria Muniz
Contact Tel: (415) 972-3811
Contact Title: Site Assessment Manager (SAM)

Site Description: Not reported

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY

US HUD OAKLAND CITY OF HOUSING AUTHORITY (Continued) **1000277302**

Date Started: Not reported
Date Completed: 05/01/1988
Priority Level: Not reported

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 06/21/1994
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 06/21/1994
Priority Level: NFRAP (No Futher Remedial Action Planned

AA122 **CLEVELAND STEEL CONTAINER CORP.** **HAZNET** **1007198739**
East **3100 E 10TH ST** **RCRA-LQG** **CAD009105958**
1/8-1/4 **OAKLAND, CA 94601** **NPDES**
0.142 mi. **CA WDS**
748 ft. **Site 1 of 2 in cluster AA**

Relative:
Higher

Actual:
37 ft.

HAZNET:
Gepaid: CAD009105958
Contact: RICK APPIANO GENERAL MANAGER
Telephone: 5107863445
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3100 EAST 10TH ST
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CA0000084517
TSD County: Sacramento
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: H141
Tons: 0.41
Facility County: Alameda

Gepaid: CAD009105958
Contact: RICK APPIANO GENERAL MANAGER
Telephone: 5107863445
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3100 EAST 10TH ST
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: NED981723513
TSD County: 99
Waste Category: Paint sludge
Disposal Method: H040
Tons: 1.83
Facility County: Alameda

Gepaid: CAD009105958
Contact: RICK APPIANO GENERAL MANAGER
Telephone: 5107863445
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3100 EAST 10TH ST
Mailing City,St,Zip: OAKLAND, CA 946010000

CLEVELAND STEEL CONTAINER CORP. (Continued) **1007198739**

Gen County: Alameda
TSD EPA ID: CAD059494310
TSD County: Santa Clara
Waste Category: Waste oil and mixed oil
Disposal Method: H141
Tons: 0.41
Facility County: Alameda

Gepaid: CAD009105958
Contact: RICK APPIANO GENERAL MANAGER
Telephone: 5107863445
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3100 EAST 10TH ST
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CAD059494310
TSD County: Santa Clara
Waste Category: Paint sludge
Disposal Method: H141
Tons: 37.32
Facility County: Alameda

Gepaid: CAD009105958
Contact: JOSEPH PLECHATY/ENVT'L MANAGER
Telephone: 5107863445
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3100 E 10TH ST
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: Alameda
TSD EPA ID: CA0000084517
TSD County: Alameda
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: 0.35
Facility County: 1

Click this hyperlink while viewing on your computer to access
5 additional CA_HAZNET: record(s) in the EDR Site Report.

RCRA-LQG:
Date form received by agency: 02/28/2006
Facility name: CLEVELAND STEEL CONTAINER CORP.
Facility address: 3100 EAST 10TH STREET
OAKLAND, CA 94601
EPA ID: CAD009105958
Contact: JOSEPH A PLECHATY
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: (510) 533-6574
Telephone ext.: 10
Contact email: JPLECHAT@CSCPAILS.COM
EPA Region: 09
Classification: Large Quantity Generator
Description: Handler: generates 1,000 kg or more of hazardous waste during any

CLEVELAND STEEL CONTAINER CORP. (Continued) **1007198739**

calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:

Owner/operator name:	NORTON PROPERTIES
Owner/operator address:	20670 CORSAIR BUOLEVARD
	HAYWARD, CA 94545
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	01/01/1980
Owner/Op end date:	Not reported

Owner/operator name:	CLEVELAND STEEL CONTAINER CORP.
Owner/operator address:	Not reported
	Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	07/01/2002
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Universal Waste Summary:

Waste type:	Batteries
Accumulated waste on-site:	No
Generated waste on-site:	No

CLEVELAND STEEL CONTAINER CORP. (Continued) **1007198739**

Waste type: Lamps
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: No

Historical Generators:
Date form received by agency: 03/01/2004
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: CLEVELAND STEEL CONTAINER CORP
Classification: Large Quantity Generator

Date form received by agency: 01/21/2002
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: B W NORTON MFG CO
Classification: Large Quantity Generator

Date form received by agency: 10/12/2000
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: NORTON PACKAGING, INC.
Classification: Large Quantity Generator

Date form received by agency: 03/04/1999
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: NORTON PACKAGING, INC.
Classification: Large Quantity Generator

Date form received by agency: 01/19/1996
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: B.W. FORTON MFG. CL. INC.
Classification: Large Quantity Generator

Date form received by agency: 03/09/1994
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: B W NORTON MFG CO
Classification: Large Quantity Generator

Date form received by agency: 02/25/1992
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: B.W. NORTON MFG. CO., INC.
Classification: Large Quantity Generator

Date form received by agency: 03/16/1990
Facility name: CLEVELAND STEEL CONTAINER CORP.
Site name: B.W. NORTON MFG. CO.,INC.
Classification: Large Quantity Generator

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF

CLEVELAND STEEL CONTAINER CORP. (Continued) **1007198739**

LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: F003
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Biennial Reports:

Last Biennial Reporting Year: 2007

Annual Waste Handled:

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
Amount (Lbs): 83573.8

Waste code: F003
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
Amount (Lbs): 101849.8

Waste code: F005
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
Amount (Lbs): 101849.8

CLEVELAND STEEL CONTAINER CORP. (Continued) **1007198739**

Violation Status: No violations found

NPDES:

Npdes Number:	Not reported
Facility Status:	Active
Agency Id:	11252
Region:	2
Regulatory Measure Id:	181253
Order No:	Not reported
Order No Of General Order:	97-03-DWQ
Regulatory Measure Type:	Storm water industrial
Place Id:	217929
WDID:	2 01I018226
Program Type:	INDSTW
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	6/30/2003
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Cleveland Steel Container Corp
Discharge Address:	3100 E 10th St
Discharge Address2:	Not reported
Discharge City:	Oakland
Discharge State:	CA
Discharge Zip:	94601

CA WDS:

Facility ID:	San Francisco Bay 01I018226
Facility Type:	Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion:	2
Facility Telephone:	5105336574
Facility Contact:	Joseph Plechaty
Agency Name:	CLEVELAND STEEL CONTAINER CORP
Agency Address:	3100 E 10th St
Agency City,St,Zip:	Oakland 946012914
Agency Contact:	Joseph Plechaty
Agency Telephone:	5105336574
Agency Type:	?
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	Not reported
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order

CLEVELAND STEEL CONTAINER CORP. (Continued) **1007198739**

should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.

Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

AA123 **NORTON PACKAGING INCORPORATED** **FINDS** **1000434965**
East **3100 EAST 10TH STREET** **CA FID UST** **N/A**
1/8-1/4 **OAKLAND, CA 94601** **HIST UST**
0.142 mi. **SWEEPS UST**
748 ft. **Site 2 of 2 in cluster AA**

Relative: Higher

Actual: 37 ft.

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110000782136

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and

NORTON PACKAGING INCORPORATED (Continued) **1000434965**

its Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

CA FID UST:
Facility ID: 01002117
Regulated By: UTNKI
Regulated ID: 00011416
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155336541
Mail To: Not reported
Mailing Address: SAME
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

HIST UST:
Region: STATE
Facility ID: 00000011416
Facility Type: Other
Other Type: PAIL MANUFACTURING
Total Tanks: 0001
Contact Name: GERALD BETTRIDGE (PLANT MGR.)
Telephone: 4155336541
Owner Name: B.W. NORTON MFG. CO. INC.
Owner Address: 3100 EAST 10TH. STREET
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 001
Year Installed: 1979
Tank Capacity: 00006000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: 3 inches
Leak Detection: Stock Inventor

SWEEPS UST:
Status: Not reported
Comp Number: 11416
Number: Not reported
Board Of Equalization: 44-000167
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported

NORTON PACKAGING INCORPORATED (Continued) **1000434965**

Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-011416-000001
Actv Date:	Not reported
Capacity:	6000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	1

AB124 **MONTGOMERY WARD BUILDING** **RCRA-SQG** **1000404530**
NNE **2825 E 14TH ST** **FINDS** **CAD981386311**
1/8-1/4 **OAKLAND, CA 94601**
0.156 mi.
824 ft. **Site 1 of 3 in cluster AB**

Relative:
Higher

Actual:
46 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	MONTGOMERY WARD CO
Facility address:	VARIOUS LOCATIONS OAKLAND, CA 94611
EPA ID:	CAD981386311
Mailing address:	2825 E FOURTEEN ST OAKLAND, CA 94616
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	MONTGOMERY WARD CO
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported
Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported

MONTGOMERY WARD BUILDING (Continued) **1000404530**

Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 03/12/1986
Facility name: MONTGOMERY WARD CO
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110001188508

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all

MONTGOMERY WARD BUILDING (Continued) **1000404530**

Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and its Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

AB125 **FORMER MONTGOMERY WARD BUILDING** **SCH** **S104735464**
NNE **2825 INTERNATIONAL BOULEVARD** **ENVIROSTOR** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.161 mi.
849 ft. **Site 2 of 3 in cluster AB**

Relative:
Higher

Actual:
46 ft.

SCH:

Facility ID:	01230003
Site Type:	School Cleanup
Site Type Detail:	School
Acres:	7.85
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	Mike Lozano
Supervisor:	Mark Malinowski
Division Branch:	Sacramento
Site Code:	201289-11
Assembly:	16
Senate:	09
Special Program Status:	Not reported
Status:	Certified
Status Date:	2001-08-31 00:00:00
Restricted Use:	NO
Funding:	School District
Latitude:	37.7794508507983
Longitude:	-122.230805056768
Alias Name:	01230003
Alias Type:	Envirostor ID Number
Alias Name:	OAKLAND UNIFIED SCHOOL DISTRICT
Alias Type:	Alternate Name
Alias Name:	FORMER MONTGOMERY WARD SITE
Alias Type:	Alternate Name
Alias Name:	FORMER MONTGOMERY WARD BUILDING
Alias Type:	Alternate Name
Alias Name:	201289-11
Alias Type:	Project Code (Site Code)
Alias Name:	110033614578
Alias Type:	EPA (FRS #)
APN:	NONE SPECIFIED
APN Description:	Not reported
Comments:	Clean up goals: The remedial action objective in the RAW was to remove TPH-, PCB-, and lead affected soil exceeding the following concentrations: TPHg>400mg/kg PPHd>500mg/kg, TPHmo>500mg/kg, PCB's>0.2mg/kg, Total lead>255mg/kg, PAH's>San FranciscoDistrict's

FORMER MONTGOMERY WARD BUILDING (Continued) **S104735464**

consultant moved forward with removal work prior to obtaining DTSC approval. DTSC sent cease and desist communication to Consultant and District; later approved workplan and completion report. Cleanup goals: The remedial action objectiRemoval action workplan and Site excavation report completed on same day. Consultant had previously moved forward with some removal work prior to obtaining DTSC approval. DTSC sent cease and desist communication to Consultant and District, thus resulting in delays and some incongruities in the timeline of the project.ve in the RAW was to remove TPH-, PCB-, and lead affected soil exceeding the following concentrations: TPHg>400mg/kg TPHd>500mg/kg, PCB's>0 TPHmo.500mg/kg,l.2mg/kg, PCB's>0.2mg/kg, Total lead >255mg/kg, PAH's. San Francisco Bay Regional Water QualBay Regional Water Quality Control Board Risk Based Screening Levels.ity Control Board Screening Levels. CEQA NOE was approved by DTSC. Approximately 1155 cubic yards of soil were excavated from 2 discrete areas. 480 cubic yards of Total Petroleum Hydrocarbon (TPH) impacted soil was transported to and disposed ofat Vasco Road Landfill, a Class 2 nonhazardous waste landfill, located in Livermore, California. 675 cubic yards of PCB's and Lead impacted soil was transported to and disposed of at Waste Management's Kettleman Hills Landfill, a Class 1 hazardouswaste landfill, located in Kettleman, Ca.

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Other Report
Completed Date:	1999-10-07 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	CEQA - Notice of Exemption
Completed Date:	2001-08-31 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Certification
Completed Date:	2001-08-31 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	2001-10-31 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Site Inspections/Visit (Non LUR)
Completed Date:	2001-02-20 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Voluntary Cleanup Agreement
Completed Date:	2000-08-31 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Removal Action Workplan
Completed Date:	2001-08-31 00:00:00

FORMER MONTGOMERY WARD BUILDING (Continued) **S104735464**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2001-08-31 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: , 3002502, 30025, 30024, 30013, 30018
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: * MANU - APPAREL & OTHER TEXTILE PRODUCTS

ENVIROSTOR:
Site Type: School Cleanup
Site Type Detailed: School
Acres: 7.85
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: Mike Lozano
Supervisor: Mark Malinowski
Division Branch: Sacramento
Facility ID: 01230003
Site Code: 201289-11
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Certified
Status Date: 2001-08-31 00:00:00
Restricted Use: NO
Funding: School District
Latitude: 37.7794508507983
Longitude: -122.230805056768
Alias Name: 01230003
Alias Type: Envirostor ID Number
Alias Name: OAKLAND UNIFIED SCHOOL DISTRICT
Alias Type: Alternate Name
Alias Name: FORMER MONTGOMERY WARD SITE

FORMER MONTGOMERY WARD BUILDING (Continued) **S104735464**

Alias Type: Alternate Name
Alias Name: FORMER MONTGOMERY WARD BUILDING
Alias Type: Alternate Name
Alias Name: 201289-11
Alias Type: Project Code (Site Code)
Alias Name: 110033614578
Alias Type: EPA (FRS #)

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Clean up goals: The remedial action objective in the RAW was to remove TPH-, PCB-, and lead affected soil exceeding the following concentrations: TPHg>400mg/kg PPHd>500mg/kg, TPHmo>500mg/kg, PCB's>0.2mg/kg, Total lead>255mg/kg, PAH's>San FranciscoDistrict's consultant moved forward with removal work prior to obtaining DTSC approval. DTSC sent cease and desist communication to Consultant and District; later approved workplan and completion report. Cleanup goals: The remedial action objectiRemoval action workplan and Site excavation report completed on same day. Consultant had previously moved forward with some removal work prior to obtaining DTSC approval. DTSC sent cease and desist communication to Consultant and District, thus resulting in delays and some incongruities in the timeline of the project.ve in the RAW was to remove TPH-, PCB-, and lead affected soil exceeding the following concentrations: TPHg>400mg/kg TPHd>500mg/kg, PCB's>0 TPHmo.500mg/kg,l.2mg/kg, PCB's>0.2mg/kg, Total lead >255mg/kg, PAH's. San Francisco Bay Regional Water QualBay Regional Water Quality Control Board Risk Based Screening Levels.ity Control Board Screening Levels. CEQA NOE was approved by DTSC. Approximately 1155 cubic yards of soil were excavated from 2 discrete areas. 480 cubic yards of Total Petroleum Hydrocarbon (TPH) impacted soil was transported to and disposed ofat Vasco Road Landfill, a Class 2 nonhazardous waste landfill, located in Livermore, California. 675 cubic yards of PCB's and Lead impacted soil was transported to and disposed of at Waste Management's Kettleman Hills Landfill, a Class 1 hazardouswaste landfill, located in Kettleman, Ca.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Other Report
Completed Date: 1999-10-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2001-08-31 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 2001-08-31 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2001-10-31 00:00:00

FORMER MONTGOMERY WARD BUILDING (Continued) **S104735464**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2001-02-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2000-08-31 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2001-08-31 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2001-08-31 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: , 3002502, 30025, 30024, 30013, 30018
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: * MANU - APPAREL & OTHER TEXTILE PRODUCTS

126
NE
1/8-1/4
0.166 mi.
877 ft.

HABAN H I
1420 29TH AVE
OAKLAND, CA

EDR Historical Auto Stations **1009011173**
N/A

Relative:
Higher

Actual:
48 ft.

EDR Historical Auto Stations:
Name: HABAN H I
Year: 1943
Type: AUTOMOBILE REPAIRING

AB127
NNE
1/8-1/4
0.167 mi.
882 ft.

HERLING ELEANOR
1404 28TH AVE
OAKLAND, CA

Site 3 of 3 in cluster AB

EDR Historical Cleaners **1009141396**
N/A

Relative:
Higher

Actual:
47 ft.

EDR Historical Cleaners:

Name:	HERLING ELEANOR
Year:	1933
Type:	CLOTHES PRESSERS AND CLEANERS

128
NNW
1/8-1/4
0.172 mi.
909 ft.

GENETROL BIOTHERAPEUTICS
2220 LIVINGSTON ST STE 201
OAKLAND, CA 94606

RCRA-SQG **1004677156**
FINDS **CAR000093856**
HAZNET

Relative:
Lower

Actual:
17 ft.

RCRA-SQG:

Date form received by agency:	03/23/2001
Facility name:	GENETROL BIOTHERAPEUTICS
Facility address:	2220 LIVINGSTON ST STE 201 OAKLAND, CA 94606
EPA ID:	CAR000093856
Contact:	LAURA BROWNING
Contact address:	2220 LIVINGSTON ST STE 201 OAKLAND, CA 94606
Contact country:	US
Contact telephone:	(510) 261-9990
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	DONALD L JONES PROPERTIES
Owner/operator address:	2220 LIVINGSTON ST STE 201 OAKLAND, CA 94606
Owner/operator country:	Not reported
Owner/operator telephone:	(510) 562-2580
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No

GENETROL BIOTHERAPEUTICS (Continued) **1004677156**

User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110012243624

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAR000093856
Contact: --
Telephone: 5102619990
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2220 LIVINGSTON ST STE 201
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Unspecified organic liquid mixture
Disposal Method: Disposal, Other
Tons: 0.12

GENETROL BIOTHERAPEUTICS (Continued) **1004677156**

Facility County: Not reported

Gepaid: CAR000093856
Contact: --
Telephone: 5102619990
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2220 LIVINGSTON ST STE 201
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: 99
Waste Category: Laboratory waste chemicals
Disposal Method: Recycler
Tons: 0.22
Facility County: Not reported

Gepaid: CAR000093856
Contact: --
Telephone: 5102619990
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2220 LIVINGSTON ST STE 201
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: Not reported
Tons: 0.18
Facility County: Not reported

Gepaid: CAR000093856
Contact: --
Telephone: 5102619990
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2220 LIVINGSTON ST STE 201
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: Disposal, Land Fill
Tons: 0.2
Facility County: Not reported

Click this hyperlink while viewing on your computer to access
-1 additional CA_HAZNET: record(s) in the EDR Site Report.

AC129 **SHELL OIL CO OFFICE** **EDR Historical Auto Stations** **1009013066**
South **315 DERBY AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.175 mi.
926 ft. **Site 1 of 2 in cluster AC**

Relative:
Lower

Actual:
13 ft.

EDR Historical Auto Stations:
Name: SHELL OIL CO OFFICE
Year: 1943
Type: GASOLINE AND OIL SERVICE STATIONS

AC130 **SIMMONS OIL CORPORATION** **LUST** **S109284009**
South **315 DERBY AVE** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.175 mi.
926 ft. **Site 2 of 2 in cluster AC**

Relative:
Lower

Actual:
13 ft.

LUST:
Region: STATE
Global Id: T0600101288
Latitude: 37.770876
Longitude: -122.23131
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1990-06-12 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1394
LOC Case Number: Not reported
File Location: Not reported
Potential Media Affect: Not reported
Potential Contaminats of Concern: Gasoline
Site History: Not reported

AD131 **STATE SHINGLE** **LUST** **S101624299**
East **880 FRUITVALE AVE** **CA FID UST** **N/A**
1/8-1/4 **OAKLAND, CA 94601** **Alameda County CS**
0.179 mi. **SWEEPS UST**
947 ft. **Site 1 of 2 in cluster AD** **HIST CORTESE**

Relative:
Higher

Actual:
32 ft.

LUST:
Region: STATE
Global Id: T0600101314
Latitude: 37.773928
Longitude: -122.226202
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1997-01-03 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1423
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3 801/03/199707/31/1995

STATE SHINGLE (Continued) **S101624299**

LUST:
Region: 2
Facility Id: 01-1423
Facility Status: Case Closed
Case Number: 3654
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 6/4/1990
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01001537
Regulated By: UTNKI
Regulated ID: 00010269
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155351311
Mail To: Not reported
Mailing Address: 880 FRUITVALE AVE
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

CS:
Status: Case Closed
Record Id: RO0001109
PE: 5602

SWEEPS UST:
Status: Not reported
Comp Number: 10269
Number: Not reported
Board Of Equalization: 44-000150
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-010269-000001
Actv Date: Not reported
Capacity: 1000
Tank Use: M.V. FUEL

STATE SHINGLE (Continued) **S101624299**

Stg: PRODUCT
Content: REG UNLEADED
Number Of Tanks: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1423

AD132 **STATE SHINGLE COMPANY** **HIST UST** **U001599027**
East **880 FRUITVALE AVE** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.179 mi.
947 ft. **Site 2 of 2 in cluster AD**

Relative:
Higher

Actual:
32 ft.

HIST UST:
Region: STATE
Facility ID: 00000010269
Facility Type: Other
Other Type: WHLSLE ROOFING MAT'L
Total Tanks: 0001
Contact Name: DONALD R. LEWIS
Telephone: 4155351311
Owner Name: STATE SHINGLE COMPANY
Owner Address: 880 FRUITVALE AVENUE
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: G - 1001
Year Installed: Not reported
Tank Capacity: 00001000
Tank Used for: Not reported
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None

AE133 **HUSTON P M** **EDR Historical Auto Stations** **1009012347**
East **1201 31ST AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.180 mi.
949 ft. **Site 1 of 3 in cluster AE**

Relative:
Higher

Actual:
42 ft.

EDR Historical Auto Stations:
Name: CLOVERLEAF RADIATOR WORKS
Year: 1928
Type: AUTOMOBILE REPAIRING AND SERVICE STATIONS

Name: HOTZ BROS
Year: 1933
Type: AUTOMOBILE REPAIRING

Name: HUSTON P M
Year: 1943
Type: AUTOMOBILE REPAIRING

AF134 **CONAGRA INC** **LUST** **S109283937**
WSW **2201 7TH ST E** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.180 mi.
950 ft. **Site 1 of 2 in cluster AF**

Relative:
Lower

Actual:
9 ft.

LUST:

Region:	STATE
Global Id:	T0600100402
Latitude:	37.775116
Longitude:	-122.237126
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	1989-03-17 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0442
LOC Case Number:	Not reported
File Location:	Not reported
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Gasoline
Site History:	Not reported

AG135 **OKA KAYE MRS** **EDR Historical Cleaners** **1009140945**
North **1077 23RD AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.181 mi.
954 ft. **Site 1 of 2 in cluster AG**

Relative:
Lower

Actual:
21 ft.

EDR Historical Cleaners:

Name:	OKA KAYE MRS
Year:	1933
Type:	CLOTHES PRESSERS AND CLEANERS

AG136 **OKA HARRY** **EDR Historical Cleaners** **1009141702**
North **1079 23RD AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.181 mi.
957 ft. **Site 2 of 2 in cluster AG**

Relative:
Lower

Actual:
21 ft.

EDR Historical Cleaners:

Name:	OKA HARRY
Year:	1925
Type:	CLEANERS DYERS AND PRESSERS

AF137 **CONAGRA INC** **HIST CORTESE** **1000591270**
WSW **2201 7TH** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.182 mi.
961 ft. **Site 2 of 2 in cluster AF**

Relative:
Lower

Actual:
9 ft.

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0442

AH138 **23RD AVENUE PARTNERS** **HAZNET** **S103947944**
North **1125 MILLER PL** **Alameda County CS** **N/A**
1/8-1/4 **OAKLAND, CA 94630**
0.182 mi.
962 ft. **Site 1 of 4 in cluster AH**

Relative:
Higher

Actual:
23 ft.

HAZNET:

Gepaid:	CAC001485736
Contact:	23RD AVENUE PARTNERS
Telephone:	5105336600
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 7509
Mailing City,St,Zip:	OAKLAND, CA 946010000
Gen County:	1
TSD EPA ID:	CAL000161741
TSD County:	1
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Recycler
Tons:	.2085
Facility County:	1

Gepaid:	CAC001485736
Contact:	23RD AVENUE PARTNERS
Telephone:	5105336600
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 7509
Mailing City,St,Zip:	OAKLAND, CA 946010000
Gen County:	1
TSD EPA ID:	CAD009466392
TSD County:	7
Waste Category:	Other empty containers 30 gallons or more
Disposal Method:	Recycler
Tons:	4.8000
Facility County:	1

CS:

Status:	Pollution Characterization
Record Id:	RO0000294
PE:	5602

AH139 **HEITZ TRUCKING INC** **CHMIRS** **U001598996**
North **1125 MILLER AVE** **HIST UST** **N/A**
1/8-1/4 **OAKLAND, CA 94601** **SWEEPS UST**
0.182 mi.
962 ft. **Site 2 of 4 in cluster AH**

Relative:
Higher

Actual:
23 ft.

CHMIRS:

OES Incident Number:	99-3259
OES notification:	8/3/199910:34:43 AM
OES Date:	Not reported
OES Time:	Not reported
Incident Date:	Not reported
Date Completed:	**Not reported**
Property Use:	Not reported
Agency Id Number:	Not reported
Agency Incident Number:	Not reported
Time Notified:	Not reported

HEITZ TRUCKING INC (Continued) **U001598996**

Time Completed:	Not reported
Surrounding Area:	Not reported
Estimated Temperature:	Not reported
Property Management:	Not reported
Special Studies 1:	Not reported
Special Studies 2:	Not reported
Special Studies 3:	Not reported
Special Studies 4:	Not reported
Special Studies 5:	Not reported
Special Studies 6:	Not reported
More Than Two Substances Involved?:	Not reported
Resp Agncy Personel # Of Decontaminated:	Not reported
Responding Agency Personel # Of Injuries:	Not reported
Responding Agency Personel # Of Fatalities:	Not reported
Others Number Of Decontaminated:	Not reported
Others Number Of Injuries:	Not reported
Others Number Of Fatalities:	Not reported
Vehicle Make/year:	Not reported
Vehicle License Number:	Not reported
Vehicle State:	Not reported
Vehicle Id Number:	Not reported
CA/DOT/PUC/ICC Number:	Not reported
Company Name:	Not reported
Reporting Officer Name/ID:	Not reported
Report Date:	Not reported
Comments:	Not reported
Facility Telephone:	Not reported
Waterway Involved:	No
Waterway:	Not reported
Spill Site:	Not reported
Cleanup By:	Unknown
Containment:	Not reported
What Happened:	Not reported
Type:	Not reported
Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	1999
Agency:	Pvt Citizen
Incident Date:	8/2/199912:00:00 AM
Admin Agency:	City of Oakland Fire Department
Amount:	Not reported
Contained:	Yes
Site Type:	Residence
E Date:	Not reported
Substance:	diesel fuel
Quantity Released:	Not reported
BBLS:	0
Cups:	0
CUFT:	0
Gallons:	0
Grams:	0
Pounds:	0
Liters:	0
Ounces:	0
Pints:	0
Quarts:	0

HEITZ TRUCKING INC (Continued) **U001598996**

Sheen: 0
Tons: 0
Unknown: 0
Description: Not reported
Evacuations: 0
Number of Injuries: 0
Number of Fatalities: 0
Description: 50 gallon bbl of diesel fuel leaking in an external "closet" at residence. Noticed spill yesterday, making it unlivable. May be several barrels of fuel within room.

HIST UST:
Region: STATE
Facility ID: 00000059474
Facility Type: Other
Other Type: TRUCKING CO.
Total Tanks: 0002
Contact Name: AL PECTON FAC. MGR.
Telephone: 4155331523
Owner Name: RONALD T DREISBACH
Owner Address: P.O. BOX 7509
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00005000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00005000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

SWEEPS UST:
Status: A
Comp Number: 59474
Number: 1
Board Of Equalization: 44-032661
Ref Date: 07-13-93
Act Date: 12-16-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-059474-000001
Actv Date: 07-13-93
Capacity: 5000
Tank Use: M.V. FUEL
Stg: P

HEITZ TRUCKING INC (Continued) **U001598996**

Content: DIESEL
Number Of Tanks: 2

Status: A
Comp Number: 59474
Number: 1
Board Of Equalization: 44-032661
Ref Date: 07-13-93
Act Date: 12-16-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 2
Swrcb Tank Id: 01-000-059474-000002
Actv Date: 07-13-93
Capacity: 5000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

AH140 **23RD AVENUE PARTNERS** **LUST** **S107472822**
North **1125 MILLER** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.183 mi.
964 ft. **Site 3 of 4 in cluster AH**

Relative:
Higher

Actual:
23 ft.

LUST:
Region: STATE
Global Id: T0600177455
Latitude: 37.780969
Longitude: -122.236309
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 2000-10-23 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
LOC Case Number: RO0000294
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel
Site History: LUFT Con. LC No water samples collected, but since only a diesel tank was re07/16/1999

AH141 **PG&E - FORMER OAKLAND STATION H** **VCP** **S106568176**
North **1134 MILLER AVENUE** **ENVIROSTOR** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.188 mi.
991 ft. **Site 4 of 4 in cluster AH**

Relative:
Higher

Actual:
23 ft.

VCP:
Facility ID: 01490018
Site Type: Voluntary Cleanup
Site Type Detail: Voluntary Cleanup
Acres: 0.55

PG&E - FORMER OAKLAND STATION H (Continued) **S106568176**

National Priorities List: NO
Cleanup Oversight Agencies: SMBRP
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager: LYNN NAKASHIMA
Supervisor: Barbara Cook
Division Branch: Berkeley
Site Code: 201390
Assembly: 16
Senate: 09
Special Programs Code: Voluntary Cleanup Program
Status: Certified
Status Date: 2004-01-20 00:00:00
Restricted Use: NO
Funding: Responsible Party
Lat/Long: 37.7805382375649 / -122.236174734849
Alias Name: 01490018
Alias Type: Envirostor ID Number
Alias Name: PG&E - STATION H
Alias Type: Alternate Name
Alias Name: 201390
Alias Type: Project Code (Site Code)
Alias Name: 110033611465
Alias Type: EPA (FRS #)
Alias Name: 019-0098-006
Alias Type: APN

APN: 019-0098-006
APN Description: Not reported
Comments: Completed RA. Certified Site. Approved Report documenting removal to unrestricted levels.Signed VCA.Fact sheet for draft RAWApproved RAW. Reports containing results of environmental media sampling indicate that the soil is contaminated with lead, cadmium and arsenic. The RAW required excavation and off-site disposal of soil containing contaminants above unrestricted use levels.

Completed Info:

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2003-07-17 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 2004-01-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2002-03-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2003-08-07 00:00:00

Completed Area Name: PROJECT WIDE

PG&E - FORMER OAKLAND STATION H (Continued) **S106568176**

Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2003-06-06 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2004-01-20 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 10097, 30001, 30013, 30108
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: ELECTRIC GENERATION/SUBSTATION

ENVIROSTOR:
Site Type: Voluntary Cleanup
Site Type Detailed: Voluntary Cleanup
Acres: 0.55
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: LYNN NAKASHIMA
Supervisor: Barbara Cook
Division Branch: Berkeley
Facility ID: 01490018
Site Code: 201390
Assembly: 16
Senate: 09
Special Program: Voluntary Cleanup Program
Status: Certified
Status Date: 2004-01-20 00:00:00
Restricted Use: NO
Funding: Responsible Party
Latitude: 37.7805382375649
Longitude: -122.236174734849
Alias Name: 01490018
Alias Type: Envirostor ID Number
Alias Name: PG&E - STATION H

PG&E - FORMER OAKLAND STATION H (Continued) **S106568176**

Alias Type: Alternate Name
Alias Name: 201390
Alias Type: Project Code (Site Code)
Alias Name: 110033611465
Alias Type: EPA (FRS #)
Alias Name: 019-0098-006
Alias Type: APN

APN: 019-0098-006
APN Description: Not reported
Comments: Completed RA. Certified Site. Approved Report documenting removal to unrestricted levels.Signed VCA.Fact sheet for draft RAWApproved RAW. Reports containing results of environmental media sampling indicate that the soil is contaminated with lead, cadmium and arsenic. The RAW required excavation and off-site disposal of soil containing contaminants above unrestricted use levels.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2003-07-17 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 2004-01-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2002-03-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2003-08-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2003-06-06 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2004-01-20 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 10097, 30001, 30013, 30108
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

PG&E - FORMER OAKLAND STATION H (Continued) **S106568176**

Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: ELECTRIC GENERATION/SUBSTATION

AE142 **PERALTA SERVICE UNION STATION** **HIST UST** **U001599015**
East **3132 E 12TH ST** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.188 mi.
995 ft. **Site 2 of 3 in cluster AE**

Relative:
Higher

Actual:
42 ft.

HIST UST:
Region: STATE
Facility ID: 00000057643
Facility Type: Gas Station
Other Type: Not reported
Total Tanks: 0003
Contact Name: VERNEL PEEL
Telephone: 4155320339
Owner Name: RALPH B. PAHLMEYER FAMILY TRUS
Owner Address: 3410 LAKESHORE AVE. #205
Owner City,St,Zip: OAKLAND, CA 94610

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: PREMIUM
Tank Construction: Not reported
Leak Detection: None

Tank Num: 003
Container Num: 3
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: None

AE143 **OIL CHANGER #616** **LUST** **S103472276**
East **3132 12TH ST E** **Alameda County CS** **N/A**
1/8-1/4 **OAKLAND, CA 94601** **HIST CORTESE**
0.188 mi.
995 ft. **Site 3 of 3 in cluster AE**

Relative:
Higher

Actual:
42 ft.

LUST:

Region:	STATE
Global Id:	T0600101042
Latitude:	37.776614
Longitude:	-122.226752
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1997-10-10 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-1132
LOC Case Number:	Not reported
File Location:	Local Agency
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 3HSCAWG 10/10/199703/03/1993

LUST:

Region:	2
Facility Id:	01-1132
Facility Status:	Case Closed
Case Number:	1136
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	3/12/1992
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	Not reported
Preliminary Site Assesment Began:	4/12/1990
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CS:

Status:	Case Closed
Record Id:	RO0001193
PE:	5602

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-1132

AI144 **WEST COAST VENDING AND FOOD SERVICE INC** **HAZNET** **S103641713**
NNW **2124 LIVINGSTON** **HIST CORTESE** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.191 mi.
1006 ft. **Site 1 of 3 in cluster AI**

Relative:
Lower

Actual:
15 ft.

HAZNET:

Gepaid:	CAC001256872
Contact:	WEST COAST VENDING
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2124 LIVINGSTON
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Aqueous solution with 10% or more total organic residues
Disposal Method:	Recycler
Tons:	.2251
Facility County:	1

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-2347

AI145 **WEST COAST VENDING INC** **LUST** **S103396027**
NNW **2124 LIVINGSTON ST** **Alameda County CS** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.191 mi.
1006 ft. **Site 2 of 3 in cluster AI**

Relative:
Lower

Actual:
15 ft.

LUST:

Region:	STATE
Global Id:	T0600102157
Latitude:	37.780902
Longitude:	-122.240712
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	1998-05-01 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	01-2347
LOC Case Number:	RO0000088
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 2,s,c,a MTBE=0.012 ppm in soil sample from tank removal, awaiting a WATER SAMPLE 07/16/1999, no water sample taken yet 6/11/03

LUST:

Region:	2
Facility Id:	01-2347
Facility Status:	Leak being confirmed
Case Number:	5943
How Discovered:	Tank Closure

WEST COAST VENDING INC (Continued) **S103396027**

Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 8/13/1998
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Pollution Characterization
Record Id: RO0000088
PE: 5602

AJ146 **DEL MONTE PLANT #26** **LUST** **S101624280**
South **400 LANCASTER ST** **CHMIRS** **N/A**
1/8-1/4 **OAKLAND, CA 94601** **CA FID UST**
0.191 mi. **Alameda County CS**
1008 ft. **Site 1 of 3 in cluster AJ** **SWEEPS UST**
HIST CORTESE

Relative:
Lower

Actual:
13 ft.

LUST:
Region: STATE
Global Id: T0600101952
Latitude: 37.770602
Longitude: -122.22952
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-02-28 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2126
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2HSCA 01/09/1996

LUST:
Region: 2
Facility Id: 01-2126
Facility Status: Case Closed
Case Number: 4980
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 12/8/1995
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

DEL MONTE PLANT #26 (Continued) **S101624280**

CHMIRS:

OES Incident Number:	03-3826
OES notification:	7/30/200303:30:02 PM
OES Date:	Not reported
OES Time:	Not reported
Incident Date:	Not reported
Date Completed:	**Not reported**
Property Use:	Not reported
Agency Id Number:	Not reported
Agency Incident Number:	Not reported
Time Notified:	Not reported
Time Completed:	Not reported
Surrounding Area:	Not reported
Estimated Temperature:	Not reported
Property Management:	Not reported
Special Studies 1:	Not reported
Special Studies 2:	Not reported
Special Studies 3:	Not reported
Special Studies 4:	Not reported
Special Studies 5:	Not reported
Special Studies 6:	Not reported
More Than Two Substances Involved?:	Not reported
Resp Agncy Personel # Of Decontaminated:	Not reported
Responding Agency Personel # Of Injuries:	Not reported
Responding Agency Personel # Of Fatalities:	Not reported
Others Number Of Decontaminated:	Not reported
Others Number Of Injuries:	Not reported
Others Number Of Fatalities:	Not reported
Vehicle Make/year:	Not reported
Vehicle License Number:	Not reported
Vehicle State:	Not reported
Vehicle Id Number:	Not reported
CA/DOT/PUC/ICC Number:	Not reported
Company Name:	Not reported
Reporting Officer Name/ID:	Not reported
Report Date:	Not reported
Comments:	Not reported
Facility Telephone:	Not reported
Waterway Involved:	Yes
Waterway:	Oakland Alameda Estuary
Spill Site:	Not reported
Cleanup By:	Unknown
Containment:	Not reported
What Happened:	Not reported
Type:	Not reported
Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	2003
Agency:	F&G
Incident Date:	7/30/200312:00:00 AM
Admin Agency:	City of Oakland Fire Department
Amount:	Not reported
Contained:	No
Site Type:	Merchant/Business
E Date:	Not reported
Substance:	antifreeze

DEL MONTE PLANT #26 (Continued) **S101624280**

Quantity Released:	Not reported
BBLS:	0
Cups:	0
CUFT:	0
Gallons:	5
Grams:	0
Pounds:	0
Liters:	0
Ounces:	0
Pints:	0
Quarts:	0
Sheen:	0
Tons:	0
Unknown:	0
Description:	Not reported
Evacuations:	0
Number of Injuries:	0
Number of Fatalities:	0
Description:	Uknown /,, substance is coming from a storm drain flowing into Oakland Alameda Estuary

CA FID UST:

Facility ID:	01002079
Regulated By:	UTNKI
Regulated ID:	00001366
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155328696
Mail To:	Not reported
Mailing Address:	400 LANCASTER ST
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94601
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

CS:

Status:	Case Closed
Record Id:	RO0000666
PE:	5602

SWEEPS UST:

Status:	Not reported
Comp Number:	1366
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-001366-000001

DEL MONTE PLANT #26 (Continued) **S101624280**

Actv Date: Not reported
Capacity: 1
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2126

AJ147 **DEL MONTE-PLANT #26** **HIST UST** **U001598993**
South **400 LANCASTER ST** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.191 mi.
1008 ft. **Site 2 of 3 in cluster AJ**

Relative:
Lower

Actual:
13 ft.

HIST UST:
Region: STATE
Facility ID: 00000001366
Facility Type: Other
Other Type: WAREHOUSE
Total Tanks: 0001
Contact Name: DAVE ROBINSON
Telephone: 4155328696
Owner Name: DEL MONTE CORPORATION
Owner Address: 1 MARKET PLAZA
Owner City,St,Zip: SAN FRANCISCO, CA 94119

Tank Num: 001
Container Num: 001
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

AJ148 **SOUTHERN PACIFIC TRANSPORTATION COMPANY** **SLIC** **S108246081**
South **0 FRUITVALE** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.192 mi.
1012 ft. **Site 3 of 3 in cluster AJ**

Relative:
Lower

Actual:
13 ft.

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 1996-12-11 00:00:00
Global Id: T06019781802
Lead Agency: ALAMEDA COUNTY LOP
Lead Agency Case Number: Not reported
Latitude: 37.790545
Longitude: -122.220082
Case Type: Cleanup Program Site

SOUTHERN PACIFIC TRANSPORTATION COMPANY (Continued) **S108246081**

Case Worker: Not reported
Local Agency: Not reported
RB Case Number: Not reported
File Location: Local Agency
Potential Media Affected: Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern: Diesel
Site History: Not reported

AK149 **ED S RADIATOR SERVICE** **EDR Historical Auto Stations** **1009011131**
East **1014 FRUITVALE AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.194 mi.
1023 ft. **Site 1 of 4 in cluster AK**

Relative:
Higher

Actual:
35 ft.

EDR Historical Auto Stations:
Name: ED S RADIATOR SERVICE
Year: 1967
Type: AUTOMOBILE REPAIRING

AL150 **MELROSE FORD** **Alameda County CS** **S106661152**
ENE **3050 INTERNATIONAL BLVD** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.198 mi.
1045 ft. **Site 1 of 2 in cluster AL**

Relative:
Higher

Actual:
47 ft.

CS:
Status: Case Closed
Record Id: RO0000544
PE: 5602

AI151 **KILPATRICK'S BAKERY INC** **LUST** **S102432220**
NW **2100 LIVINGSTON ST** **Alameda County CS** **N/A**
1/8-1/4 **OAKLAND, CA 94606** **HIST CORTESE**
0.199 mi.
1051 ft. **Site 3 of 3 in cluster AI**

Relative:
Lower

Actual:
14 ft.

LUST:
Region: STATE
Global Id: T0600100796
Latitude: 37.780836
Longitude: -122.239616
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1994-11-23 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0862
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Not reported
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2HSCAWG Fo11/23/1994

KILPATRICK'S BAKERY INC (Continued) **S102432220**

LUST:

Region:	2
Facility Id:	01-0862
Facility Status:	Case Closed
Case Number:	3624
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	Not reported
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	3/8/1991
Preliminary Site Assesment Began:	Not reported
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CS:

Status:	Case Closed
Record Id:	RO0001061
PE:	5602

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0862

152
North
1/8-1/4
0.200 mi.
1058 ft.

PACIFIC BELL **RCRA-SQG 1000251063**
1415 MITCHELL STREET **FINDS CAT080018948**
OAKLAND, CA 94601

Relative:
Higher

Actual:
47 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	PACIFIC BELL
Facility address:	1415 MITCHELL STREET OAKLAND, CA 94601
EPA ID:	CAT080018948
Mailing address:	220 MONTGOMERY STREET RM 1051 SAN FRANCISCO, CA 94104
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

PACIFIC BELL (Continued) **1000251063**

Owner/Operator Summary:
Owner/operator name: THE PACIFIC TEL & TEL COMPANY
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 01/16/1981
Facility name: PACIFIC BELL
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002948348

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and

PACIFIC BELL (Continued) **1000251063**

corrective action activities required under RCRA.

AK153 **STANSBERRY W A** **EDR Historical Auto Stations** **1009014676**
East **1058 FRUITVALE AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.201 mi.
1061 ft. **Site 2 of 4 in cluster AK**

Relative:
Higher

Actual:
36 ft.

EDR Historical Auto Stations:

Name:	MIEHE ERNEST
Year:	1928
Type:	GASOLINE AND OIL SERVICE STATIONS
Name:	STANSBERRY W A
Year:	1933
Type:	GASOLINE AND OIL SERVICE STATIONS

AM154 **BULLOCK M A** **EDR Historical Auto Stations** **1009013796**
North **2550 E 12TH ST** **N/A**
1/8-1/4 **OAKLAND, CA**
0.201 mi.
1062 ft. **Site 1 of 2 in cluster AM**

Relative:
Higher

Actual:
34 ft.

EDR Historical Auto Stations:

Name:	HYSOM G W
Year:	1933
Type:	AUTOMOBILE REPAIRING
Name:	BULLOCK M A
Year:	1943
Type:	AUTOMOBILE REPAIRING

AM155 **DIAMOND DIESEL** **RCRA-SQG** **1000301490**
North **2550 E 12TH ST** **FINDS** **CAD981571359**
1/8-1/4 **OAKLAND, CA 94601** **HAZNET**
0.201 mi.
1062 ft. **Site 2 of 2 in cluster AM**

Relative:
Higher

Actual:
34 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	DIAMOND DIESEL
Facility address:	2550 E 12TH ST OAKLAND, CA 94601
EPA ID:	CAD981571359
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of

DIAMOND DIESEL (Continued) **1000301490**

hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	DIAMOND DISEL
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Historical Generators:

Date form received by agency:	09/30/1986
Facility name:	DIAMOND DIESEL
Classification:	Large Quantity Generator

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002717999

California - Hazardous Waste Tracking System - Datamart

DIAMOND DIESEL (Continued) **1000301490**

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD981571359
Contact:	TERRENCE D MOORE
Telephone:	5105328500
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2550 E 12TH ST
Mailing City,St,Zip:	OAKLAND, CA 946011502
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Not reported
Tons:	0.26
Facility County:	Not reported

Gepaid:	CAD981571359
Contact:	TERRENCE D MOORE
Telephone:	5105328500
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2550 E 12TH ST
Mailing City,St,Zip:	OAKLAND, CA 946011502
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	0.59
Facility County:	Not reported

Gepaid:	CAD981571359
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2550 E 12TH ST
Mailing City,St,Zip:	OAKLAND, CA 946011502
Gen County:	1
TSD EPA ID:	CA0000084517
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Treatment, Tank
Tons:	0.3002
Facility County:	1

Gepaid:	CAD981571359
Contact:	TERRENCE D MOORE
Telephone:	5105328500

DIAMOND DIESEL (Continued) **1000301490**

Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2550 E 12TH ST
Mailing City,St,Zip:	OAKLAND, CA 946011502
Gen County:	Alameda
TSD EPA ID:	CA0000084517
TSD County:	Alameda
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	0.22
Facility County:	1

Gepaid:	CAD981571359
Contact:	TERRENCE D MOORE
Telephone:	5105328500
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2550 E 12TH ST
Mailing City,St,Zip:	OAKLAND, CA 946011502
Gen County:	Alameda
TSD EPA ID:	CA0000084517
TSD County:	Sacramento
Waste Category:	Liquids with halogenated organic compounds > 1000 mg/l
Disposal Method:	Transfer Station
Tons:	0.02
Facility County:	Not reported

Click this hyperlink while viewing on your computer to access
4 additional CA_HAZNET: record(s) in the EDR Site Report.

AK156 **AMERICAN CONTRACTING SERV** **RCRA-SQG** **1000360829**
East **3229 SAN LEANDRO ST** **FINDS** **CAD098317563**
1/8-1/4 **OAKLAND, CA 94601** **HIST UST**
0.208 mi.
1097 ft. **Site 3 of 4 in cluster AK**

Relative:
Higher

Actual:
34 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	AMERICAN CONTRACTING SERV
Facility address:	3229 SAN LEANDRO ST OAKLAND, CA 94601
EPA ID:	CAD098317563
Mailing address:	PO BOX 24081 OAKLAND, CA 94623
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

AMERICAN CONTRACTING SERV (Continued) **1000360829**

Owner/Operator Summary:
Owner/operator name: CORPORATION
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 12/12/1980
Facility name: AMERICAN CONTRACTING SERV
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002665704

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and

AMERICAN CONTRACTING SERV (Continued) **1000360829**

corrective action activities required under RCRA.

HIST UST:

Region:	STATE
Facility ID:	00000018377
Facility Type:	Other
Other Type:	ROOFING CONTRACTOR
Total Tanks:	0002
Contact Name:	MIKE BARTILSON
Telephone:	4155331040
Owner Name:	AMERICAN CONTRACTING SERVICES,
Owner Address:	16519 SO. BROADWAY
Owner City,St,Zip:	GARDENA, CA 90248
Tank Num:	001
Container Num:	1
Year Installed:	1981
Tank Capacity:	00005000
Tank Used for:	PRODUCT
Type of Fuel:	UNLEADED
Tank Construction:	Not reported
Leak Detection:	Stock Inventor
Tank Num:	002
Container Num:	2
Year Installed:	1981
Tank Capacity:	00005000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Tank Construction:	Not reported
Leak Detection:	Stock Inventor

AK157 **AMERICAN CONTRACTING SERV INC** **CA FID UST** **S101580231**
East **3229 SAN LEANDRO ST** **SWEEPS UST** **N/A**
1/8-1/4 **OAKLAND, CA 94623**
0.208 mi.
1097 ft. **Site 4 of 4 in cluster AK**

Relative:
Higher

Actual:
34 ft.

CA FID UST:

Facility ID:	01002140
Regulated By:	UTNKI
Regulated ID:	CAC000690
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	Not reported
Mail To:	Not reported
Mailing Address:	10940 BIGGE ST
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94623
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

AMERICAN CONTRACTING SERV INC (Continued) **S101580231**

SWEEPS UST:

Status:	Not reported
Comp Number:	18377
Number:	Not reported
Board Of Equalization:	44-000240
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-018377-000002
Actv Date:	Not reported
Capacity:	5000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	Not reported

Status:	Not reported
Comp Number:	18377
Number:	Not reported
Board Of Equalization:	44-000240
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-018377-000001
Actv Date:	Not reported
Capacity:	5000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	2

AL158 **MELROSE FORD** **RCRA-SQG** **1000368030**
ENE **3050 E 14TH ST** **FINDS** **CAD055395008**
1/8-1/4 **OAKLAND, CA 94601** **HAZNET**
0.216 mi. **LUST**
1141 ft. **Site 2 of 2 in cluster AL** **CA FID UST**
HIST UST
Relative: **SWEEPS UST**
Higher **HIST CORTESE**

Actual: **47 ft.**

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	MELROSE FORD
Facility address:	3050 E 14TH ST OAKLAND, CA 94601
EPA ID:	CAD055395008
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09

MELROSE FORD (Continued) **1000368030**

Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: MELROSE FORD
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 10/15/1985
Facility name: MELROSE FORD
Classification: Large Quantity Generator

Violation Status: No violations found

Evaluation Action Summary:

MELROSE FORD (Continued) **1000368030**

Evaluation date: 08/25/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002650319

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD055395008
Contact: C. J. DI BARI (FACSIMILE EXTEN
Telephone: 5105348520
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3050 INTERNATIONAL BLVD
Mailing City,St,Zip: OAKLAND, CA 946012223
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Not reported
Tons: .4170
Facility County: 1

Gepaid: CAD055395008
Contact: C. J. DI BARI (FACSIMILE EXTEN
Telephone: 5105348520
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3050 INTERNATIONAL BLVD
Mailing City,St,Zip: OAKLAND, CA 946012223
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Tons: .8757
Facility County: 1

Gepaid: CAD055395008
Contact: C. J. DI BARI (FACSIMILE EXTEN
Telephone: 5105348520
Facility Addr2: Not reported
Mailing Name: Not reported

MELROSE FORD (Continued) **1000368030**

Mailing Address: 3050 INTERNATIONAL BLVD
Mailing City,St,Zip: OAKLAND, CA 946012223
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Tons: .6503
Facility County: 1

Gepaid: CAD055395008
Contact: C. J. DI BARI (FACSIMILE EXTEN
Telephone: 5105348520
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3050 INTERNATIONAL BLVD
Mailing City,St,Zip: OAKLAND, CA 946012223
Gen County: 1
TSD EPA ID: CAD982446874
TSD County: Yolo
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .6672
Facility County: 1

Gepaid: CAD055395008
Contact: C. J. DI BARI (FACSIMILE EXTEN
Telephone: 5105348520
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 3050 INTERNATIONAL BLVD
Mailing City,St,Zip: OAKLAND, CA 946012223
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Tons: 1.8343
Facility County: 1

Click this hyperlink while viewing on your computer to access
28 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600100883
Latitude: 37.778246
Longitude: -122.225956
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-12-19 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0959
LOC Case Number: Not reported
File Location: Local Agency

MELROSE FORD (Continued) **1000368030**

Potential Media Affect: Not reported
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAW Ho03/01/1999

LUST:
Region: 2
Facility Id: 01-0959
Facility Status: Case Closed
Case Number: 13
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 4/30/1991
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01002076
Regulated By: UTNKI
Regulated ID: 00001216
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155348520
Mail To: Not reported
Mailing Address: 3050 E 014TH ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

HIST UST:
Region: STATE
Facility ID: 00000001216
Facility Type: Other
Other Type: AUTO DEALER
Total Tanks: 0002
Contact Name: Not reported
Telephone: 4155348520
Owner Name: MELROSE FORD
Owner Address: 3050 EAST 14TH STREET
Owner City,St,Zip: OAKLAND, CA 94601

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000500

MELROSE FORD (Continued) **1000368030**

Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: None

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00000500
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None

SWEEPS UST:
Status: Not reported
Comp Number: 1216
Number: Not reported
Board Of Equalization: 44-000016
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-001216-000001
Actv Date: Not reported
Capacity: 500
Tank Use: OIL
Stg: WASTE
Content: WASTE OIL
Number Of Tanks: 2

Status: Not reported
Comp Number: 1216
Number: Not reported
Board Of Equalization: 44-000016
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-001216-000002
Actv Date: Not reported
Capacity: 500
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: REG UNLEADED
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0959

159 **ACKER & GUERRERO ROOF COMPANY** **UST** **U003911885**
North **1092 CALCOT PL** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.219 mi.
1158 ft.

Relative:
Lower

Actual:
21 ft.

UST:
Global ID: 4126
Latitude: 37.78153
Longitude: -122.23769

AN160 **ST JOSEPH PROFESSIONAL CENTER** **LUST** **S103890923**
North **2647 14TH ST E** **HIST CORTESE** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.220 mi.
1163 ft. **Site 1 of 3 in cluster AN**

Relative:
Higher

Actual:
40 ft.

LUST:
Region: STATE
Global Id: T0600102014
Latitude: 37.780959
Longitude: -122.232182
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1997-05-08 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2192
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel
Site History: LUFT Con. LC 23HSC 05/09/1997

LUST:
Region: 2
Facility Id: 01-2192
Facility Status: Case Closed
Case Number: 5577
How Discovered: OM
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2192

AN161 **OAKLAND DENTAL ASSOCIATES** **HAZNET** **S104581481**
North **2647 INTERNATIONAL BLVD 402** **Alameda County CS** **N/A**
1/8-1/4 **OAKLAND, CA 94601**
0.220 mi.
1163 ft. **Site 2 of 3 in cluster AN**

Relative:
Higher

Actual:
40 ft.

HAZNET:

Gepaid:	CAL000188376
Contact:	FARHAD PARTOVI\\ OWNER
Telephone:	5105328995
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2647 INTERNATIONAL BLVD 402
Mailing City,St,Zip:	OAKLAND, CA 946010000
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Santa Clara
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Tons:	0.12
Facility County:	Not reported

Gepaid:	CAL000188376
Contact:	FARHAD PARTOVI\\\\ OWNER
Telephone:	5105328995
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2647 INTERNATIONAL BLVD 402
Mailing City,St,Zip:	OAKLAND, CA 946010000
Gen County:	Alameda
TSD EPA ID:	CAD003963592
TSD County:	Santa Clara
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	H010
Tons:	0.12
Facility County:	Alameda

Gepaid:	CAL000188376
Contact:	FARHAD PARTOVI
Telephone:	5105328995
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2647 INTERNATIONAL BLVD 402
Mailing City,St,Zip:	OAKLAND, CA 946010000
Gen County:	1
TSD EPA ID:	CAD003963592
TSD County:	Santa Clara
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Tons:	0.1668
Facility County:	1

Gepaid:	CAL000188376
Contact:	FARHAD PARTOVI\\ OWNER
Telephone:	5105328995
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2647 INTERNATIONAL BLVD 402
Mailing City,St,Zip:	OAKLAND, CA 946010000

OAKLAND DENTAL ASSOCIATES (Continued) **S104581481**

Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Santa Clara
Waste Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Tons: 0.12
Facility County: Not reported

Gepaid: CAL000188376
Contact: FARHAD PARTOVI
Telephone: 5105328995
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2647 INTERNATIONAL BLVD 402
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: 1
TSD EPA ID: CAD003963592
TSD County: Santa Clara
Waste Category: Photochemicals/photoprocessing waste
Disposal Method: Recycler
Tons: .1042
Facility County: 1

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

CS:
Status: Case Closed
Record Id: RO0000687
PE: 5602

162
South
1/8-1/4
0.222 mi.
1173 ft.

U C HOUSEHOLD SHIPPING CO **FINDS** **1000118205**
333 LANCASTER ST **RCRA-NonGen** **CAD981692122**
OAKLAND, CA 94601

Relative:
Lower

Actual:
9 ft.

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002754939

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

RCRA-NonGen:
Date form received by agency: 10/14/1986
Facility name: U C HOUSEHOLD SHIPPING CO
Facility address: 333 LANCASTER ST
OAKLAND, CA 94601
EPA ID: CAD981692122
Mailing address: LANCASTER ST

U C HOUSEHOLD SHIPPING CO (Continued) **1000118205**

OAKLAND, CA 94601
Contact: ENVIRONMENTAL MANAGER
Contact address: 333 LANCASTER ST
OAKLAND, CA 94601
Contact country: US
Contact telephone: (415) 436-8944
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: GLOBAL MOVING SERVICES
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

AN163 **OAKLAND HOSPITAL** **RCRA-SQG** **1000277313**
North **2648 E 14TH ST** **FINDS** **CAD079076261**
1/8-1/4 **OAKLAND, CA 94601** **HAZNET**
0.225 mi. **SWEEPS UST**
1189 ft. **Site 3 of 3 in cluster AN**

Relative:
Higher

Actual:
42 ft.

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	OAKLAND HOSPITAL
Facility address:	2648 E 14TH ST OAKLAND, CA 94601
EPA ID:	CAD079076261
Mailing address:	E 14TH ST OAKLAND, CA 94601
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	PARACELSUS HOSPITAL CORP
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown

OAKLAND HOSPITAL (Continued) **1000277313**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002659711

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD079076261
Contact: Not reported
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2648 E 14TH ST
Mailing City,St,Zip: OAKLAND, CA 946010000
Gen County: 1
TSD EPA ID: CAD009466392
TSD County: 7
Waste Category: Other empty containers 30 gallons or more
Disposal Method: Not reported
Tons: .1800
Facility County: 1

SWEEPS UST:
Status: Not reported
Comp Number: 4699
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-004699-000001
Actv Date: Not reported
Capacity: 1000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: DIESEL
Number Of Tanks: 1

164
East
1/8-1/4
0.225 mi.
1190 ft.

THOMPSON W B
1203 FRUITVALE AVE
OAKLAND, CA

EDR Historical Auto Stations

1009014396
N/A

Relative:
Higher

Actual:
40 ft.

EDR Historical Auto Stations:
Name: THOMPSON W B
Year: 1933
Type: GASOLINE AND OIL SERVICE STATIONS

AO165
SSW
1/8-1/4
0.230 mi.
1216 ft.

ALLIED ENGINEERING CORPORATION
2421 BLANDING
ALAMEDA, CA 94501
Site 1 of 5 in cluster AO

LUST

S108240548
N/A

Relative:
Lower

Actual:
11 ft.

LUST:
Region: STATE
Global Id: T06019716048
Latitude: 37.770408
Longitude: -122.236409
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 2004-01-16 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
LOC Case Number: RO0002601
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: Not reported

AO166
SSW
1/8-1/4
0.230 mi.
1216 ft.

ALAMEDA ELECTRIC
2420 BLANDING AVE
ALAMEDA, CA 94501
Site 2 of 5 in cluster AO

LUST
CA FID UST
Alameda County CS
SWEEPS UST
HIST CORTESE

S101580213
N/A

Relative:
Lower

Actual:
11 ft.

LUST:
Region: STATE
Global Id: T0600100273
Latitude: 37.7699
Longitude: -122.2354
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1993-06-02 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0294
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3H Ce

ALAMEDA ELECTRIC (Continued) **S101580213**

LUST:
Region: 2
Facility Id: 01-0294
Facility Status: Case Closed
Case Number: 4392
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 12/16/1992
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01001986
Regulated By: UTNKI
Regulated ID: Not reported
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 5105236933
Mail To: Not reported
Mailing Address: 25823 CLAWITER
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

CS:
Status: Case Closed
Record Id: RO0000918
PE: 5602

SWEEPS UST:
Status: Not reported
Comp Number: 89882
Number: Not reported
Board Of Equalization: 44-034239
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-089882-000001
Actv Date: Not reported
Capacity: 500
Tank Use: PETROLEUM

ALAMEDA ELECTRIC (Continued) **S101580213**

Stg: PRODUCT
Content: UNKNOWN
Number Of Tanks: 2

Status: Not reported
Comp Number: 89882
Number: Not reported
Board Of Equalization: 44-034239
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-089882-000002
Actv Date: Not reported
Capacity: 500
Tank Use: PETROLEUM
Stg: PRODUCT
Content: UNKNOWN
Number Of Tanks: 2

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0294

AO167 **ALLIED ENGINEERING PRODUCT CORP** **HAZNET** **S100929246**
SSW **2421 BLANDING AVE** **SLIC** **N/A**
1/8-1/4 **ALAMEDA, CA** **Alameda County CS**
0.230 mi.
1216 ft. **Site 3 of 5 in cluster AO**

Relative:
Lower

Actual:
11 ft.

HAZNET:
Gepaid: CAD981452543
Contact: ROBERT E MILLER
Telephone: 5105221500
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1230
Mailing City,St,Zip: ALAMEDA, CA 945010134
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 1.6888
Facility County: 1

Gepaid: CAD981452543
Contact: CHRISTINE SIMONINI
Telephone: 5105221500
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1230
Mailing City,St,Zip: ALAMEDA, CA 945010134
Gen County: Alameda

ALLIED ENGINEERING PRODUCT CORP (Continued) **S100929246**

TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Unspecified solvent mixture Waste
Disposal Method: Transfer Station
Tons: 0.45
Facility County: Not reported

Gepaid: CAD981452543
Contact: ROBERT E MILLER
Telephone: 5105221500
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1230
Mailing City,St,Zip: ALAMEDA, CA 945010134
Gen County: 1
TSD EPA ID: CAT080031628
TSD County: Kern
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: .7089
Facility County: 1

Gepaid: CAD981452543
Contact: ROBERT E MILLER
Telephone: 5105221500
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1230
Mailing City,St,Zip: ALAMEDA, CA 945010134
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified oil-containing waste
Disposal Method: Not reported
Tons: 1.1467
Facility County: 1

Click this hyperlink while viewing on your computer to access
-1 additional CA_HAZNET: record(s) in the EDR Site Report.

SLIC:
Region: STATE
Facility Status: Open - Inactive
Status Date: 2009-06-04 00:00:00
Global Id: SLT2O00313
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.7601126823019
Longitude: -122.255990851793
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: SLT2O00313
File Location: Not reported
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

ALLIED ENGINEERING PRODUCT CORP (Continued) **S100929246**

SLIC:
Region: 2
Facility ID: SLT2O00313
Facility Status: Leak being confirmed
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Pollution Characterization
Record Id: RO0002601
PE: 5602

Status: Leak being confirmed
Record Id: RO0002601
PE: 5602

AO168 **DOLORES STAUNDENRAUS** **LUST** **S103472146**
SSW **2424 BLANDING AVE** **Alameda County CS** **N/A**
1/8-1/4 **ALAMEDA, CA 94501** **HIST CORTESE**
0.231 mi.
1218 ft. **Site 4 of 5 in cluster AO**

Relative:
Lower

Actual:
11 ft.

LUST:
Region: STATE
Global Id: T0600101993
Latitude: 37.770187
Longitude: -122.23682
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-10-29 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2169
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 0HSCA 10/29/1996

LUST:
Region: 2
Facility Id: 01-2169
Facility Status: Case Closed
Case Number: 4570
How Discovered: Tank Closure

DOLORES STAUNDENRAUS (Continued) **S103472146**

Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 9/24/1996
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Case Closed
Record Id: RO0000671
PE: 5602

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2169

AP169 **BYTECH CHEMICAL CORPORATION** **HIST UST** **U001599112**
WNW **1905 DENNISON ST** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.231 mi.
1222 ft. **Site 1 of 8 in cluster AP**

Relative:
Lower

Actual:
9 ft.

HIST UST:
Region: STATE
Facility ID: 00000068705
Facility Type: Other
Other Type: CHEMICAL CORP.
Total Tanks: 0005
Contact Name: Not reported
Telephone: 4155340350
Owner Name: WAREHOUSE INVESTMENT COMPANY
Owner Address: 1991 DENNISON STREET
Owner City,St,Zip: OAKLAND, CA 94606

Tank Num: 001
Container Num: 1
Year Installed: 1963
Tank Capacity: 00000000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Unkown centimeters
Leak Detection: None

Tank Num: 001
Container Num: 1
Year Installed: 1963
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: None

BYTECH CHEMICAL CORPORATION (Continued) **U001599112**

Tank Num:	002
Container Num:	3
Year Installed:	1963
Tank Capacity:	00000000
Tank Used for:	PRODUCT
Type of Fuel:	Not reported
Tank Construction:	Not reported
Leak Detection:	None

Tank Num:	003
Container Num:	3
Year Installed:	1963
Tank Capacity:	00000000
Tank Used for:	PRODUCT
Type of Fuel:	Not reported
Tank Construction:	Not reported
Leak Detection:	None

Tank Num:	004
Container Num:	4
Year Installed:	1963
Tank Capacity:	00000000
Tank Used for:	PRODUCT
Type of Fuel:	Not reported
Tank Construction:	Not reported
Leak Detection:	None

Tank Num:	005
Container Num:	5
Year Installed:	1963
Tank Capacity:	00000000
Tank Used for:	PRODUCT
Type of Fuel:	Not reported
Tank Construction:	Not reported
Leak Detection:	None

AP170 **BYTECH CHEMICAL CORPORATION** **CA FID UST** **1000591001**
WNW **1905 DENNISON ST** **SWEEPS UST** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.231 mi.
1222 ft. **Site 2 of 8 in cluster AP**

Relative:
Lower

Actual:
9 ft.

CA FID UST:

Facility ID:	01001921
Regulated By:	UTNKI
Regulated ID:	00068705
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155340350
Mail To:	Not reported
Mailing Address:	P O BOX
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94606
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported

BYTECH CHEMICAL CORPORATION (Continued) **1000591001**

Comments: Not reported
Status: Inactive

SWEEPS UST:
Status: Not reported
Comp Number: 68705
Number: Not reported
Board Of Equalization: 44-000776
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068705-000001
Actv Date: Not reported
Capacity: 1
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: 6

Status: Not reported
Comp Number: 68705
Number: Not reported
Board Of Equalization: 44-000776
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068705-000002
Actv Date: Not reported
Capacity: 1
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: Not reported

Status: Not reported
Comp Number: 68705
Number: Not reported
Board Of Equalization: 44-000776
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068705-000003
Actv Date: Not reported
Capacity: 1
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: Not reported

Status: Not reported
Comp Number: 68705

BYTECH CHEMICAL CORPORATION (Continued) **1000591001**

Number: Not reported
Board Of Equalization: 44-000776
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068705-000004
Actv Date: Not reported
Capacity: 1
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: Not reported

Status: Not reported
Comp Number: 68705
Number: Not reported
Board Of Equalization: 44-000776
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068705-000005
Actv Date: Not reported
Capacity: 1
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: Not reported

Status: Not reported
Comp Number: 68705
Number: Not reported
Board Of Equalization: 44-000776
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-068705-000006
Actv Date: Not reported
Capacity: 1000
Tank Use: UNKNOWN
Stg: PRODUCT
Content: Not reported
Number Of Tanks: Not reported

AP171 **BYTECH CHEMICAL** **SLIC** **U001599111**
WNW **1905 DENNISON ST** **HIST UST** **N/A**
1/8-1/4 **OAKLAND, CA 94606**
0.231 mi.
1222 ft. **Site 3 of 8 in cluster AP**

Relative:
Lower

Actual:
9 ft.

SLIC:

Region:	STATE
Facility Status:	**Open - Inactive**
Status Date:	2009-06-02 00:00:00
Global Id:	T0600191487
Lead Agency:	SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number:	Not reported
Latitude:	37.779013
Longitude:	-122.243082
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01S0073
File Location:	Not reported
Potential Media Affected:	Under Investigation
Potential Contaminants of Concern:	* Solvents
Site History:	Not reported

SLIC:

Region:	2
Facility ID:	01S0073
Facility Status:	Leak being confirmed
Date Closed:	Not reported
Local Case #:	Not reported
How Discovered:	Tank Closure
Leak Cause:	UNK
Leak Source:	UNK
Date Confirmed:	7/13/1987
Date Prelim Site Assmnt Workplan Submitted:	Not reported
Date Preliminary Site Assessment Began:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

HIST UST:

Region:	STATE
Facility ID:	00000068758
Facility Type:	Other
Other Type:	MANUFACTURER
Total Tanks:	0006
Contact Name:	Not reported
Telephone:	4155351700
Owner Name:	ROCHESTER MIDLAND
Owner Address:	333 HOLLENBECK STREET
Owner City,St,Zip:	ROCHESTER, NY 14621
Tank Num:	001
Container Num:	1
Year Installed:	1966
Tank Capacity:	00000500
Tank Used for:	WASTE

BYTECH CHEMICAL (Continued) **U001599111**

Type of Fuel: 2
Tank Construction: Unkown inches
Leak Detection: None

Tank Num: 002
Container Num: 2
Year Installed: 1966
Tank Capacity: 00000500
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

Tank Num: 003
Container Num: 3
Year Installed: 1966
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: None

Tank Num: 004
Container Num: 4
Year Installed: 1966
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: None

Tank Num: 005
Container Num: 5
Year Installed: 1966
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: None

Tank Num: 006
Container Num: 6
Year Installed: 1966
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: None

AO172 **NATIONAL LAUNDRY** **EDR Historical Cleaners** **1009140318**
SSW **2431 BLANDING AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.231 mi.
1222 ft. **Site 5 of 5 in cluster AO**

Relative:
Lower

Actual:
11 ft.

EDR Historical Cleaners:
Name: NATIONAL LAUNDRY
Year: 1925
Type: LAUNDRIES

AP173 **PORT OF OAKLAND - EMBARCADERO COVE** **Cortese** **S100833252**
WNW **DENNISON AND EMBARCADERO STREET** **CA BOND EXP. PLAN** **N/A**
1/8-1/4 **OAKLAND, CA 94606** **RESPONSE**
0.238 mi. **DEED**
1256 ft. **Site 4 of 8 in cluster AP** **ENVIROSTOR**
HIST Cal-Sites
HIST CORTESE

Relative:
Lower

Actual:
9 ft.

Cortese:
Region: CORTESE
Envirostor Id: 1510021
Site/Facility Type: STATE RESPONSE
Cleanup Status: CERTIFIED / OPERATION & MAINTENANCE - LAND USE RESTRICTIONS
Status Date: 3/28/1997
Site Code: 200083
Latitude: 37.779773895582302
Longitude: -122.243244444444

CA BOND EXP. PLAN:
Reponsible Party: RESPONSIBLE PARTY-LEAD SITE CLEANUP WORKPLAN
Project Revenue Source Company: Not reported
Project Revenue Source Addr: Not reported
Project Revenue Source City,St,Zip: Not reported
Project Revenue Source Desc: The Port of Oakland owns the site and is in compliance with an order issued by DHS. Monsanto Company has also been identified as a potentially responsible party by DHS. DHS has budgeted $50,000 for oversight/monitoring of cleanup efforts. DHS will recover 100 percent of direct costs plus staff costs and overhead related to the project. The responsible parties will pay all costs associated with remedial investigations and cleanup activities.
Site Description: The site is located on Embarcadero Street at the foot of Dennison Street in Oakland. For 60 to 70 years, the 1.3 acre site was leased to industrial tenants, including oil companies and formulators of pesticides and wood preservatives. It is now a vacant lot.
Hazardous Waste Desc: Pentachlorophenol (PCP), organochlorine pesticides and solvents have been discovered in soil and ground water at this site. About 8,000 cubic yards of soil and an unknown amount of ground water is contaminated. Dioxins and furans, impurities of PCP,have been found in low levels in soil and ground water.
Threat To Public Health & Env: Residential, industrial, commercial, recreational and military areas are adjacent to the site. The population within a three-mile radius is estimated at 215,331 persons. PCP was not detected in shoreline sediment samples or at the box culvert outletin the Bay at Dennison Street. The closest domestic well is about three-quarters of a mile away.
Site Activity Status: The final phase of remedial investigation is being conducted. Upon completion of that work, the feasibility study and RAP will be prepared.

RESPONSE:
Facility ID: 01510021
Site Type: State Response

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Site Type Detail:	State Response or NPL
Acres:	1.3
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	JAYANTHA RANDENI
Supervisor:	Karen Toth
Division Branch:	Berkeley
Site Code:	200083
Assembly:	16
Senate:	09
Special Program Status:	* RCRA 3012 - Past Haz Waste Disp Inven Site
Status:	Certified / Operation & Maintenance
Status Date:	1997-03-28 00:00:00
Restricted Use:	YES
Funding:	Responsible Party
Latitude:	37.7797738955823
Longitude:	-122.243244444444
Alias Name:	00-500-001-00
Alias Type:	APN
Alias Name:	01510021
Alias Type:	Envirostor ID Number
Alias Name:	200083
Alias Type:	Project Code (Site Code)
Alias Name:	110033612062
Alias Type:	EPA (FRS #)
Alias Name:	P21050
Alias Type:	PCode
Alias Name:	CAD980638670
Alias Type:	EPA Identification Number

APN:	00-500-001-00
APN Description:	Not reported
Comments:	Recommended cleanup includes, installation of a cap over the contaminated area, installation of HDPE cutoff wall around the site boundary to isolate groundwater, operation of well skimmer to remove free petroleum products, deed restriction, site andNo major problems were noted. Follow-up on missing decorative rocks which are used for erosion control and ponding outside of the fence area will need to take place.Completed Site Screening requiring additional information on site chemicals.This report was prepared to study the variability in dioxin concentrations over the second five year review period. The sample preparation method for the analysis of dioxin was changed in 2001 and over the last several years dioxin concentrations haCompleted Five-Year Review. Soil and groundwater continue to be protective of human health and environment. Groundwater results have either become stable or decreased.Approved O&M Plan. An Operation and Maintenance Plan was approved for the cap, barrier wall and groundwater monitoring system at the site.Completed Remedial Action. Approval of Implementation Report. The final remedial action required the installation of the following: a geosynthetic clay liner and high density barrier around the perimeter of the site; a multimedia cap over 1.3 acreFinal design documents for remedial action approved. The final remedy required a multimedia cap, a high-density polyethylene cutoff wall around the entire boundary and a well skimmer to remove petroleum product.Order amended to include

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Operations and Maintenance of the Site.Recorded Deed Restriction to ensure its commercial, industrial use and to protect the remedial system.Certified Site.Negative Declaration and Remedial Action Plan approved.Dept. of Health Services issued a Remedial Action Order to Port of Oakland, Embarcadero Cove, to investigate and clean up the soil and groundwater contamination at the site.Site Discovery.Completed PA. As part of site invetigation, pentachlorophenol (PCP), organochlorine pesticides and solvents were discovered in soil and groundwater.Agreement was amendment to include submittals in electronic format.The cap was observed to be in good condition. A section of fence was damaged.PCP and tetrachlorophenol (TeCP), pesticides, dioxins and furans were detected in soils and groundwater.A temporary chip seal was constructed over the site surface contaminated with PCP until implementation of the final remedial action.Results of chemical analyses of groundwater samples collected during this reporting period show that concentrations remain within historical ranges.DTSC concludes that site remain protective of human health and environment.Dioxin data shows variability due to change in analytical procedure for dioxin. Submittal of an addendum to the Five-Year Review Report with the reassessed dioxin data is required.Groundwater contamination appears to be consistent with historic ranges. Cap in in good condition. Damaged permineter fence has been repaired.Groundwater contamination appears to be consistent with historic ranges.Fence repair was completed.s; and a skimming program to remove free petroleum hydrocarbons products. Construction was initiated in July 1995 and was completed in December 1995.ve increased or fluctuated significantly in some wells. This report documents that the variability of dioxin concentration was related the change in the analytical procedure.groundwater use restrictions, and periodic groundwater monitoring.

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	5 Year Review Reports
Completed Date:	2001-10-19 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Operations and Maintenance Plan
Completed Date:	1997-01-29 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Remedial Action Completion Report
Completed Date:	1996-06-10 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Design/Implementation Workplan
Completed Date:	1995-04-03 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Operation & Maintenance Order/Agreement
Completed Date:	1997-03-07 00:00:00

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction
Completed Date: 1997-02-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 1997-03-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Initial Study/ Neg. Declaration
Completed Date: 1994-06-29 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Unilateral Order (I/SE, RAO, CAO, EPA AO)
Completed Date: 1987-07-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 1981-07-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fence & Post Order
Completed Date: 1985-02-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction Monitoring Report
Completed Date: 2007-03-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Amendment - Order/Agreement
Completed Date: 2006-09-12 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2008-04-25 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2009-04-14 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 1989-05-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Completed Document Type: Removal Action Completion Report
Completed Date: 1990-04-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operations and Maintenance Report
Completed Date: 2005-11-22 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Other Report
Completed Date: 2006-03-06 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: 5 Year Review Reports
Completed Date: 2006-11-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Long Term Monitoring Report
Completed Date: 2007-12-17 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Long Term Monitoring Report
Completed Date: 2008-08-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Other Report
Completed Date: 2008-06-04 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: 5 Year Review Reports
Completed Date: 2008-08-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Plan
Completed Date: 1994-06-29 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Screening
Completed Date: 1987-04-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Assessment Report
Completed Date: 1984-02-21 00:00:00

Confirmed: 30003,30004,30006,30008,30009,30537,30018,30024,30025,30032,30207,3026
,30448
Confirmed Description: Benzene
Confirmed Description: Chlordane

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Confirmed Description:	DDD
Confirmed Description:	DDT
Confirmed Description:	Dioxin (as 2,3,7,8-TCDD TEQ)
Confirmed Description:	2,3,4,6-Tetrachlorophenol
Confirmed Description:	Polychlorinated biphenyls (PCBs)
Confirmed Description:	TPH-diesel
Confirmed Description:	TPH-gas
Confirmed Description:	Acetone
Confirmed Description:	Dieldrin
Confirmed Description:	Endosulfan
Confirmed Description:	Pentachlorophenol
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	Public Notice
Future Due Date:	2012
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	5 Year Review Reports
Future Due Date:	2012
Media Affected:	30003, 30004, 30006, 30008, 30009, 30018, 30024, 30025, 30032, 30207, 30261, 30448, 30537
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported

Management:

Management Required:	REM, DAY, ELD, HOS, LUC, MON, EX, GW, OIL, NUSE, FOOD, COV, RES
Management Required Desc:	Activities prohibited which disturb the remedy and monitoring systems without approval
Management Required Desc:	Day care center prohibited
Management Required Desc:	Elder Care Center Prohibited
Management Required Desc:	Hospital use prohibited
Management Required Desc:	Land Use covenant
Management Required Desc:	Maintain monitoring of Groundwater
Management Required Desc:	No Excavation or activities which disturb the soil at any depth without approval
Management Required Desc:	No groundwater extraction at any depth without approval
Management Required Desc:	No oil or gas extraction at any depth
Management Required Desc:	Notify prior to change in land use
Management Required Desc:	Raising of food prohibited
Management Required Desc:	Requires surface covers
Management Required Desc:	Residence use prohibited
Potential:	OTH, SOIL
Potenital Description:	Not reported
Potenital Description:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Schedule Revised Date: Not reported
PastUse: MANUFACTURING - LUMBER/WOOD PRODUCTS, PESTICIDE/INSECTIDE/RODENTICIDE STORAGE

DEED:
Area: PROJECT WIDE
Sub Area: Not reported
Site Type: STATE RESPONSE
Status: CERTIFIED / OPERATION & MAINTENANCE
Deed Date(s): 2/13/1997

ENVIROSTOR:
Site Type: State Response
Site Type Detailed: State Response or NPL
Acres: 1.3
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: JAYANTHA RANDENI
Supervisor: Karen Toth
Division Branch: Berkeley
Facility ID: 01510021
Site Code: 200083
Assembly: 16
Senate: 09
Special Program: * RCRA 3012 - Past Haz Waste Disp Inven Site
Status: Certified / Operation & Maintenance
Status Date: 1997-03-28 00:00:00
Restricted Use: YES
Funding: Responsible Party
Latitude: 37.7797738955823
Longitude: -122.243244444444
Alias Name: 00-500-001-00
Alias Type: APN
Alias Name: 01510021
Alias Type: Envirostor ID Number
Alias Name: 200083
Alias Type: Project Code (Site Code)
Alias Name: 110033612062
Alias Type: EPA (FRS #)
Alias Name: P21050
Alias Type: PCode
Alias Name: CAD980638670
Alias Type: EPA Identification Number

APN: 00-500-001-00
APN Description: Not reported
Comments: Recommended cleanup includes, installation of a cap over the contaminated area, installation of HDPE cutoff wall around the site boundary to isolate groundwater, operation of well skimmer to remove free petroleum products, deed restriction, site andNo major problems were noted. Follow-up on missing decorative rocks which are used for erosion control and ponding outside of the fence area will need to take place.Completed Site Screening requiring additional information on site chemicals.This report was prepared to study the variability in dioxin concentrations over the second five year review period. The

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

sample preparation method for the analysis of dioxin was changed in 2001 and over the last several years dioxin concentrations haCompleted Five-Year Review. Soil and groundwater continue to be protective of human health and environment. Groundwater results have either become stable or decreased.Approved O&M Plan. An Operation and Maintenance Plan was approved for the cap, barrier wall and groundwater monitoring system at the site.Completed Remedial Action. Approval of Implementation Report. The final remedial action required the installation of the following: a geosynthetic clay liner and high density barrier around the perimeter of the site; a multimedia cap over 1.3 acreFinal design documents for remedial action approved. The final remedy required a multimedia cap, a high-density polyethylene cutoff wall around the entire boundary and a well skimmer to remove petroleum product.Order amended to include Operations and Maintenance of the Site.Recorded Deed Restriction to ensure its commercial, industrial use and to protect the remedial system.Certified Site.Negative Declaration and Remedial Action Plan approved.Dept. of Health Services issued a Remedial Action Order to Port of Oakland, Embarcadero Cove, to investigate and clean up the soil and groundwater contamination at the site.Site Discovery.Completed PA. As part of site invetigation, pentachlorophenol (PCP), organochlorine pesticides and solvents were discovered in soil and groundwater.Agreement was amendment to include submittals in electronic format.The cap was observed to be in good condition. A section of fence was damaged.PCP and tetrachlorophenol (TeCP), pesticides, dioxins and furans were detected in soils and groundwater.A temporary chip seal was constructed over the site surface contaminated with PCP until implementation of the final remedial action.Results of chemical analyses of groundwater samples collected during this reporting period show that concentrations remain within historical ranges.DTSC concludes that site remain protective of human health and environment.Dioxin data shows variability due to change in analytical procedure for dioxin. Submittal of an addendum to the Five-Year Review Report with the reassessed dioxin data is required.Groundwater contamination appears to be consistent with historic ranges. Cap in in good condition. Damaged permineter fence has been repaired.Groundwater contamination appears to be consistent with historic ranges.Fence repair was completed.s; and a skimming program to remove free petroleum hydrocarbons products. Construction was initiated in July 1995 and was completed in December 1995.ve increased or fluctuated significantly in some wells. This report documents that the variability of dioxin concentration was related the change in the analytical procedure.groundwater use restrictions, and periodic groundwater monitoring.

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	5 Year Review Reports
Completed Date:	2001-10-19 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Operations and Maintenance Plan
Completed Date:	1997-01-29 00:00:00
Completed Area Name:	PROJECT WIDE

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Completion Report
Completed Date: 1996-06-10 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Design/Implementation Workplan
Completed Date: 1995-04-03 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operation & Maintenance Order/Agreement
Completed Date: 1997-03-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction
Completed Date: 1997-02-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 1997-03-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Initial Study/ Neg. Declaration
Completed Date: 1994-06-29 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Unilateral Order (I/SE, RAO, CAO, EPA AO)
Completed Date: 1987-07-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 1981-07-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fence & Post Order
Completed Date: 1985-02-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction Monitoring Report
Completed Date: 2007-03-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Amendment - Order/Agreement
Completed Date: 2006-09-12 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit

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Completed Date: 2008-04-25 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2009-04-14 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 1989-05-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 1990-04-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operations and Maintenance Report
Completed Date: 2005-11-22 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Other Report
Completed Date: 2006-03-06 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: 5 Year Review Reports
Completed Date: 2006-11-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Long Term Monitoring Report
Completed Date: 2007-12-17 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Long Term Monitoring Report
Completed Date: 2008-08-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Other Report
Completed Date: 2008-06-04 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: 5 Year Review Reports
Completed Date: 2008-08-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Plan
Completed Date: 1994-06-29 00:00:00

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Site Screening
Completed Date:	1987-04-13 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Assessment Report
Completed Date:	1984-02-21 00:00:00
Confirmed:	30003,30004,30006,30008,30009,30537,30018,30024,30025,30032,30207,3026 ,30448
Confirmed Description:	Benzene
Confirmed Description:	Chlordane
Confirmed Description:	DDD
Confirmed Description:	DDT
Confirmed Description:	Dioxin (as 2,3,7,8-TCDD TEQ)
Confirmed Description:	2,3,4,6-Tetrachlorophenol
Confirmed Description:	Polychlorinated biphenyls (PCBs)
Confirmed Description:	TPH-diesel
Confirmed Description:	TPH-gas
Confirmed Description:	Acetone
Confirmed Description:	Dieldrin
Confirmed Description:	Endosulfan
Confirmed Description:	Pentachlorophenol
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	Public Notice
Future Due Date:	2012
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	5 Year Review Reports
Future Due Date:	2012
Media Affected:	30003, 30004, 30006, 30008, 30009, 30018, 30024, 30025, 30032, 30207, 30261, 30448, 30537
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported

Management:

Management Required:	REM, DAY, ELD, HOS, LUC, MON, EX, GW, OIL, NUSE, FOOD, COV, RES
Management Required Desc:	Activities prohibited which disturb the remedy and monitoring systems without approval
Management Required Desc:	Day care center prohibited
Management Required Desc:	Elder Care Center Prohibited
Management Required Desc:	Hospital use prohibited
Management Required Desc:	Land Use covenant
Management Required Desc:	Maintain monitoring of Groundwater

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Management Required Desc: No Excavation or activities which disturb the soil at any depth without approval
Management Required Desc: No groundwater extraction at any depth without approval
Management Required Desc: No oil or gas extraction at any depth
Management Required Desc: Notify prior to change in land use
Management Required Desc: Raising of food prohibited
Management Required Desc: Requires surface covers
Management Required Desc: Residence use prohibited
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MANUFACTURING - LUMBER/WOOD PRODUCTS, PESTICIDE/INSECTIDE/RODENTICIDE STORAGE

HISTORICAL CAL-SITES:
Facility ID: 01510021
Region: 2
Region Name: BERKELEY
Branch: NC
Branch Name: NORTH COAST
File Name: Not reported
State Senate District: 03281997
Status: COM - CERTIFIED OPERATION AND MAINTENANCE, ALL PLANNED ACTIVITIES IMPLEMENTED REMEDIATION CONTINUES
Status Name: CERTIFIED / OPERATION & MAINTENANCE
Lead Agency: DTSC
Lead Agency: DEPT OF TOXIC SUBSTANCES CONTROL
Facility Type: RP
Type Name: RESPONSIBLE PARTY
NPL: Not Listed
SIC Code: 51
SIC Name: WHOLESALE TRADE - NONDURABLE GOODS
Access: Not reported
Cortese: Not reported
Hazardous Ranking Score: Not reported
Date Site Hazard Ranked: Not reported
Groundwater Contamination: Confirmed
Staff Member Responsible for Site: JRANDENI
Supervisor Responsible for Site: Not reported
Region Water Control Board: SF
Region Water Control Board Name: SAN FRANCISCO BAY
Lat/Long Direction: Not reported
Lat/Long (dms): 0 0 0 / 0 0 0
Lat/long Method: Not reported
Lat/Long Description: Not reported
State Assembly District Code: 16
State Senate District Code: 09
Facility ID: 01510021
Activity: DISC
Activity Name: DISCOVERY
AWP Code: Not reported
Proposed Budget: 0
AWP Completion Date: Not reported

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Revised Due Date:	Not reported
Comments Date:	07131981
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	SS
Activity Name:	SITE SCREENING
AWP Code:	PORT
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	04021987
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	ORDER
Activity Name:	I/SE, IORSE, FFA, FFSRA, VCA, EA
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	07301987
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	PPP
Activity Name:	PUBLIC PARTICIPATION PLAN
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	10301988
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	RA
Activity Name:	REMOVAL ACTION
AWP Code:	CAP
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	04301990
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	X
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	N
Activity Comments:	A TEMPORARY CHIP SEAL OVER THE SITE SURFACE CONTAMINATED WITH PCPUNTIL IMPLEMENTATION OF A FINAL REMEDIAL ACTION.
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Unknown Type:	0
Facility ID:	01510021
Activity:	PRP
Activity Name:	POTENTIAL RESPONSIBLE PARTY SEARCH
AWP Code:	BASE
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	12121991
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	RIFS
Activity Name:	REMEDIAL INVESTIGATION / FEASIBILITY STUDY
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	02111994
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	CEQA
Activity Name:	CEQA INCLUDING NEGATIVE DECS
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	06291994

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Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	RAP
Activity Name:	REMEDIAL ACTION PLAN / RECORD OF DECISION
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	06291994
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	DES
Activity Name:	DESIGN
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	04031995
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported

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Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	RMDL
Activity Name:	REMEDIAL ACTION (RAP REQUIRED)
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	06101996
Est Person-Yrs to complete:	0
Estimated Size:	M
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	X
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	N
Activity Comments:	A GEOSYNTHETIC CLAY LINER & HIGH DENSITY BARRIER AROUND THE PERIMETEROF THE SITE. A MULTIMEDIA CAP OVER 1.3 ACRES; AND A SKIMMING PROGRAMTO REMOVE FREE PETROLEUM HYDROCARBON PRODUCTS.
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	CERT
Activity Name:	CERTIFICATION
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	03281997
Est Person-Yrs to complete:	0
Estimated Size:	M
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	1.40000
For Residential Reuse:	0
Unknown Type:	0

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Facility ID:	01510021
Activity:	OM
Activity Name:	OPERATION & MAINTENANCE
AWP Code:	PLAN
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	01291997
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	DEED
Activity Name:	DEED RESTRICTIONS
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	02131997
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	ORDER
Activity Name:	I/SE, IORSE, FFA, FFSRA, VCA, EA
AWP Code:	OM
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	03071997
Est Person-Yrs to complete:	0

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Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	COST
Activity Name:	COST RECOVERY
AWP Code:	SETTL
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	04291997
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	5YEAR
Activity Name:	FIVE-YEAR REVIEW REQUIRED BY CERCLA
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	10192001
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported

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Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01510021
Activity:	5YEAR
Activity Name:	FIVE-YEAR REVIEW REQUIRED BY CERCLA
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	10312006
Revised Due Date:	Not reported
Comments Date:	Not reported
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	COM
Definition of Status:	CERTIFIED / OPERATION & MAINTENANCE
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Alternate Address:	EMBARCADERO COVE MARINA SITE
Alternate City,St,Zip:	OAKLAND, CA 94606
Alternate Address:	DENNISON AND EMBARCADERO STREETS
Alternate City,St,Zip:	OAKLAND, CA 94606
Background Info:	Since the earlier 1900's, the 1.3-acre site was leased to industrial tenants, including oil companies and formulators of pesticides and wood preservatives. As part of site investigation pentachlorophenol (PCP), organochlorine pesticides and solvents were discovered in soil and groundwater.
Comments Date:	01291997
Comments:	Approved O&M Plan. An Operation and Maintenance Plan was
Comments Date:	01291997
Comments:	approved for the cap, barrier wall and groundwater monitoring
Comments Date:	01291997
Comments:	system at the site.
Comments Date:	02111994
Comments:	Approved Remedial Investigation/Feasibility Study.
Comments Date:	02131997
Comments:	Recorded Deed Restriction to ensure its commercial, industrial
Comments Date:	02131997
Comments:	use and to protect the remedial system.
Comments Date:	02211984
Comments:	Completed PA. As part of site invetigation, pentachlorophenol
Comments Date:	02211984
Comments:	(PCP), organochlorine pesticides and solvents were discovered in
Comments Date:	02211984
Comments:	soil and groundwater.

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

Comments Date:	03071997
Comments:	Order amended to include Operations and Maintenance of the Site.
Comments Date:	03281997
Comments:	Certified Site.
Comments Date:	04021987
Comments:	Completed Site Screening.
Comments Date:	04031995
Comments:	Final design documents for remedial action approved. The final
Comments Date:	04031995
Comments:	remedy required a multimedia cap, a high-density polyethylene
Comments Date:	04031995
Comments:	cutoff wall around the entire boundary and a well skimmer to
Comments Date:	04031995
Comments:	remove petroleum product.
Comments Date:	04301990
Comments:	Completed Removal Action: Surface cap.
Comments Date:	06101996
Comments:	Completed Remedial Action. Approval of Implementation Report.
Comments Date:	06101996
Comments:	The final remedial action required the installation of the
Comments Date:	06101996
Comments:	following: a geosynthetic clay liner and high density barrier
Comments Date:	06101996
Comments:	around the perimeter of the site; a multimedia cap over 1.3
Comments Date:	06101996
Comments:	acres; and a skimming program to remove free petroleum
Comments Date:	06101996
Comments:	hydrocarbons products. Construction was initiated in July 1995
Comments Date:	06101996
Comments:	and was completed in December 1995.
Comments Date:	06291994
Comments:	Negative Declaration and Remedial Action Plan approved.
Comments Date:	07131981
Comments:	Site Discovery.
Comments Date:	07301987
Comments:	Issued I&SE Order.
Comments Date:	09011982
Comments:	Oakland Fire Marshall condemned three 40,000-gallon storage
Comments Date:	09011982
Comments:	tanks due to leakage.
Comments Date:	10192001
Comments:	Completed Five-Year Review.
Comments Date:	10301988
Comments:	Approved Public Participation Plan.
Comments Date:	12121991
Comments:	Conducted Potential Responsible Parties search.
ID Name:	CALSTARS CODE
ID Value:	200083
ID Name:	BEP DATABASE PCODE
ID Value:	P21050
ID Name:	EPA IDENTIFICATION NUMBER
ID Value:	CAD980638670
Alternate Name:	PORT OF OAKLAND - EMBARCADERO COVE
Special Programs Code:	R3012
Special Programs Name:	RCRA 3012

PORT OF OAKLAND - EMBARCADERO COVE (Continued) **S100833252**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: CALSI
Reg Id: 01510021

AQ174 **UNITED DRY CLEANERS** **EDR Historical Cleaners** **1009139847**
East **1232 FRUITVALE AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.239 mi.
1261 ft. **Site 1 of 2 in cluster AQ**

Relative: Higher

Actual: 41 ft.

EDR Historical Cleaners:
Name: UNITED DRY CLEANERS
Year: 1925
Type: CLEANERS DYERS AND PRESSERS

Name: UNITED DRY CLEANERS
Year: 1933
Type: CLEANERS GARMENTS CURTAINS AND DRAPERIES

AP175 **OCEANIC BOATWORKS COMPANY INCORPORATED** **FINDS** **1000857469**
WNW **1899 DENNISON STREET** **RCRA-NonGen** **CAD983669052**
1/8-1/4 **OAKLAND, CA 94606**
0.240 mi.
1267 ft. **Site 5 of 8 in cluster AP**

Relative: Lower

Actual: 9 ft.

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110001164793

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

RCRA-NonGen:
Date form received by agency: 06/01/1993
Facility name: STEAM VALVE MACHINE CO INC
Facility address: 1899 DENNISON ST
OAKLAND, CA 94606
EPA ID: CAD983669052
Mailing address: 98 HEGENBERGER LOOP
OAKLAND, CA 946211324
Contact: DAVID CURTO
Contact address: 1899 DENNISON ST
OAKLAND, CA 94606
Contact country: US
Contact telephone: (510) 635-9091
Contact email: Not reported
EPA Region: 09

OCEANIC BOATWORKS COMPANY INCORPORATED (Continued) **1000857469**

Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: STEAM VALVE MACHINE CO INC
Owner/operator address: 98 HEGENBERGER LOOP
OAKLAND, CA 94621
Owner/operator country: Not reported
Owner/operator telephone: (510) 635-9091
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

AP176 **CRYER BOATYARD FORMER** **SLIC** **S102002598**
WNW **1899 DENNISON ST** **N/A**
1/8-1/4 **OAKLAND, CA**
0.240 mi.
1267 ft. **Site 6 of 8 in cluster AP**

Relative:
Lower

Actual:
9 ft.

SLIC:
Region: 2
Facility ID: 01S0478
Facility Status: Pollution Characterization
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

AP177 **CRYER-STEAMVALVE** **SLIC** **S107869609**
WNW **1899 DENNISON ST.** **N/A**
1/8-1/4 **OAKLAND, CA NA**
0.240 mi.
1267 ft. **Site 7 of 8 in cluster AP**

Relative:
Lower

Actual:
9 ft.

SLIC:

Region:	STATE
Facility Status:	**Open**
Status Date:	2005-01-01 00:00:00
Global Id:	SL0600190696
Lead Agency:	SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number:	Not reported
Latitude:	37.778773
Longitude:	-122.242799
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01S0478
File Location:	Regional Board
Potential Media Affected:	Soil
Potential Contaminants of Concern:	Chromium, Copper, Diesel
Site History:	The site is a former boat repair facility the City of Oakland want to redevelop as a park. Contaminants of concern include heavy metal slag - apparently imported from off-site - and paint chips and oil left by former on-site industrial activities. Leachability tests on the slag indicate the presence of lead and copper. These two constituents have been detected in the Beach Area at levels exceeding the Water Boards environmental screening levels. As the Responsible Party, the City of Oakland's(City) ability to cleanup these contaminants is substantially constrained by available bond money. Because sufficient cleanup cannot be achieved, the City indicated that access to the Beach Area will prohibited. However, development plans will prevent direct contact exposure to the upland slag areas by excavating and covering the slag area either with concrete or a subsurface warning barrier covered by at least one foot of fill. The City has been reviewing and finalizing landscaping plans forthe park for the past few months and will probably proceed with the redevelopment some time this year.

AP178 **PORT OF OAKLAND** **HAZNET** **S103556311**
WNW **1899 DENNISON ST** **Alameda County CS** **N/A**
1/8-1/4 **OAKLAND, CA 94611**
0.240 mi.
1267 ft. **Site 8 of 8 in cluster AP**

Relative:
Lower

Actual:
9 ft.

HAZNET:

Gepaid:	CAL000213101
Contact:	JEFF RUBIN/ASSOC PORT ENV SCI
Telephone:	5106271134
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	530 WATER STREET EH&SC DEPT
Mailing City,St,Zip:	OAKLAND, CA 946070000
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Los Angeles
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Transfer Station
Tons:	0.1
Facility County:	Not reported

PORT OF OAKLAND (Continued) **S103556311**

Gepaid: CAC002129256
Contact: PORT OF OAKLAND
Telephone: 5102721176
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 530 WATER ST
Mailing City,St,Zip: OAKLAND, CA 946070000
Gen County: 1
TSD EPA ID: WAD991281767
TSD County: 99
Waste Category: Other organic solids
Disposal Method: Disposal, Land Fill
Tons: 0.475
Facility County: 1

Gepaid: CAL000213101
Contact: PORT OF OAKLAND
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 530 WATER ST
Mailing City,St,Zip: OAKLAND, CA 946070000
Gen County: 1
TSD EPA ID: WAD991281767
TSD County: 99
Waste Category: Unspecified oil-containing waste
Disposal Method: Treatment, Tank
Tons: .2000
Facility County: 1

Gepaid: CAL000213101
Contact: JEFF RUBIN/ASSOC PORT ENV SCI
Telephone: 5106271134
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 530 WATER STREET EH&SC DEPT
Mailing City,St,Zip: OAKLAND, CA 946070000
Gen County: Alameda
TSD EPA ID: CAD059494310
TSD County: Alameda
Waste Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Tons: 0.01
Facility County: 1

Gepaid: CAL000213101
Contact: JEFF RUBIN/ASSOC PORT ENV SCI
Telephone: 5106271134
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 530 WATER STREET EH&SC DEPT
Mailing City,St,Zip: OAKLAND, CA 946070000
Gen County: Alameda
TSD EPA ID: CAD059494310
TSD County: Alameda
Waste Category: Unspecified oil-containing waste
Disposal Method: Disposal, Other

PORT OF OAKLAND (Continued) **S103556311**

Tons: 0.83
Facility County: 1

Click this hyperlink while viewing on your computer to access
2 additional CA_HAZNET: record(s) in the EDR Site Report.

CS:
Status: Case Transferred
Record Id: RO0002789
PE: 5502

AQ179 **FERREE E C** **EDR Historical Auto Stations** **1009121946**
East **1307 FRUITVALE AVE** **N/A**
1/8-1/4 **OAKLAND, CA**
0.241 mi.
1270 ft. **Site 2 of 2 in cluster AQ**

Relative:
Higher

Actual:
41 ft.

EDR Historical Auto Stations:
Name: FERREE E C
Year: 1928
Type: AUTOMOBILE REPAIRING AND SERVICE STATIONS

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180 **MORGAN ENVIRONMENTAL SERVICES** **RCRA-SQG** **1000857851**
North **1091 CALCOT PL STE 2323** **FINDS** **CAD983673005**
1/8-1/4 **OAKLAND, CA 94606** **HAZNET**
0.242 mi.
1280 ft.

Relative:
Lower

Actual:
18 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: MORGAN ENVIRONMENTAL SERVICES
Facility address: 1091 CALCOT PL STE 2323
OAKLAND, CA 94606
EPA ID: CAD983673005
Mailing address: 702 CARMEL AVE
PACIFICA, CA 94044
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: THOMAS H MORGAN
Owner/operator address: 702 CARMEL AVE
PACIFICA, CA 94044
Owner/operator country: Not reported

MORGAN ENVIRONMENTAL SERVICES (Continued) **1000857851**

Owner/operator telephone: (415) 355-6566
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 07/30/1993
Facility name: MORGAN ENVIRONMENTAL SERVICES
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002902690

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD983673005
Contact: THOMAS H MORGAN
Telephone: 5105332001
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 702 CARMEL AVE
Mailing City,St,Zip: PACIFICA, CA 940442415
Gen County: 1
TSD EPA ID: CAD000088252

MORGAN ENVIRONMENTAL SERVICES (Continued) **1000857851**

TSD County: Los Angeles
Waste Category: Off-specification, aged, or surplus inorganics
Disposal Method: Transfer Station
Tons: .1000
Facility County: 1

Gepaid: CAD983673005
Contact: THOMAS H MORGAN
Telephone: 5105332001
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 702 CARMEL AVE
Mailing City,St,Zip: PACIFICA, CA 940442415
Gen County: 1
TSD EPA ID: CAD000088252
TSD County: Los Angeles
Waste Category: Liquids with pH <UN-> 2
Disposal Method: Transfer Station
Tons: .2293
Facility County: 1

Gepaid: CAD983673005
Contact: THOMAS H MORGAN
Telephone: 5105332001
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 702 CARMEL AVE
Mailing City,St,Zip: PACIFICA, CA 940442415
Gen County: 1
TSD EPA ID: CAD000088252
TSD County: Los Angeles
Waste Category: Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
Disposal Method: Transfer Station
Tons: .2293
Facility County: 1

Gepaid: CAD983673005
Contact: THOMAS H MORGAN
Telephone: 5105332001
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 702 CARMEL AVE
Mailing City,St,Zip: PACIFICA, CA 940442415
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: .2293
Facility County: 1

Gepaid: CAT080013428
Contact: ROSEMARY HORNER MORGAN
Telephone: 4158912323
Facility Addr2: Not reported
Mailing Name: Not reported

MORGAN ENVIRONMENTAL SERVICES (Continued) **1000857851**

Mailing Address: 702 CARMEL AVE
Mailing City,St,Zip: PACIFICA, CA 940442415
Gen County: 1
TSD EPA ID: CAD059494310
TSD County: Santa Clara
Waste Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Tons: 0.3127
Facility County: 1

Click this hyperlink while viewing on your computer to access
7 additional CA_HAZNET: record(s) in the EDR Site Report.

AR181 **TRI CITY CLEANERS** **Alameda County CS** **S106661151**
North **2560 INTERNATIONAL BLVD** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.256 mi.
1351 ft. **Site 1 of 3 in cluster AR**

Relative: **Higher**

Actual: **40 ft.**

CS:
Status: Case Closed
Record Id: RO0000865
PE: 5602

AS182 **WILFRED & WILMA GARFINKLE** **HAZNET** **S105870730**
South **2515 BLANDING AVE** **Alameda County CS** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.256 mi.
1352 ft. **Site 1 of 4 in cluster AS**

Relative: **Lower**

Actual: **11 ft.**

HAZNET:
Gepaid: CAC002555805
Contact: BEN GARFINKLE
Telephone: 5105671600
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2938 NORTHWOOD DR
Mailing City,St,Zip: ALAMEDA, CA 94501
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Contra Costa
Waste Category: Other empty containers 30 gallons or more
Disposal Method: Recycler
Tons: 0.15
Facility County: Not reported

Gepaid: CAC002555805
Contact: BEN GARFINKLE
Telephone: 5105671600
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2938 NORTHWOOD DR
Mailing City,St,Zip: ALAMEDA, CA 94501
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Santa Clara

WILFRED & WILMA GARFINKLE (Continued) **S105870730**

Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 0.20
Facility County: Not reported

CS:
Status: Leak being confirmed
Record Id: RO0002513
PE: 5602

Status: Pollution Characterization
Record Id: RO0002513
PE: 5602

AS183 **STONE BOAT YARD INC** **HAZNET** **S102002612**
South **2517 BLANDING AVE** **EMI** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.257 mi. **CA WDS**
1358 ft. **Site 2 of 4 in cluster AS**

Relative:
Lower

Actual:
11 ft.

HAZNET:
Gepaid: CAL000075114
Contact: BODLE GRACE C & A WILLIAM
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2517 BLANDING AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: Disposal, Other
Tons: .0125
Facility County: 1

Gepaid: CAL000075114
Contact: BODLE GRACE C & A WILLIAM
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2517 BLANDING AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CA0000084517
TSD County: Sacramento
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Tons: .1230
Facility County: 1

Gepaid: CAL000075114
Contact: BODLE GRACE C & A WILLIAM
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2517 BLANDING AVE

STONE BOAT YARD INC (Continued) **S102002612**

Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAL000161741
TSD County: 1
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 4.3785
Facility County: 1

Gepaid: CAL000219758
Contact: MARY SWIFT/OFF MGR
Telephone: 5105233030
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2517 BLANDING AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Sacramento
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Tons: 0.36
Facility County: Not reported

Gepaid: CAL000219758
Contact: MARY SWIFT/OFF MGR
Telephone: 5105233030
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2517 BLANDING AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Not reported
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: Transfer Station
Tons: 0.30
Facility County: Not reported

Click this hyperlink while viewing on your computer to access
19 additional CA_HAZNET: record(s) in the EDR Site Report.

EMI:
Year: 1996
County Code: 1
Air Basin: SF
Facility ID: 8502
Air District Name: BA
SIC Code: 3732
Air District Name: BAY AREA AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 0
Reactive Organic Gases Tons/Yr: 0
Carbon Monoxide Emissions Tons/Yr: 0
NOX - Oxides of Nitrogen Tons/Yr: 0
SOX - Oxides of Sulphur Tons/Yr: 0

STONE BOAT YARD INC (Continued) **S102002612**

Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1998
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1999
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	2000
County Code:	1
Air Basin:	SF

STONE BOAT YARD INC (Continued) **S102002612**

Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported

STONE BOAT YARD INC (Continued) **S102002612**

Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.708
Reactive Organic Gases Tons/Yr:	0.6994332
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	8502
Air District Name:	BA
SIC Code:	3732
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.708
Reactive Organic Gases Tons/Yr:	.6994332
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

CS:

Status:	Pollution Characterization
Record Id:	RO0002861
PE:	5502

Status:	Case Closed
Record Id:	RO0002861
PE:	5502

Status:	Remedial action (cleanup) Underway
Record Id:	RO0002861
PE:	5502

CA WDS:

STONE BOAT YARD INC (Continued) **S102002612**

Facility ID:	San Francisco Bay 01I015945
Facility Type:	Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion:	2
Facility Telephone:	5105233030
Facility Contact:	STEVE HUTCHISON
Agency Name:	STONE BOAT YARD INC
Agency Address:	2517 Blanding Ave
Agency City,St,Zip:	Alameda 945011599
Agency Contact:	GRACE BODLE
Agency Telephone:	5105233030
Agency Type:	Private
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported
POTW:	Not reported
Treat To Water:	Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

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184 North 1/4-1/2 0.258 mi. 1364 ft.

ERNIE'S AUTOMOTIVE
2400 E 12TH ST
OAKLAND, CA 94601

Alameda County CS **S106880546**
N/A

Relative: Higher

Actual: 28 ft.

CS:

Status:	Case Closed
Record Id:	RO0000935
PE:	5602

AT185 **CHILDREN'S HOSPITAL** **Alameda County CS** **S105870897**
NNW **1050 22ND AVE** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.259 mi.
1365 ft. **Site 1 of 2 in cluster AT**

Relative:
Lower

Actual:
14 ft.

CS:
Status: Case Closed
Record Id: RO0000730
PE: 5602

AT186 **CHILDRENS HOSPITAL** **LUST** **S102427840**
NNW **1050 22ND AVE** **SWEEPS UST** **N/A**
1/4-1/2 **OAKLAND, CA 94606** **HIST CORTESE**
0.259 mi.
1365 ft. **Site 2 of 2 in cluster AT**

Relative:
Lower

Actual:
14 ft.

LUST:
Region: STATE
Global Id: T0600101707
Latitude: 37.782018
Longitude: -122.239218
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-01-09 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1841
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Not reported
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 01/09/1996

LUST:
Region: 2
Facility Id: 01-1841
Facility Status: Case Closed
Case Number: 4615
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: Tank
Date Leak Confirmed: 1/25/1995
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

SWEEPS UST:
Status: Not reported
Comp Number: 2781
Number: Not reported
Board Of Equalization: Not reported
Ref Date: Not reported
Act Date: Not reported

CHILDRENS HOSPITAL (Continued) **S102427840**

Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-002781-000001
Actv Date: Not reported
Capacity: 1000
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: REG UNLEADED
Number Of Tanks: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1841

AR187 **TRI CITY CLEANERS** **LUST** **S103066217**
North **2560 14TH ST E** **HIST CORTESE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.259 mi.
1368 ft. **Site 2 of 3 in cluster AR**

Relative:
Higher

Actual:
40 ft.

LUST:
Region: STATE
Global Id: T0600100979
Latitude: 37.781729
Longitude: -122.231907
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1998-03-30 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1062
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Stoddard solvent / Mineral Spriits / Distillates
Site History: LUFT Con. LC 3HSCA Ju07/23/199703/19/1998

LUST:
Region: 2
Facility Id: 01-1062
Facility Status: Case Closed
Case Number: 239
How Discovered: Tank Closure
Leak Cause: Corrosion
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: 3/19/1998

TRI CITY CLEANERS (Continued) **S103066217**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1062

AR188 **DELAWARE DEVELOPMENT CORPORATION** **Alameda County CS** **S106661150**
North **2530 INTERNATIONAL BLVD** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.260 mi.
1372 ft. **Site 3 of 3 in cluster AR**

Relative:
Higher

Actual:
40 ft.

CS:
Status: Case Closed
Record Id: RO0001126
PE: 5602

AS189 **FIRST SAMOAN CONGREGATIONAL CHURCH** **LUST** **S105031175**
South **2526 BLANDING AVE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.263 mi.
1389 ft. **Site 3 of 4 in cluster AS**

Relative:
Lower

Actual:
11 ft.

LUST:
Region: STATE
Global Id: T0600194031
Latitude: 37.769408
Longitude: -122.235098
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2001-04-10 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2521
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Not reported
Potential Contaminats of Concern: Kerosene
Site History: LUFT Con. LC PINEAPPLE SAILS NOW OWN THE SITE. CONTACT IS SALLY RICHARDS AT 510 444-4321. ADDRESS IS 123 2ND STREET, OAKLAND,

LUST:
Region: 2
Facility Id: 01-2521
Facility Status: Case Closed
Case Number: 6692
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 10/6/2000
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported

FIRST SAMOAN CONGREGATIONAL CHURCH (Continued) **S105031175**

Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

AS190
South
1/4-1/2
0.263 mi.
1389 ft.

FIRST SAMOAN CONGREGATION **Alameda County CS** **S106660986**
2526 BLANDING AVE **N/A**
ALAMEDA, CA 94501

Site 4 of 4 in cluster AS

Relative:
Lower

Actual:
11 ft.

CS:
Status: Case Closed
Record Id: RO0000181
PE: 5602

191
North
1/4-1/2
0.274 mi.
1449 ft.

DELAWARE DEVELOPMENT COMPANY **LUST** **S102428710**
2530 14TH ST E **HIST CORTESE** **N/A**
OAKLAND, CA 94601

Relative:
Higher

Actual:
40 ft.

LUST:
Region: STATE
Global Id: T0600100439
Latitude: 37.781897
Longitude: -122.23218
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1997-03-04 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0483
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2SCAW 03/04/1997

LUST:
Region: 2
Facility Id: 01-0483
Facility Status: Case Closed
Case Number: 3679
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 4/4/1990
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

DELAWARE DEVELOPMENT COMPANY (Continued) **S102428710**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0483

AU192 **PARK STREET LANDING** **Alameda County CS** **S109516963**
WSW **2301-2337 BLANDING AVE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.277 mi.
1465 ft. **Site 1 of 4 in cluster AU**

Relative:
Lower

Actual:
12 ft.

CS:
Status: Leak being confirmed
Record Id: RO0002466
PE: 5502

Status: Pollution Characterization
Record Id: RO0002466
PE: 5502

AU193 **PARK ST LANDING** **LUST** **S109284022**
WSW **2301 BLANDING AVE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.277 mi.
1465 ft. **Site 2 of 4 in cluster AU**

Relative:
Lower

Actual:
12 ft.

LUST:
Region: STATE
Global Id: T0600101574
Latitude: 37.7708
Longitude: -122.2372
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2001-10-31 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1703
LOC Case Number: Not reported
File Location: Not reported
Potential Media Affect: Not reported
Potential Contaminats of Concern: Waste Oil / Motor / Hydraulic / Lubricating
Site History: Not reported

AU194 **PARK STREET LANDING** **SLIC** **S108246039**
WSW **2301-2337 BLANDING** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.277 mi.
1465 ft. **Site 3 of 4 in cluster AU**

Relative: **Lower**

Actual: **12 ft.**

SLIC:

Region:	STATE
Facility Status:	**Open - Verification Monitoring**
Status Date:	2001-01-23 00:00:00
Global Id:	T06019744728
Lead Agency:	ALAMEDA COUNTY LOP
Lead Agency Case Number:	RO0002466
Latitude:	37.770927
Longitude:	-122.238196
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	Not reported
File Location:	Local Agency
Potential Media Affected:	Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern:	Gasoline
Site History:	LUFT Con. LC SLIC SITE WITH TWO DIFFERENT INVESTIGATIONS. ONE IS BEING HANDLED BY CHEVRON, FOR TPH IN GROUNDWATER. THE OTHER IS METALS IN SHALLOW SOIL ANI SMALL DRUM AREA, HANDLED BY MONROE WINGATE. PROPERTY OWNERS ARE HANDLE JULIE BECK BALL.

AU195 **PARK ST LANDING** **HIST CORTESE** **S102434979**
WSW **2301 BLANDING** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.277 mi.
1465 ft. **Site 4 of 4 in cluster AU**

Relative: **Lower**

Actual: **12 ft.**

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-1703

AV196 **MEL SENNA BRAKE SERVICE INC** **LUST** **S103576529**
North **2301 12TH ST E** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.279 mi.
1473 ft. **Site 1 of 2 in cluster AV**

Relative: **Higher**

Actual: **22 ft.**

LUST:

Region:	STATE
Global Id:	T0600101212
Latitude:	37.7821
Longitude:	-122.235
Case Type:	LUST Cleanup Site
Status:	Open - Remediation
Status Date:	1990-12-24 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	01-1317
LOC Case Number:	RO0000387

MEL SENNA BRAKE SERVICE INC (Continued) **S103576529**

File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG MTBE=ND, site is impacted by TPHg, d , BTEX and chlorinated VOC02/02/1999

LUST:
Region: 2
Facility Id: 01-1317
Facility Status: Preliminary site assessment underway
Case Number: 71
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 11/27/1991
Preliminary Site Assesment Began: 1/2/1965
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

AV197 **MEL SENNA BRAKE SERVICE** **Alameda County CS** **S106880535**
North **2301 E 12TH ST** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.279 mi.
1473 ft. **Site 2 of 2 in cluster AV**

Relative:
Higher

Actual:
22 ft.

CS:
Status: Remediation Plan
Record Id: RO0000387
PE: 5602

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198 **ALAMEDA COLLISION REPAIR INCORPORATED** **RCRA-SQG** **1000297249**
SW **1911 PARK STREET** **FINDS** **CAD982361461**
1/4-1/2 **ALAMEDA, CA 94501** **HAZNET**
0.291 mi. **LUST**
1534 ft. **EMI**
Alameda County CS

Relative:
Lower

Actual:
15 ft.

HIST CORTESE

RCRA-SQG:
Date form received by agency: 02/23/1987
Facility name: ALAMEDA COLLISION REPAIR
Facility address: 1911 PARK ST
ALAMEDA, CA 94501
EPA ID: CAD982361461
Contact: ENVIRONMENTAL MANAGER
Contact address: 1911 PARK ST
ALAMEDA, CA 94501
Contact country: US
Contact telephone: (415) 523-4836
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	JIMMIE THOMPSON
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site

Registry ID: 110001164926

California - Hazardous Waste Tracking System - Datamart

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD982361461
Contact:	JIMMIE D THOMPSON OR JEFFREY J
Telephone:	5105234836
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1911 PARK ST
Mailing City,St,Zip:	ALAMEDA, CA 945011419
Gen County:	1
TSD EPA ID:	CAT000613950
TSD County:	Sacramento
Waste Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	Transfer Station
Tons:	.7420
Facility County:	1

Gepaid:	CAD982361461
Contact:	JIMMIE D THOMPSON OR JEFFREY J
Telephone:	5105234836
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1911 PARK ST
Mailing City,St,Zip:	ALAMEDA, CA 945011419
Gen County:	1
TSD EPA ID:	CA0000084517
TSD County:	Sacramento
Waste Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	Transfer Station
Tons:	.7240
Facility County:	1

Gepaid:	CAD982361461
Contact:	JIMMIE D THOMPSON OR JEFFREY J
Telephone:	5105234836
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1911 PARK ST
Mailing City,St,Zip:	ALAMEDA, CA 945011419
Gen County:	1
TSD EPA ID:	CAD980887418
TSD County:	1
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	.2293
Facility County:	1

Gepaid:	CAD982361461
Contact:	JIMMIE D. THOMPSON
Telephone:	5105234836

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1911 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945011419
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Sacramento
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Tons: 0.07
Facility County: Not reported

Gepaid: CAD982361461
Contact: JIMMIE D THOMPSON OR JEFFREY J
Telephone: 5105234836
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1911 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945011419
Gen County: 1
TSD EPA ID: CA0000084517
TSD County: Sacramento
Waste Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Tons: 0.668
Facility County: 1

Click this hyperlink while viewing on your computer to access
16 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600100037
Latitude: 37.769741
Longitude: -122.236921
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1994-06-02 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0042
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG Gr06/02/1994

LUST:
Region: 2
Facility Id: 01-0042
Facility Status: Case Closed
Case Number: 3713
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 12/18/1992
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

EMI:

Year:	1990
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1993
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1995
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1996
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	2
Reactive Organic Gases Tons/Yr:	2
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1998
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1999
County Code:	1

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2000
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	1
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.649
Reactive Organic Gases Tons/Yr:	0.508381
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	6235
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.649
Reactive Organic Gases Tons/Yr:	.508381
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0

ALAMEDA COLLISION REPAIR INCORPORATED (Continued) **1000297249**

Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	18052
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.649
Reactive Organic Gases Tons/Yr:	.508381
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	2007
County Code:	1
Air Basin:	SF
Facility ID:	18052
Air District Name:	BA
SIC Code:	7532
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.089
Reactive Organic Gases Tons/Yr:	.0781898
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

CS:

Status:	Case Closed
Record Id:	RO0001140
PE:	5602

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0042

AW199 **CLAMP SWING** **LUST** **S108241213**
South **2515 BLANDING** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.291 mi.
1534 ft. **Site 1 of 2 in cluster AW**

Relative:
Lower

Actual:
11 ft.

LUST:

Region:	STATE
Global Id:	T06019714517
Latitude:	37.769755
Longitude:	-122.235307
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	2003-04-04 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	Not reported
LOC Case Number:	RO0002513
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	Not reported

AX200 **ARCO #0402 / PARKING LOT** **LUST** **S108240595**
East **1450 FRUITVALE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.294 mi.
1551 ft. **Site 1 of 2 in cluster AX**

Relative:
Higher

Actual:
43 ft.

LUST:

Region:	STATE
Global Id:	T06019734265
Latitude:	37.778279
Longitude:	-122.225165
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	2002-06-10 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	Not reported
LOC Case Number:	RO0000307
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 1,h,s,c,G MTBE= 92 PPB MW2 9/02, UP TO 25,000 PPB TPHG ,2000 PPB BENZENE IN MW3

AX201 **ARCO #0402 / PARKING LOT** **Alameda County CS** **S106661132**
East **1450 FRUITVALE AVE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.294 mi.
1551 ft. **Site 2 of 2 in cluster AX**

Relative:
Higher

Actual:
43 ft.

CS:
Status: Preliminary site assessment underway
Record Id: RO0000307
PE: 5602

Status: Pollution Characterization
Record Id: RO0000307
PE: 5602

Status: Post remedial action monitoring
Record Id: RO0000307
PE: 5602

Status: Leak being confirmed
Record Id: RO0000307
PE: 5602

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202 **STANDARD BRANDS PAINT** **LUST** **S104396757**
North **2442 14TH ST E** **HIST CORTESE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.297 mi.
1568 ft.

Relative:
Higher

Actual:
40 ft.

LUST:
Region: STATE
Global Id: T0600101312
Latitude: 37.782173
Longitude: -122.233068
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1994-11-08 00:00:00
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1421
LOC Case Number: Not reported
File Location: Not reported
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: Not reported

LUST:
Region: 2
Facility Id: 01-1421
Facility Status: Case Closed
Case Number: 01-1421
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported

STANDARD BRANDS PAINT (Continued) **S104396757**

Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1421

AW203 **STONE BOAT YARD** **LUST** **S109284040**
South **2517 BLANDING** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.298 mi.
1575 ft. **Site 2 of 2 in cluster AW**

Relative:
Lower

Actual:
11 ft.

LUST:
Region: STATE
Global Id: T0600135924
Latitude: 37.769738
Longitude: -122.234777
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2005-11-30 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
LOC Case Number: RO0002861
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel, Gasoline, Lead, Chromium, Copper
Site History: Not reported

AY204 **BRIDGESIDE SHOPPING CENTER** **Alameda County CS** **S109516944**
South **2523-2691 BLANDING AVE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.314 mi.
1656 ft. **Site 1 of 3 in cluster AY**

Relative:
Lower

Actual:
12 ft.

CS:
Status: Leak being confirmed
Record Id: RO0002738
PE: 5502

Status: Pollution Characterization
Record Id: RO0002738
PE: 5502

Status: Remedial action (cleanup) Underway
Record Id: RO0002738
PE: 5502

Status: Case Closed
Record Id: RO0002738

BRIDGESIDE SHOPPING CENTER (Continued) **S109516944**

PE: 5502

Status: Preliminary site assessment underway
Record Id: RO0002738
PE: 5502

AY205 **BRIDGESIDE SHOPPING CENTER** **SLIC** **S107869607**
South **2523-2691 BLANDING** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.314 mi.
1656 ft. **Site 2 of 3 in cluster AY**

Relative:
Lower

Actual:
12 ft.

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 2007-03-09 00:00:00
Global Id: SL0600132345
Lead Agency: ALAMEDA COUNTY LOP
Lead Agency Case Number: RO0002738
Latitude: 37.768249
Longitude: -122.233284
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-0066
File Location: Local Agency
Potential Media Affected: Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern: Tetrachloroethylene (PCE), Gasoline
Site History: Not reported

AY206 **NEXCYCLE** **SWRCY** **S108991925**
South **2531 BLANDING AVE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.315 mi.
1664 ft. **Site 3 of 3 in cluster AY**

Relative:
Lower

Actual:
12 ft.

SWRCY:
Certification Status: O
Facility Phone Number: Not reported
Date facility became certified: 3/4/2008
Date facility began operating: 6/1/2008
Date facility ceased operating: Still operating
Whether The Facility Is Grandfathered: Not reported
Convenience Zone Where Faciltiy Located: 7
Convenience Zone Where Faciltiy Located 2: 6112
Convenience Zone Where Faciltiy Located 3: Not Accepted
Convenience Zone Where Faciltiy Located 4: Not Accepted
Convenience Zone Where Faciltiy Located 5: Not Accepted
Convenience Zone Where Faciltiy Located 6: Not Accepted
Convenience Zone Where Faciltiy Located 7: Not Accepted
Aluminum Beverage Containers Redeemed: AL
Glass Beverage Containers Redeemed: GL
Plastic Beverage Containers Redeemed: PL
Other mat beverage containers redeemed: Not reported
Refillable Beverage Containers Redeemed: Not reported

AZ207 **OWENS ILLINOIS INC GCD 20** **SLIC S103881513**
SSE **3600 ALAMEDA AVE** **NPDES N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.318 mi.
1681 ft. **Site 1 of 2 in cluster AZ**

Relative:
Lower

Actual:
15 ft.

SLIC:

Region:	STATE
Facility Status:	**Completed - Case Closed**
Status Date:	2005-01-01 00:00:00
Global Id:	T0600191486
Lead Agency:	SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number:	Not reported
Latitude:	37.768174
Longitude:	-122.223306
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01S0071
File Location:	Not reported
Potential Media Affected:	Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern:	Heating Oil / Fuel Oil
Site History:	Not reported

SLIC:

Region:	2
Facility ID:	01S0071
Facility Status:	Preliminary site assessment underway
Date Closed:	Not reported
Local Case #:	Not reported
How Discovered:	Tank Closure
Leak Cause:	UNK
Leak Source:	UNK
Date Confirmed:	Not reported
Date Prelim Site Assmnt Workplan Submitted:	Not reported
Date Preliminary Site Assessment Began:	2/5/1995
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

NPDES:

Npdes Number:	Not reported
Facility Status:	Active
Agency Id:	32890
Region:	2
Regulatory Measure Id:	180652
Order No:	Not reported
Order No Of General Order:	97-03-DWQ
Regulatory Measure Type:	Storm water industrial
Place Id:	246363
WDID:	2 01I001277
Program Type:	INDSTW
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	3/27/1992
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Owens Brockway Inc

OWENS ILLINOIS INC GCD 20 (Continued) **S103881513**

Discharge Address: 3600 Alameda Ave
Discharge Address2: Not reported
Discharge City: Oakland
Discharge State: CA
Discharge Zip: 94601

AZ208 **OWENS BROCKWAY GLASS CONTAINERS** **FINDS** **1000319786**
SSE **3600 ALAMEDA AVE** **HAZNET** **94621WNSLL36**
1/4-1/2 **OAKLAND, CA 94601** **LUST**
0.318 mi. **RCRA-LQG**
1681 ft. **Site 2 of 2 in cluster AZ** **TRIS**
CA FID UST
Relative: **HIST UST**
Lower **Alameda County CS**
SWEEPS UST
Actual: **CA WDS**
15 ft. **HIST CORTESE**

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110000483780

Not reported

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

California - Hazardous Waste Tracking System - Datamart

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and its Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

HAZNET:

Gepaid:	CAT000618918
Contact:	OWENS-ILLINOIS INC
Telephone:	4192472000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1019
Mailing City,St,Zip:	OAKLAND, CA 946041019
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Unspecified organic liquid mixture
Disposal Method:	Recycler
Tons:	.3127
Facility County:	1

Gepaid:	CAT000618918
Contact:	OWENS-ILLINOIS INC
Telephone:	4192472000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1019
Mailing City,St,Zip:	OAKLAND, CA 946041019
Gen County:	1
TSD EPA ID:	CAD044429835
TSD County:	Los Angeles
Waste Category:	Unspecified solvent mixture Waste
Disposal Method:	Recycler
Tons:	.0325
Facility County:	1

Gepaid:	CAT000618918
Contact:	OWENS-ILLINOIS INC
Telephone:	4192472000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1019
Mailing City,St,Zip:	OAKLAND, CA 946041019

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Gen County: 1
TSD EPA ID: CAD083166728
TSD County: Stanislaus
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 67.5623
Facility County: 1

Gepaid: CAT000618918
Contact: OWENS-ILLINOIS INC
Telephone: 4192472000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1019
Mailing City,St,Zip: OAKLAND, CA 946041019
Gen County: 1
TSD EPA ID: CAD083166728
TSD County: Stanislaus
Waste Category: Unspecified oil-containing waste
Disposal Method: Not reported
Tons: 17.9310
Facility County: 1

Gepaid: CAT000618918
Contact: OWENS-ILLINOIS INC
Telephone: 4192472000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1019
Mailing City,St,Zip: OAKLAND, CA 946041019
Gen County: 1
TSD EPA ID: CAD059494310
TSD County: Santa Clara
Waste Category: Other inorganic solid waste
Disposal Method: Disposal, Other
Tons: .2075
Facility County: 1

Click this hyperlink while viewing on your computer to access
267 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600102223
Latitude: 37.768174
Longitude: -122.223306
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1987-03-12 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-2414
LOC Case Number: RO0000289
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Site History: LUFT Con. LC 2 MTBE has been requested but has not yet been run (4/00)01/06/1999

LUST:
Region: 2
Facility Id: 01-2414
Facility Status: Preliminary site assessment underway
Case Number: 866
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 9/28/1998
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 1/2/1965
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

RCRA-LQG:
Date form received by agency: 02/14/2006
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Facility address: 3600 ALAMEDA AVE
OAKLAND, CA 94601
EPA ID: CAT000618918
Contact: WILLIAM L BOSCACCI
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: (510) 436-2166
Contact email: BILL.BOSCACCI@US.O-I.COM
EPA Region: 09
Land type: Private
Classification: Large Quantity Generator
Description: Handler: generates 1,000 kg or more of hazardous waste during any calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:
Owner/operator name: OWENS ILLINOIS
Owner/operator address: ONE SEAGATE 30LDP
TOLEDO, OH 43336
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1937

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Owner/Op end date: Not reported

Owner/operator name: OWEN ILLINOIS
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1937
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Lamps
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Pesticides
Accumulated waste on-site: No
Generated waste on-site: No

Waste type: Thermostats
Accumulated waste on-site: No
Generated waste on-site: No

Historical Generators:
Date form received by agency: 02/18/2004
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Classification: Large Quantity Generator

Date form received by agency: 02/13/2002
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-BROCKWAY GLASS CONTAINER INC
Classification: Large Quantity Generator

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Date form received by agency: 10/12/2000
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-BROCKWAY GLASS CONTAINER
Classification: Large Quantity Generator

Date form received by agency: 03/04/1999
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-BROCKWAY GLASS CONTAINER
Classification: Large Quantity Generator

Date form received by agency: 09/01/1996
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-ILLINOIS INC OAKLAND PLT 20
Classification: Large Quantity Generator

Date form received by agency: 03/26/1996
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-BROCKWAY GLASS CONTAINER
Classification: Large Quantity Generator

Date form received by agency: 03/15/1994
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS BROCKWAY GLASS
Classification: Large Quantity Generator

Date form received by agency: 02/27/1992
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-BROCKWAY
Classification: Large Quantity Generator

Date form received by agency: 04/09/1990
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-ILLINOIS INC OAKLAND PLT 20
Classification: Large Quantity Generator

Date form received by agency: 08/18/1980
Facility name: OWENS BROCKWAY GLASS CONTAINERS
Site name: OWENS-ILLINOIS INC OAKLAND PLT 20
Classification: Large Quantity Generator

Hazardous Waste Summary:
Waste code: 181
Waste name: 181

Waste code: 212
Waste name: 212

Waste code: 214
Waste name: 214

Waste code: 343
Waste name: 343

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D006
Waste name: CADMIUM

Waste code: D007
Waste name: CHROMIUM

Waste code: D008
Waste name: LEAD

Waste code: D010
Waste name: SELENIUM

Waste code: D035
Waste name: METHYL ETHYL KETONE

Waste code: F003
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste code: F005
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Biennial Reports:

Last Biennial Reporting Year: 2007

Annual Waste Handled:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
Amount (Lbs): 368.5

Waste code: D006
Waste name: CADMIUM

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Amount (Lbs): 29680

Waste code: D007
Waste name: CHROMIUM
Amount (Lbs): 339140

Waste code: D008
Waste name: LEAD
Amount (Lbs): 339140

Waste code: D010
Waste name: SELENIUM
Amount (Lbs): 339140

Waste code: D035
Waste name: METHYL ETHYL KETONE
Amount (Lbs): 368.5

Waste code: F003
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
Amount (Lbs): 368.5

Waste code: F005
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
Amount (Lbs): 368.5

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 10/19/2004
Date achieved compliance: 02/24/2005
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/19/2004
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 02/25/2004
Date achieved compliance: 05/16/2004
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 04/16/2004
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 02/25/2004
Date achieved compliance: 05/16/2004
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/16/2004
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 04/09/1998
Date achieved compliance: 06/03/1998
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 04/09/1998
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 279
Area of violation: Used Oil - Generators
Date violation determined: 04/09/1998
Date achieved compliance: 06/03/1998
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 04/09/1998
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Evaluation Action Summary:
Evaluation date: 10/19/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 02/24/2005
Evaluation lead agency: State

Evaluation date: 02/25/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 05/16/2004
Evaluation lead agency: EPA

Evaluation date: 04/09/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 06/03/1998
Evaluation lead agency: EPA

Evaluation date: 04/09/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 06/03/1998
Evaluation lead agency: EPA

Evaluation date: 04/13/1994
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

CA FID UST:
Facility ID: 01001219
Regulated By: UTNKA
Regulated ID: 00032195
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4154362000
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

HIST UST:
Region: STATE
Facility ID: 00000032195
Facility Type: Other
Other Type: MANUFACTURING
Total Tanks: 0011
Contact Name: Not reported

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Telephone: 4154362000
Owner Name: OI GLASS CONTAINER STS INC
Owner Address: ONE SEGATE
Owner City,St,Zip: TOLEDO, OH 43666

Tank Num: 001
Container Num: #2
Year Installed: Not reported
Tank Capacity: 00000500
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 002
Container Num: TANK #1
Year Installed: 1937
Tank Capacity: 00004000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 003
Container Num: #6
Year Installed: 1970
Tank Capacity: 00024000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 004
Container Num: #7
Year Installed: 1970
Tank Capacity: 00024000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 005
Container Num: #9
Year Installed: 1937
Tank Capacity: 00008300
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 006
Container Num: #11
Year Installed: 1937
Tank Capacity: 00004000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Leak Detection: Stock Inventor

Tank Num: 007
Container Num: #12
Year Installed: 1937
Tank Capacity: 00012000
Tank Used for: PRODUCT
Type of Fuel: Not reported
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 008
Container Num: #15
Year Installed: 1937
Tank Capacity: 00004000
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: 6 inches
Leak Detection: None

Tank Num: 009
Container Num: #16
Year Installed: 1937
Tank Capacity: 00000250
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 010
Container Num: #17
Year Installed: 1937
Tank Capacity: 00004000
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: 6 inches
Leak Detection: None

Tank Num: 011
Container Num: #18
Year Installed: 1937
Tank Capacity: 00000250
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: Stock Inventor

CS:
Status: Pollution Characterization
Record Id: RO0000289
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 32195
Number: 9

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #2
Swrcb Tank Id: 01-000-032195-000001
Actv Date: 07-01-85
Capacity: 500
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: 9

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: TANK #1
Swrcb Tank Id: 01-000-032195-000002
Actv Date: 07-01-85
Capacity: 4000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #6
Swrcb Tank Id: 01-000-032195-000003
Actv Date: 07-01-85
Capacity: 24000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #7

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Swrcb Tank Id: 01-000-032195-000004
Actv Date: 07-01-85
Capacity: 24000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #9
Swrcb Tank Id: 01-000-032195-000005
Actv Date: 07-01-85
Capacity: 8300
Tank Use: UNKNOWN
Stg: P
Content: Not reported
Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #11
Swrcb Tank Id: 01-000-032195-000006
Actv Date: 07-01-85
Capacity: 4000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #12
Swrcb Tank Id: 01-000-032195-000007
Actv Date: 07-01-85
Capacity: 12000
Tank Use: UNKNOWN
Stg: P
Content: Not reported

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #16
Swrcb Tank Id: 01-000-032195-000008
Actv Date: 07-01-85
Capacity: 250
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: Not reported

Status: A
Comp Number: 32195
Number: 9
Board Of Equalization: Not reported
Ref Date: 07-01-85
Act Date: Not reported
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: #18
Swrcb Tank Id: 01-000-032195-000009
Actv Date: 07-01-85
Capacity: 250
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: Not reported

CA WDS:
Facility ID: San Francisco Bay 01I001277
Facility Type: Not reported
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number: CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion: 2
Facility Telephone: Not reported
Facility Contact: Not reported
Agency Name: OWENS-BROCKWAY INC
Agency Address: Not reported
Agency City,St,Zip: 0
Agency Contact: Not reported
Agency Telephone: Not reported
Agency Type: Not reported
SIC Code: 0
SIC Code 2: Not reported
Primary Waste: Not reported
Primary Waste Type: Not reported
Secondary Waste: Not reported

OWENS BROCKWAY GLASS CONTAINERS (Continued) **1000319786**

Secondary Waste Type: Not reported
Design Flow: 0
Baseline Flow: 0
Reclamation: Not reported
POTW: Not reported
Treat To Water: Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2414

BA209 **CONTRACTORS EQUIPMENT RENTAL** **LUST** **S104396754**
North **2250 12TH ST E** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.320 mi.
1689 ft. **Site 1 of 2 in cluster BA**

Relative:
Lower

Actual:
19 ft.

LUST:
Region: STATE
Global Id: T0600102003
Latitude: 37.783257
Longitude: -122.237538
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-09-23 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2179
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HC 09/20/1996

LUST:
Region: 2
Facility Id: 01-2179
Facility Status: Case Closed
Case Number: 206
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: Not reported

CONTRACTORS EQUIPMENT RENTAL (Continued) **S104396754**

Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

BA210 **ACTION RENTALS** **CA FID UST** **S101580337**
North **2250 E 12TH ST** **Alameda County CS** **N/A**
1/4-1/2 **OAKLAND, CA 94606** **SWEEPS UST**
0.320 mi.
1689 ft. **Site 2 of 2 in cluster BA**

Relative:
Lower

Actual:
19 ft.

CA FID UST:
Facility ID: 01002515
Regulated By: UTNKA
Regulated ID: CAC000182
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155361377
Mail To: Not reported
Mailing Address: 2250 E 12TH ST
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94606
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Case Closed
Record Id: RO0000976
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 309
Number: 1
Board Of Equalization: 44-031942
Ref Date: 06-15-93
Act Date: 04-25-94
Created Date: 04-03-91
Tank Status: A
Owner Tank Id: LTL211031
Swrcb Tank Id: 01-000-000309-000001
Actv Date: 06-15-93
Capacity: 7500
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: 2

Status: A

ACTION RENTALS (Continued) **S101580337**

Comp Number:	309
Number:	1
Board Of Equalization:	44-031942
Ref Date:	06-15-93
Act Date:	04-25-94
Created Date:	04-03-91
Tank Status:	A
Owner Tank Id:	LTL211031
Swrcb Tank Id:	01-000-000309-000002
Actv Date:	06-15-93
Capacity:	7500
Tank Use:	M.V. FUEL
Stg:	P
Content:	DIESEL
Number Of Tanks:	Not reported

BB211 **TAXI TAXI INC** **LUST** **S103576612**
North **2345 14TH ST E** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.330 mi.
1745 ft. **Site 1 of 2 in cluster BB**

Relative:
Higher

Actual:
35 ft.

LUST:

Region:	STATE
Global Id:	T0600101337
Latitude:	37.782937
Longitude:	-122.234121
Case Type:	LUST Cleanup Site
Status:	Open - Remediation
Status Date:	1994-12-05 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	01-1448
LOC Case Number:	RO0000327
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 3HSCAWG MTBE= ND, very high gas and BTEX but no MTBE, release probably09/01/1999

LUST:

Region:	2
Facility Id:	01-1448
Facility Status:	Preliminary site assessment underway
Case Number:	2116
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	3/9/1992
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	Not reported
Preliminary Site Assesment Began:	1/2/1965
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

212
NW
1/4-1/2
0.331 mi.
1750 ft.

KNOWN
1755 EMBARCADECO EAST
OAKLAND, CA 92626

Notify 65 **S100178934**
N/A

Relative:
Lower

Actual:
13 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

213
WSW
1/4-1/2
0.336 mi.
1774 ft.

UNKNOWN
2235 CLEMENT AVENUE
ALAMEDA, CA 92405

Notify 65 **S100179085**
N/A

Relative:
Lower

Actual:
14 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92405

BB214
North
1/4-1/2
0.337 mi.
1777 ft.

TAXI TAXI INC
2345 INTERNATIONAL BLVD
OAKLAND, CA 94601

Site 2 of 2 in cluster BB

Alameda County CS **S106661149**
N/A

Relative:
Higher

Actual:
34 ft.

CS:
Status: Pollution Characterization
Record Id: RO0000327
PE: 5602

Status: Remedial action (cleanup) Underway
Record Id: RO0000327
PE: 5602

Status: Preliminary site assessment underway
Record Id: RO0000327
PE: 5602

BC215 **ALPHA BETA** **LUST** **S109283908**
South **2691 BLANDING AVE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.345 mi.
1821 ft. **Site 1 of 2 in cluster BC**

Relative:
Lower

Actual:
12 ft.

LUST:

Region:	STATE
Global Id:	T0600100060
Latitude:	37.76857
Longitude:	-122.23279
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	1987-11-04 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0066
LOC Case Number:	Not reported
File Location:	Not reported
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Gasoline
Site History:	Not reported

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216 **SERVICE STATION** **Notify 65** **S100178956**
North **2200 EAST 12TH STREET** **N/A**
1/4-1/2 **OAKLAND, CA 92626**
0.348 mi.
1835 ft.

Relative:
Lower

Actual:
15 ft.

Notify 65:

Date Reported:	Not reported
Staff Initials:	Not reported
Board File Number:	Not reported
Facility Type:	Not reported
Discharge Date:	Not reported
Incident Description:	92626

BC217 **ALAMEDA BRIDGESIDE CENTER** **HAZNET** **S100223508**
South **2691 BLANDING AVE** **HIST CORTESE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.349 mi.
1845 ft. **Site 2 of 2 in cluster BC**

Relative:
Lower

Actual:
13 ft.

HAZNET:

Gepaid:	CAC002563388
Contact:	MARY HUNTER/SENIOR PROPERTY MGR
Telephone:	9254165919
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	4637 SHABOT DR #112
Mailing City,St,Zip:	PLEASANTON, CA 94588
Gen County:	Alameda
TSD EPA ID:	CAL000161743
TSD County:	Alameda
Waste Category:	Unspecified organic liquid mixture
Disposal Method:	Transfer Station
Tons:	0.14

ALAMEDA BRIDGESIDE CENTER (Continued) **S100223508**

Facility County: 1

Gepaid: CAC002563388
Contact: MARY HUNTER/SENIOR PROPERTY MGR
Telephone: 9254165919
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 4637 SHABOT DR #112
Mailing City,St,Zip: PLEASANTON, CA 94588
Gen County: Alameda
TSD EPA ID: CAL000161743
TSD County: Alameda
Waste Category: Other organic solids
Disposal Method: Transfer Station
Tons: 0.25
Facility County: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0066

BD218 **RON GOODE RAMBLER & TOYOTA** **RCRA-SQG** **1000116090**
SW **1825 PARK ST** **FINDS** **CAD981573264**
1/4-1/2 **ALAMEDA, CA 94501** **HAZNET**
0.350 mi. **LUST**
1849 ft. **Site 1 of 3 in cluster BD** **CA FID UST**
HIST UST
Relative: **Alameda County CS**
Lower **SWEEPS UST**
HIST CORTESE

Actual:
19 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: RON GOODE RAMBLER & TOYOTA
Facility address: 1825 PARK ST
ALAMEDA, CA 94501
EPA ID: CAD981573264
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: RON GOODE
Owner/operator address: NOT REQUIRED

RON GOODE RAMBLER & TOYOTA (Continued) **1000116090**

NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 09/30/1986
Facility name: RON GOODE RAMBLER & TOYOTA
Classification: Large Quantity Generator

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 03/10/1994
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 07/08/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

RON GOODE RAMBLER & TOYOTA (Continued) **1000116090**

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002719121

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:

Gepaid:	CAD981573264
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1825 PARK ST
Mailing City,St,Zip:	ALAMEDA, CA 945011417
Gen County:	1
TSD EPA ID:	CAD982446890
TSD County:	San Joaquin
Waste Category:	Waste oil and mixed oil
Disposal Method:	Transfer Station
Tons:	.0417
Facility County:	1

Gepaid:	CAD981573264
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1825 PARK ST
Mailing City,St,Zip:	ALAMEDA, CA 945011417
Gen County:	1
TSD EPA ID:	CAD980887418
TSD County:	1
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	.8340
Facility County:	1

LUST:

Region:	STATE
Global Id:	T0600101156
Latitude:	37.75584
Longitude:	-122.246534
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1997-01-10 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-1258

RON GOODE RAMBLER & TOYOTA (Continued) **1000116090**

LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Waste Oil / Motor / Hydraulic / Lubricating
Site History: LUFT Con. LC 2HSCAW 401/10/199708/05/1997

LUST:
Region: 2
Facility Id: 01-1258
Facility Status: Case Closed
Case Number: 3799
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 12/31/1991
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01001376
Regulated By: UTNKI
Regulated ID: 00012714
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155226400
Mail To: Not reported
Mailing Address: 1825 PARK ST
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

HIST UST:
Region: STATE
Facility ID: 00000012714
Facility Type: Other
Other Type: NEW CAR DEALER
Total Tanks: 0002
Contact Name: DENNIS MINTER
Telephone: 4155226400
Owner Name: RON GOODE
Owner Address: 1825 PARK ST
Owner City,St,Zip: ALAMEDA, CA 94501

Tank Num: 001
Container Num: 1

RON GOODE RAMBLER & TOYOTA (Continued) **1000116090**

Year Installed: Not reported
Tank Capacity: 00000200
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: None

Tank Num: 002
Container Num: 2
Year Installed: 1973
Tank Capacity: 00000550
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None

CS:
Status: Case Closed
Record Id: RO0000603
PE: 5602

SWEEPS UST:
Status: Not reported
Comp Number: 12714
Number: Not reported
Board Of Equalization: 44-000191
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-012714-000001
Actv Date: Not reported
Capacity: 200
Tank Use: OIL
Stg: WASTE
Content: WASTE OIL
Number Of Tanks: 2

Status: Not reported
Comp Number: 12714
Number: Not reported
Board Of Equalization: 44-000191
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-012714-000002
Actv Date: Not reported
Capacity: 550
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: REG UNLEADED
Number Of Tanks: Not reported

RON GOODE RAMBLER & TOYOTA (Continued) **1000116090**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1258

BE219 **URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN** **US BROWNFIELDS** **1007266049**
North **2200-2288 EAST 12TH ST/23RD AVE** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.355 mi.
1875 ft. **Site 1 of 6 in cluster BE**

Relative:
Lower

Actual:
16 ft.

US BROWNFIELDS:
Recipient name: R9 TBA (Superfund Funded)
Project name: R9 TBA (Superfund Funded)
Property name: Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010600100
Parcel #: Not reported
Parcel size: 4.00
Latitude: 37.78372
Longitude: -122.23874
Region: 9
HCM label: Not reported
Map scale: Not reported
Point of reference: Not reported
Datum: Not reported
ACRES property ID: 11348
Start date: 9/30/2003
Completed date: 9/30/2003
Accomplishment type: Phase II Environmental Assessment
Accomplishment (acres): Not reported
Ownership entity: Not reported
Current use: Not reported
Current owner: Not reported
Future use: Not reported
Past use flag: Not reported
Future use flag: Not reported
Cleanup required: Not reported
Proprietary controls: Not reported
Gov. control: Not reported
Enforcement permit tools: Not reported
Info. devices: Not reported
Video available: Not reported
Photo available: Not reported
Usage type: Not reported
Not in state/tribal program: Not reported
IC data address: Not reported
IC in place date: Not reported
IC in place flag: Unknown
IC required flag: Not reported
NFA issue date: Not reported
State and tribal program date: Not reported
State and tribal program ID: Not reported
Air contaminated: Not reported
Air cleaned: Not reported
Asbestos found: Not reported
Asbestos cleaned: Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010600200
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11340
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010600301
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11353
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010600500
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11352
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010601100
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

ACRES property ID:	11351
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010601202
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11350
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010601302
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11349
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700100

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11345
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700200
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11344
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700300
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11343
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700400
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11342
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700501
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11341
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700603
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11347
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700704
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11346
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported
Recipient name:	R9 TBA (Superfund Funded)
Project name:	R9 TBA (Superfund Funded)
Property name:	Urban Promise Academy - Oakland Unified School Dis-Urban-Apn020-010700706
Parcel #:	Not reported
Parcel size:	4.00
Latitude:	37.78372
Longitude:	-122.23874
Region:	9
HCM label:	Not reported
Map scale:	Not reported
Point of reference:	Not reported
Datum:	Not reported
ACRES property ID:	11339
Start date:	9/30/2003
Completed date:	9/30/2003
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Not reported
Current use:	Not reported
Current owner:	Not reported

URBAN PROMISE ACADEMY - OAKLAND UNIFIED SCHOOL DIS-URBAN-APN (Continued) **1007266049**

Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Not reported
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Not reported
Video available:	Not reported
Photo available:	Not reported
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	Not reported
IC in place flag:	Unknown
IC required flag:	Not reported
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Not reported
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Not reported
Other metals cleaned:	Not reported
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Not reported
Petro products cleaned:	Not reported
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Not reported
Soil cleaned up:	Not reported
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Not reported
VOCs cleaned:	Not reported

BE220 **SOUTHERN PACIFIC** **HIST CORTESE** **S105025324**
North **12TH ST E. / 22ND AVE** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.360 mi.
1899 ft. **Site 2 of 6 in cluster BE**

Relative:
Lower

Actual:
16 ft.

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2149

BE221 **EXXON R/S #7-0238** **HAZNET** **S102808410**
North **2200 E 12TH ST** **EMI** **N/A**
1/4-1/2 **OAKLAND, CA 94606** **Alameda County CS**
0.360 mi. **SWEEPS UST**
1899 ft. **Site 3 of 6 in cluster BE**

Relative:
Lower

Actual:
16 ft.

HAZNET:
Gepaid: CAL000028844
Contact: EXXON CO USA
Telephone: 7136567761
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 2180
Mailing City,St,Zip: HOUSTON, TX 772522180
Gen County: 1
TSD EPA ID: CAD087210399
TSD County: 1
Waste Category: Other empty containers 30 gallons or more
Disposal Method: Recycler
Tons: .0200
Facility County: 1

Gepaid: CAL000028844
Contact: EXXON CO USA
Telephone: 7136567761
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 2180
Mailing City,St,Zip: HOUSTON, TX 772522180
Gen County: 1
TSD EPA ID: CAD043260702
TSD County: San Mateo
Waste Category: Unspecified aqueous solution
Disposal Method: Recycler
Tons: .2085
Facility County: 1

Gepaid: CAD982463606
Contact: EXXON CO USA
Telephone: 7136567761
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 2180
Mailing City,St,Zip: HOUSTON, TX 772522180
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture

EXXON R/S #7-0238 (Continued) **S102808410**

Disposal Method: Recycler
Tons: .2085
Facility County: 1

Gepaid: CAD982463606
Contact: EXXON CO USA
Telephone: 7136567761
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 2180
Mailing City,St,Zip: HOUSTON, TX 772522180
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Tons: .0834
Facility County: 1

Gepaid: CAD982463606
Contact: CAROLYN A JONES/WASTE ADMIN
Telephone: 7136569075
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 4552
Mailing City,St,Zip: HOUSTON, TX 772104552
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Tons: 0.16
Facility County: Not reported

Click this hyperlink while viewing on your computer to access
11 additional CA_HAZNET: record(s) in the EDR Site Report.

EMI:
Year: 2003
County Code: 1
Air Basin: SF
Facility ID: 15044
Air District Name: BA
SIC Code: 5541
Air District Name: BAY AREA AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 0
Reactive Organic Gases Tons/Yr: 0
Carbon Monoxide Emissions Tons/Yr: 0
NOX - Oxides of Nitrogen Tons/Yr: 0
SOX - Oxides of Sulphur Tons/Yr: 0
Particulate Matter Tons/Yr: 0
Part. Matter 10 Micrometers & Smllr Tons/Yr: 0

Year: 2004
County Code: 1

EXXON R/S #7-0238 (Continued) **S102808410**

Air Basin:	SF
Facility ID:	15044
Air District Name:	BA
SIC Code:	5541
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.044
Reactive Organic Gases Tons/Yr:	0.0307384
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	15044
Air District Name:	BA
SIC Code:	5541
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.083
Reactive Organic Gases Tons/Yr:	.0579838
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	15044
Air District Name:	BA
SIC Code:	5541
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.001
Reactive Organic Gases Tons/Yr:	.0006986
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2007
County Code:	1
Air Basin:	SF
Facility ID:	15044
Air District Name:	BA
SIC Code:	5541
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported

EXXON R/S #7-0238 (Continued) **S102808410**

Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

CS:

Status:	Remedial action (cleanup) Underway
Record Id:	RO0000390
PE:	5602

SWEEPS UST:

Status:	Not reported
Comp Number:	4545
Number:	Not reported
Board Of Equalization:	44-000285
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-004545-000001
Actv Date:	Not reported
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	3

Status:	Not reported
Comp Number:	4545
Number:	Not reported
Board Of Equalization:	44-000285
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-004545-000002
Actv Date:	Not reported
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	LEADED
Number Of Tanks:	Not reported

Status:	Not reported
Comp Number:	4545
Number:	Not reported
Board Of Equalization:	44-000285
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported

EXXON R/S #7-0238 (Continued) **S102808410**

Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-004545-000003
Actv Date: Not reported
Capacity: 7500
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: REG UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 4545
Number: 1
Board Of Equalization: 44-000285
Ref Date: 06-04-93
Act Date: 12-17-93
Created Date: 01-10-91
Tank Status: A
Owner Tank Id: 4
Swrcb Tank Id: 01-000-004545-000004
Actv Date: 06-04-93
Capacity: 550
Tank Use: PETROLEUM
Stg: W
Content: PETROLEUM
Number Of Tanks: 4

Status: A
Comp Number: 4545
Number: 1
Board Of Equalization: 44-000285
Ref Date: 06-04-93
Act Date: 12-17-93
Created Date: 01-10-91
Tank Status: A
Owner Tank Id: 5
Swrcb Tank Id: 01-000-004545-000005
Actv Date: 06-04-93
Capacity: 12000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 4545
Number: 1
Board Of Equalization: 44-000285
Ref Date: 06-04-93
Act Date: 12-17-93
Created Date: 01-10-91
Tank Status: A
Owner Tank Id: 6
Swrcb Tank Id: 01-000-004545-000006
Actv Date: 06-04-93
Capacity: 12000
Tank Use: M.V. FUEL

EXXON R/S #7-0238 (Continued) **S102808410**

Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 4545
Number: 1
Board Of Equalization: 44-000285
Ref Date: 06-04-93
Act Date: 12-17-93
Created Date: 01-10-91
Tank Status: A
Owner Tank Id: 7
Swrcb Tank Id: 01-000-004545-000007
Actv Date: 06-04-93
Capacity: 12000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

BE222 **EXXON** **LUST** **S106610916**
North **2200 12TH ST E** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.360 mi.
1899 ft. **Site 4 of 6 in cluster BE**

Relative:
Lower

Actual:
16 ft.

LUST:
Region: STATE
Global Id: T0600101343
Latitude: 37.783960241
Longitude: -122.238375
Case Type: LUST Cleanup Site
Status: Open - Remediation
Status Date: 1988-05-31 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-1455
LOC Case Number: RO0000390
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG MTBE=50,000 ppb apparently limited to onsite. Offsite wells fr02/24/199901/06/1998

LUST:
Region: 2
Facility Id: 01-1455
Facility Status: Remedial action (cleanup) Underway
Case Number: 245
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 5/30/1988
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 5/31/1988

EXXON (Continued) **S106610916**

Preliminary Site Assesment Began: 5/31/1988
Pollution Characterization Began: 11/30/1988
Pollution Remediation Plan Submitted: 11/30/1989
Date Remediation Action Underway: 9/4/1991
Date Post Remedial Action Monitoring Began: Not reported

BE223 **SOUTHERN PACIFIC TRANSPORTATION COMPANY** **Alameda County CS** **S106880544**
North **0 E 12TH ST / 22ND AVE** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.361 mi.
1904 ft. **Site 5 of 6 in cluster BE**

Relative:
Lower

Actual:
16 ft.

CS:
Status: Case Closed
Record Id: RO0000896
PE: 5602

BE224 **SENNA AUTOMOTIVE** **Notify 65** **S100179580**
North **2301 EAST 12TH STREET** **N/A**
1/4-1/2 **OAKLAND, CA 92626**
0.361 mi.
1906 ft. **Site 6 of 6 in cluster BE**

Relative:
Lower

Actual:
16 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

BD225 **CHEVRON** **LUST** **S101580404**
SW **1801 PARK ST** **CA FID UST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.367 mi. **SWEEPS UST**
1939 ft. **Site 2 of 3 in cluster BD** **HIST CORTESE**

Relative:
Lower

Actual:
19 ft.

LUST:
Region: STATE
Global Id: T0600101945
Latitude: 37.768797
Longitude: -122.238838
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1998-03-04 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2119
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG 45ppb MtBE 90’ from former USTs03/04/1998

CHEVRON (Continued) **S101580404**

LUST:
Region: 2
Facility Id: 01-2119
Facility Status: Case Closed
Case Number: 3581
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 6/5/1997
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01002794
Regulated By: UTNKA
Regulated ID: 00062629
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 5105225990
Mail To: Not reported
Mailing Address: 2410 CAMINO RAMON
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Case Closed
Record Id: RO0000805
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 62629
Number: 3
Board Of Equalization: 44-031913
Ref Date: 10-05-93
Act Date: 04-29-94
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-062629-000001
Actv Date: 10-05-93
Capacity: 10000
Tank Use: M.V. FUEL

CHEVRON (Continued) **S101580404**

Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	3
Status:	A
Comp Number:	62629
Number:	3
Board Of Equalization:	44-031913
Ref Date:	10-05-93
Act Date:	04-29-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	2
Swrcb Tank Id:	01-000-062629-000002
Actv Date:	10-05-93
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	PRM UNLEADED
Number Of Tanks:	Not reported
Status:	A
Comp Number:	62629
Number:	3
Board Of Equalization:	44-031913
Ref Date:	10-05-93
Act Date:	04-29-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	3
Swrcb Tank Id:	01-000-062629-000003
Actv Date:	10-05-93
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	PLUS UNLEADE
Number Of Tanks:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-2119

BD226 **ALAMEDA AUTO REPAIR** **HAZNET** **S103636970**
SW **1800 PARK ST** **HIST CORTESE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.367 mi.
1939 ft. **Site 3 of 3 in cluster BD**

Relative:
Lower

Actual:
19 ft.

HAZNET:

Gepaid:	CAL000064403
Contact:	DIMALANTA VIRGILIO P
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1800 PARK ST

ALAMEDA AUTO REPAIR (Continued) **S103636970**

Mailing City,St,Zip: ALAMEDA, CA 945011418
Gen County: 1
TSD EPA ID: CAT080013352
TSD County: Los Angeles
Waste Category: Aqueous solution with 10% or more total organic residues
Disposal Method: Recycler
Tons: .2085
Facility County: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1559

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227 **CAMISA BROS ROOFING** **LUST** **S102426268**
South **1901 BROADWAY** **Alameda County CS** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **HIST CORTESE**
0.368 mi.
1943 ft.

Relative:
Lower

Actual:
15 ft.

LUST:
Region: STATE
Global Id: T0600101918
Latitude: 37.767789
Longitude: -122.233506
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1995-08-09 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2087
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCA 08/09/1995

LUST:
Region: 2
Facility Id: 01-2087
Facility Status: Case Closed
Case Number: 310
How Discovered: OM
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CAMISA BROS ROOFING (Continued) **S102426268**

CS:
Status: Case Closed
Record Id: RO0000849
PE: 5602

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2087

BF228 **ENGINE WORKS** **HAZNET S103643231**
WSW **2241 CLEMENT** **HIST CORTESE N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.382 mi.
2018 ft. **Site 1 of 5 in cluster BF**

Relative:
Lower

Actual:
14 ft.

HAZNET:
Gepaid: CAL000081641
Contact: ERIC QUAN
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2241 CLEMENT AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .2293
Facility County: 1

Gepaid: CAL000081641
Contact: ERIC QUAN
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2241 CLEMENT AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .2293
Facility County: 1

Gepaid: CAL000081641
Contact: ERIC QUAN
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2241 CLEMENT AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAD980887418

ENGINE WORKS (Continued) **S103643231**

TSD County: 1
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .4586
Facility County: 1

Gepaid: CAL000081641
Contact: --
Telephone: --
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2241 CLEMENT AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: Alameda
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 0.2
Facility County: Not reported

Click this hyperlink while viewing on your computer to access
-1 additional CA_HAZNET: record(s) in the EDR Site Report.

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 3214

BF229 **CLEMENT AVENUE PROJECT** **LUST** **S105870859**
WSW **2241 CLEMENT AVE** **Alameda County CS** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.382 mi.
2018 ft. **Site 2 of 5 in cluster BF**

Relative:
Lower

Actual:
14 ft.

LUST:
Region: STATE
Global Id: T0600100389
Latitude: 37.771533
Longitude: -122.241858
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-03-16 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0429
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Waste Oil / Motor / Hydraulic / Lubricating
Site History: LUFT Con. LC 3- 03/13/1996

LUST:
Region: 2
Facility Id: 01-0429

CLEMENT AVENUE PROJECT (Continued) **S105870859**

Facility Status: Case Closed
Case Number: 1325
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Case Closed
Record Id: RO0001131
PE: 5602

BG230 **CHEVRON** **LUST** **S106610910**
North **2142 12TH ST E** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.386 mi.
2039 ft. **Site 1 of 2 in cluster BG**

Relative:
Lower

Actual:
14 ft.

LUST:
Region: STATE
Global Id: T0600101235
Latitude: 37.7841
Longitude: -122.238
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-01-26 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-1340
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG R 01/07/199712/16/1997

LUST:
Region: 2
Facility Id: 01-1340
Facility Status: Case Closed
Case Number: 3908
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 7/21/1992
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 11/2/1989
Pollution Characterization Began: 7/27/1992
Pollution Remediation Plan Submitted: Not reported

CHEVRON (Continued) **S106610910**

Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

BG231 **CHEVRON USA #201919** **CA FID UST** **S101580134**
North **2142 E 12TH ST** **Alameda County CS** **N/A**
1/4-1/2 **OAKLAND, CA 94606** **SWEEPS UST**
0.386 mi.
2039 ft. **Site 2 of 2 in cluster BG**

Relative:
Lower

Actual:
14 ft.

CA FID UST:

Facility ID:	01001452
Regulated By:	UTNKA
Regulated ID:	00067187
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4154363777
Mail To:	Not reported
Mailing Address:	P O BOX
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94606
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Active

CS:

Status:	Case Closed
Record Id:	RO0001009
PE:	5602

SWEEPS UST:

Status:	A
Comp Number:	67187
Number:	1
Board Of Equalization:	44-031913
Ref Date:	11-10-93
Act Date:	05-06-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	1
Swrcb Tank Id:	01-000-067187-000001
Actv Date:	06-06-93
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	4

Status:	A
Comp Number:	67187
Number:	1
Board Of Equalization:	44-031913
Ref Date:	11-10-93
Act Date:	05-06-94

CHEVRON USA #201919 (Continued) **S101580134**

Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	2
Swrcb Tank Id:	01-000-067187-000002
Actv Date:	06-06-93
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	PRM UNLEADED
Number Of Tanks:	Not reported

Status:	A
Comp Number:	67187
Number:	1
Board Of Equalization:	44-031913
Ref Date:	11-10-93
Act Date:	05-06-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	3
Swrcb Tank Id:	01-000-067187-000003
Actv Date:	06-06-93
Capacity:	12000
Tank Use:	M.V. FUEL
Stg:	P
Content:	PRM UNLEADED
Number Of Tanks:	Not reported

Status:	A
Comp Number:	67187
Number:	1
Board Of Equalization:	44-031913
Ref Date:	11-10-93
Act Date:	05-06-94
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	4
Swrcb Tank Id:	01-000-067187-000004
Actv Date:	06-06-93
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	DIESEL
Number Of Tanks:	Not reported

BF232 **COLLINS PROPERTY** **VCP** **S106568166**
WSW **2235 CLEMENT AVENUE** **ENVIROSTOR** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.387 mi.
2043 ft. **Site 3 of 5 in cluster BF**

Relative:
Lower

Actual:
14 ft.

VCP:

Facility ID:	01390007
Site Type:	Voluntary Cleanup
Site Type Detail:	Voluntary Cleanup
Acres:	6.8
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP

COLLINS PROPERTY (Continued) **S106568166**

Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	Not reported
Supervisor:	Denise Tsuji
Division Branch:	Berkeley
Site Code:	201542
Assembly:	16
Senate:	09
Special Programs Code:	Voluntary Cleanup Program
Status:	Certified
Status Date:	2007-03-15 00:00:00
Restricted Use:	NO
Funding:	Responsible Party
Lat/Long:	37.7718098564758 / -122.240329020335
Alias Name:	01390007
Alias Type:	Envirostor ID Number
Alias Name:	COLLINS PROPERTY
Alias Type:	Alternate Name
Alias Name:	201542
Alias Type:	Project Code (Site Code)
Alias Name:	110033613427
Alias Type:	EPA (FRS #)
Alias Name:	071-0290-002-00
Alias Type:	APN
APN:	071-0290-002-00
APN Description:	Not reported
Comments:	Fact sheet finalized and scheduled to be mailed out 2/18/2006. Public comment period from 2/22/20006 to 3/24/2006.Public notice finalized. Notice will be published in the Alameda Times Star on 2/22/2006.VCA signed.Site remediated to unrestricted standards.Backfilling completed.Final remedy approved requiring removal of all contaminated soils above unrestricted levels.The property owner excavated and disposed off-site all contamination above unrestricted levels.Community Profile approved by Public Participation.NOE sign off.

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Fact Sheets
Completed Date:	2006-02-17 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Public Notice
Completed Date:	2006-02-17 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Voluntary Cleanup Agreement
Completed Date:	2004-03-29 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Certification
Completed Date:	2007-03-15 00:00:00

COLLINS PROPERTY (Continued) **S106568166**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2006-04-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2006-04-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2007-03-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Community Profile
Completed Date: 2006-02-09 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2006-10-12 00:00:00

Confirmed: 30019,30024,30001,30013
Confirmed Description: Polynuclear aromatic hydrocarbons (PAHs)
Confirmed Description: TPH-diesel
Confirmed Description: Arsenic
Confirmed Description: Lead
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30001, 30013, 30019, 30024
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MACHINE SHOP, MANUFACTURING - METAL, SHIPYARD - SHIP BUILDING/REPAIR

ENVIROSTOR:
Site Type: Voluntary Cleanup
Site Type Detailed: Voluntary Cleanup
Acres: 6.8
NPL: NO

COLLINS PROPERTY (Continued) **S106568166**

Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: Not reported
Supervisor: Denise Tsuji
Division Branch: Berkeley
Facility ID: 01390007
Site Code: 201542
Assembly: 16
Senate: 09
Special Program: Voluntary Cleanup Program
Status: Certified
Status Date: 2007-03-15 00:00:00
Restricted Use: NO
Funding: Responsible Party
Latitude: 37.7718098564758
Longitude: -122.240329020335
Alias Name: 01390007
Alias Type: Envirostor ID Number
Alias Name: COLLINS PROPERTY
Alias Type: Alternate Name
Alias Name: 201542
Alias Type: Project Code (Site Code)
Alias Name: 110033613427
Alias Type: EPA (FRS #)
Alias Name: 071-0290-002-00
Alias Type: APN

APN: 071-0290-002-00
APN Description: Not reported
Comments: Fact sheet finalized and scheduled to be mailed out 2/18/2006. Public comment period from 2/22/20006 to 3/24/2006.Public notice finalized. Notice will be published in the Alameda Times Star on 2/22/2006.VCA signed.Site remediated to unrestricted standards.Backfilling completed.Final remedy approved requiring removal of all contaminated soils above unrestricted levels.The property owner excavated and disposed off-site all contamination above unrestricted levels.Community Profile approved by Public Participation.NOE sign off.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2006-02-17 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Public Notice
Completed Date: 2006-02-17 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2004-03-29 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification

COLLINS PROPERTY (Continued) **S106568166**

Completed Date: 2007-03-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2006-04-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2006-04-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2007-03-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Community Profile
Completed Date: 2006-02-09 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2006-10-12 00:00:00

Confirmed: 30019,30024,30001,30013
Confirmed Description: Polynuclear aromatic hydrocarbons (PAHs)
Confirmed Description: TPH-diesel
Confirmed Description: Arsenic
Confirmed Description: Lead
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30001, 30013, 30019, 30024
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MACHINE SHOP, MANUFACTURING - METAL, SHIPYARD - SHIP BUILDING/REPAIR

BF233 **RELIANCE SHEET & STRIP COMPANY** **CHMIRS** **S101623481**
WSW **2235 CLEMENT AVE** **CA FID UST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.387 mi. **SWEEPS UST**
2043 ft. **Site 4 of 5 in cluster BF** **HIST CORTESE**

Relative:
Lower

Actual:
14 ft.

CHMIRS:

OES Incident Number:	05-0671
OES notification:	1/27/200504:43:24 PM
OES Date:	Not reported
OES Time:	Not reported
Incident Date:	Not reported
Date Completed:	**Not reported**
Property Use:	Not reported
Agency Id Number:	Not reported
Agency Incident Number:	Not reported
Time Notified:	Not reported
Time Completed:	Not reported
Surrounding Area:	Not reported
Estimated Temperature:	Not reported
Property Management:	Not reported
Special Studies 1:	Not reported
Special Studies 2:	Not reported
Special Studies 3:	Not reported
Special Studies 4:	Not reported
Special Studies 5:	Not reported
Special Studies 6:	Not reported
More Than Two Substances Involved?:	Not reported
Resp Agncy Personel # Of Decontaminated:	Not reported
Responding Agency Personel # Of Injuries:	Not reported
Responding Agency Personel # Of Fatalities:	Not reported
Others Number Of Decontaminated:	Not reported
Others Number Of Injuries:	Not reported
Others Number Of Fatalities:	Not reported
Vehicle Make/year:	Not reported
Vehicle License Number:	Not reported
Vehicle State:	Not reported
Vehicle Id Number:	Not reported
CA/DOT/PUC/ICC Number:	Not reported
Company Name:	Not reported
Reporting Officer Name/ID:	Not reported
Report Date:	Not reported
Comments:	Not reported
Facility Telephone:	Not reported
Waterway Involved:	Not reported
Waterway:	San Francisco Bay
Spill Site:	Not reported
Cleanup By:	Unknown
Containment:	Not reported
What Happened:	Not reported
Type:	Not reported
Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	2005
Agency:	Region 2 OES
Incident Date:	1/27/200512:00:00 AM
Admin Agency:	Alameda County Environmental Health
Amount:	Not reported

RELIANCE SHEET & STRIP COMPANY (Continued) **S101623481**

Contained:	Unknown
Site Type:	Ship/Harbor/Port
E Date:	Not reported
Substance:	Vessel
Quantity Released:	Not reported
BBLS:	0
Cups:	0
CUFT:	0
Gallons:	0.000000
Grams:	0
Pounds:	0
Liters:	0
Ounces:	0
Pints:	0
Quarts:	0
Sheen:	0
Tons:	0
Unknown:	0
Description:	Not reported
Evacuations:	0
Number of Injuries:	0
Number of Fatalities:	0
Description:	Per caller, a vessel is leaking fuel in the Oakland Estuary

CA FID UST:

Facility ID:	01000561
Regulated By:	UTNKI
Regulated ID:	00031805
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	Not reported
Mail To:	Not reported
Mailing Address:	2235 CLEMENT AVE
Mailing Address 2:	Not reported
Mailing City,St,Zip:	ALAMEDA 94501
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

CS:

Status:	Case Transferred
Record Id:	RO0002538
PE:	5502

SWEEPS UST:

Status:	Not reported
Comp Number:	31805
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported

RELIANCE SHEET & STRIP COMPANY (Continued) **S101623481**

Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-031805-000001
Actv Date: Not reported
Capacity: 1
Tank Use: M.V. FUEL
Stg: PRODUCT
Content: LEADED
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0429

BH234 **CHEVRON** **LUST** **S102426849**
East **3616 SAN LEANDRO ST** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.390 mi.
2057 ft. **Site 1 of 3 in cluster BH**

Relative:
Higher

Actual:
29 ft.

LUST:
Region: STATE
Global Id: T0600100333
Latitude: 37.773426578
Longitude: -122.2226055
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1988-07-12 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-0362
LOC Case Number: RO0000233
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3,A,W,H,S,G MTBE= 216 ppb in VH-1 (11/24/99) no sensitive receptors nearby01/07/1999

LUST:
Region: 2
Facility Id: 01-0362
Facility Status: Preliminary site assessment underway
Case Number: 4249
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 9/15/1988
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 9/15/1989
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

BH235 **CHEVRON TRAINING CENTER** **LUST** **S109283914**
East **3616 SAN LEANDRO ST** **N/A**
1/4-1/2 **OAKLAND, CA 94621**
0.390 mi.
2057 ft. **Site 2 of 3 in cluster BH**

Relative:
Higher

Actual:
29 ft.

LUST:

Region:	STATE
Global Id:	T0600101675
Latitude:	37.751174
Longitude:	-122.193308
Case Type:	LUST Cleanup Site
Status:	Open - Site Assessment
Status Date:	1996-08-22 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-1807
LOC Case Number:	Not reported
File Location:	Not reported
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Waste Oil / Motor / Hydraulic / Lubricating
Site History:	Not reported

BH236 **TERRY MCILRAITH** **HAZNET** **S103655399**
East **3616 SAN LEANDRO ST** **Alameda County CS** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.390 mi.
2057 ft. **Site 3 of 3 in cluster BH**

Relative:
Higher

Actual:
29 ft.

HAZNET:

Gepaid:	CAP400100100
Contact:	Not reported
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	Not reported
Mailing City,St,Zip:	000000000
Gen County:	0
TSD EPA ID:	CAT000613893
TSD County:	Los Angeles
Waste Category:	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method:	Not reported
Tons:	.6240
Facility County:	0

CS:

Status:	Pollution Characterization
Record Id:	RO0000233
PE:	5602

BF237 **FOX PROPERTY** **HAZNET** **S101641239**
WSW **2229 CLEMENT AVE** **SLIC** **N/A**
1/4-1/2 **ALAMEDA, CA**
0.391 mi.
2067 ft. **Site 5 of 5 in cluster BF**

Relative:
Lower

Actual:
14 ft.

HAZNET:

Gepaid:	CAC002569711
Contact:	TYSON APPEL
Telephone:	9252504056
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	4070 NELSON AVE
Mailing City,St,Zip:	CONCORD, CA 94520
Gen County:	Alameda
TSD EPA ID:	CAT000646117
TSD County:	Alameda
Waste Category:	Other inorganic solid waste
Disposal Method:	Disposal, Land Fill
Tons:	18
Facility County:	1

Gepaid:	CAL000089756
Contact:	HAROLD E NELSON
Telephone:	5105365548
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1074
Mailing City,St,Zip:	ALAMEDA, CA 945010110
Gen County:	1
TSD EPA ID:	CAD000633164
TSD County:	Imperial
Waste Category:	Metal dust - machining waste and Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method:	Disposal, Land Fill
Tons:	.1500
Facility County:	1

Gepaid:	CAL000089756
Contact:	HAROLD E NELSON
Telephone:	5105365548
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1074
Mailing City,St,Zip:	ALAMEDA, CA 945010110
Gen County:	1
TSD EPA ID:	CAL000121946
TSD County:	Marin
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	Recycler
Tons:	.0291
Facility County:	1

Gepaid:	CAL000089756
Contact:	HAROLD E NELSON
Telephone:	5105365548
Facility Addr2:	Not reported

FOX PROPERTY (Continued) **S101641239**

Mailing Name: Not reported
Mailing Address: PO BOX 1074
Mailing City,St,Zip: ALAMEDA, CA 945010110
Gen County: 1
TSD EPA ID: WAD991281767
TSD County: 99
Waste Category: Other organic solids
Disposal Method: Disposal, Land Fill
Tons: 4.7955
Facility County: 1

Click this hyperlink while viewing on your computer to access
-1 additional CA_HAZNET: record(s) in the EDR Site Report.

SLIC:
Region: STATE
Facility Status: Open - Inactive
Status Date: 2009-01-01 00:00:00
Global Id: SLT2O005918
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.7713
Longitude: -122.2416
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01S0274
File Location: Not reported
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

SLIC:
Region: 2
Facility ID: 01S0274
Facility Status: Leak being confirmed
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

BI238 **SKS DIE CASTING INCORPORATED** **RCRA-SQG** **1000395880**
SW **1849 OAK ST.** **FINDS** **CAD009205048**
1/4-1/2 **ALAMEDA, CA 94501** **HAZNET**
0.394 mi. **NPDES**
2080 ft. **Site 1 of 2 in cluster BI** **Alameda County CS**
CA WDS

Relative:
Lower

Actual:
18 ft.

RCRA-SQG:

Date form received by agency:	03/20/1996
Facility name:	SKS DIE CASTING AND MACHINING
Facility address:	1849 OAK ST ALAMEDA, CA 94501
EPA ID:	CAD009205048
Contact:	JEFF RATTO
Contact address:	1849 OAK ST ALAMEDA, CA 94501
Contact country:	US
Contact telephone:	(510) 523-2541
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	SKS DIE CASTING AND MACHINING
Owner/operator address:	1849 OAK ST ALAMEDA, CA 94501
Owner/operator country:	Not reported
Owner/operator telephone:	(510) 523-2541
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown

SKS DIE CASTING INCORPORATED (Continued) **1000395880**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 06/20/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110000495786

California - Hazardous Waste Tracking System - Datamart

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that these facilities release directly to air, water, land, or that are transported off-site.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD009205048
Contact: JEROME W KEATING-PRESIDENT
Telephone: 5105232541
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1849 OAK ST
Mailing City,St,Zip: ALAMEDA, CA 945011412
Gen County: 1
TSD EPA ID: CAT080013352
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: 4.5869
Facility County: 1

Gepaid: CAD009205048
Contact: JEROME W KEATING-PRESIDENT
Telephone: 5105232541

SKS DIE CASTING INCORPORATED (Continued) **1000395880**

Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1849 OAK ST
Mailing City,St,Zip: ALAMEDA, CA 945011412
Gen County: 1
TSD EPA ID: CAD097030993
TSD County: Los Angeles
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Recycler
Tons: 1.8348
Facility County: 1

Gepaid: CAD009205048
Contact: JEROME W KEATING-PRESIDENT
Telephone: 5105232541
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1849 OAK ST
Mailing City,St,Zip: ALAMEDA, CA 945011412
Gen County: 1
TSD EPA ID: CAT080033681
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: Recycler
Tons: .3500
Facility County: 1

Gepaid: CAD009205048
Contact: JEROME W KEATING-PRESIDENT
Telephone: 5105232541
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1849 OAK ST
Mailing City,St,Zip: ALAMEDA, CA 945011412
Gen County: 1
TSD EPA ID: CAT080013352
TSD County: Los Angeles
Waste Category: Unspecified solvent mixture Waste
Disposal Method: Recycler
Tons: .2293
Facility County: 1

Gepaid: CAD009205048
Contact: JEROME W KEATING-PRESIDENT
Telephone: 5105232541
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1849 OAK ST
Mailing City,St,Zip: ALAMEDA, CA 945011412
Gen County: 1
TSD EPA ID: CAT080013352
TSD County: Los Angeles
Waste Category: Unspecified aqueous solution
Disposal Method: Recycler
Tons: 2.2935
Facility County: 1

SKS DIE CASTING INCORPORATED (Continued) **1000395880**

Click this hyperlink while viewing on your computer to access
61 additional CA_HAZNET: record(s) in the EDR Site Report.

NPDES:

Npdes Number:	Not reported
Facility Status:	Active
Agency Id:	41187
Region:	2
Regulatory Measure Id:	180689
Order No:	Not reported
Order No Of General Order:	97-03-DWQ
Regulatory Measure Type:	Storm water industrial
Place Id:	257348
WDID:	2 01I002229
Program Type:	INDSTW
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	3/31/1992
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	SKS Die Casting
Discharge Address:	1849 Oak St
Discharge Address2:	Not reported
Discharge City:	Alameda
Discharge State:	CA
Discharge Zip:	94501

CS:

Status:	Case Closed
Record Id:	RO0002639
PE:	5502

CA WDS:

Facility ID:	San Francisco Bay 01I002229
Facility Type:	Not reported
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion:	2
Facility Telephone:	Not reported
Facility Contact:	Not reported
Agency Name:	SKS DIE CASTING
Agency Address:	Not reported
Agency City,St,Zip:	0
Agency Contact:	Not reported
Agency Telephone:	Not reported
Agency Type:	Not reported
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste:	Not reported
Primary Waste Type:	Not reported
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	Not reported

SKS DIE CASTING INCORPORATED (Continued) **1000395880**

POTW: Not reported
Treat To Water: Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

BI239 **SKS DIE CASTING AND MACHINING** **SLIC** **S108246079**
SW **1849 OAK** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.394 mi.
2080 ft. **Site 2 of 2 in cluster BI**

Relative: **Lower**
Actual: **18 ft.**

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 1997-11-04 00:00:00
Global Id: T06019723918
Lead Agency: ALAMEDA COUNTY LOP
Lead Agency Case Number: Not reported
Latitude: 37.77066
Longitude: -122.241264
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: Not reported
File Location: Local Agency
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: Not reported

BJ240 **FRUITVALE TRANSIT VILLAGE** **SLIC** **S107138705**
East **3501-3601 E 12TH ST** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.406 mi.
2142 ft. **Site 1 of 2 in cluster BJ**

Relative: **Higher**
Actual: **35 ft.**

SLIC:
Region: STATE
Facility Status: **Open - Verification Monitoring**
Status Date: 2006-08-30 00:00:00
Global Id: SL0600154423
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.775120434
Longitude: -122.222695922
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported

FRUITVALE TRANSIT VILLAGE (Continued) **S107138705**

RB Case Number: 01S0639
File Location: Regional Board
Potential Media Affected: Other Groundwater (uses other than drinking water), Soil, Soil Vapor
Potential Contaminants of Concern: Chromium, Gasoline, Waste Oil / Motor / Hydraulic / Lubricating
Site History: Soil beneath the site has been impacted from the past site uses that included an auto sales yard, and radiator and plastic fabrication shops. The soil contaminants include chromium, diesel and motor oil. The soil contamination is minor and does notappear to pose a significant risks to future site occupants. The groundwater contamination is a part of an off-site plume which is being actively remediated, and therefore is expected to decrease in the future. The magnetometer survey did not confirm the presence of suspected USTs at the site. The soil gas investigation results indicated that fuel hydrocarbons are not present in soil gas beneath the subject site, therefore there is no risk from vapor volatilization to indoor air in future sitebuildings. The RAP including the soil and groundwater management plans will be submitted for the Board approval prior to site reconstruction field activities.

BJ241 **BART PARKING LOT** **US BROWNFIELDS** **1008377100**
East **3501-3601 E. 12TH STREET** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.406 mi.
2142 ft. **Site 2 of 2 in cluster BJ**

Relative:
Higher

Actual:
35 ft.

US BROWNFIELDS:

Recipient name:	Oakland, City of
Project name:	Oakland, CA
Property name:	BART Parking Lot
Parcel #:	033-2197-019 and 033-2177-021
Parcel size:	3.64
Latitude:	37.77604
Longitude:	-122.22301
Region:	9
HCM label:	Address Matching-House Number
Map scale:	1:24,000
Point of reference:	Entrance Point of a Facility or Station
Datum:	World Geodetic System of 1984
ACRES property ID:	15202
Start date:	9/30/1997
Completed date:	9/30/1997
Accomplishment type:	Phase I Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Government
Current use:	Parking lot for BART commuters
Current owner:	Bay Area Rapid Transit
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Yes
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Yes
Video available:	No
Photo available:	Yes
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	4/28/2006

BART PARKING LOT (Continued) **1008377100**

IC in place flag:	Unknown
IC required flag:	Yes
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Yes
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes

Recipient name:	San Francisco Bay Area Rapid Transit District
Project name:	SF BART,CA- Fruitvale Parking (C03)
Property name:	BART Parking Lot
Parcel #:	033-2197-019 and 033-2177-021
Parcel size:	3.64
Latitude:	37.77604
Longitude:	-122.22301
Region:	9
HCM label:	Address Matching-House Number
Map scale:	1:24,000
Point of reference:	Entrance Point of a Facility or Station
Datum:	World Geodetic System of 1984
ACRES property ID:	15202

BART PARKING LOT (Continued) **1008377100**

Start date:	10/8/2004
Completed date:	10/8/2004
Accomplishment type:	Phase I Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Government
Current use:	Parking lot for BART commuters
Current owner:	Bay Area Rapid Transit
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Yes
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Yes
Video available:	No
Photo available:	Yes
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	4/28/2006
IC in place flag:	Unknown
IC required flag:	Yes
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Yes
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water affected:	Not reported

BART PARKING LOT (Continued) **1008377100**

Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Recipient name:	San Francisco Bay Area Rapid Transit District
Project name:	SF BART,CA- Fruitvale Parking (C03)
Property name:	BART Parking Lot
Parcel #:	033-2197-019 and 033-2177-021
Parcel size:	3.64
Latitude:	37.77604
Longitude:	-122.22301
Region:	9
HCM label:	Address Matching-House Number
Map scale:	1:24,000
Point of reference:	Entrance Point of a Facility or Station
Datum:	World Geodetic System of 1984
ACRES property ID:	15202
Start date:	11/15/2005
Completed date:	11/15/2005
Accomplishment type:	Phase II Environmental Assessment
Accomplishment (acres):	Not reported
Ownership entity:	Government
Current use:	Parking lot for BART commuters
Current owner:	Bay Area Rapid Transit
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Yes
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Yes
Video available:	No
Photo available:	Yes
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	4/28/2006
IC in place flag:	Unknown
IC required flag:	Yes
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Yes

BART PARKING LOT (Continued) **1008377100**

Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes

Recipient name:	San Francisco Bay Area Rapid Transit District
Project name:	SF BART,CA- Fruitvale Parking (C03)
Property name:	BART Parking Lot
Parcel #:	033-2197-019 and 033-2177-021
Parcel size:	3.64
Latitude:	37.77604
Longitude:	-122.22301
Region:	9
HCM label:	Address Matching-House Number
Map scale:	1:24,000
Point of reference:	Entrance Point of a Facility or Station
Datum:	World Geodetic System of 1984
ACRES property ID:	15202
Start date:	4/28/2006
Completed date:	Not reported
Accomplishment type:	Cleanup Activity
Accomplishment (acres):	Not reported
Ownership entity:	Government
Current use:	Parking lot for BART commuters
Current owner:	Bay Area Rapid Transit
Future use:	Not reported
Past use flag:	Not reported
Future use flag:	Not reported
Cleanup required:	Yes
Proprietary controls:	Not reported
Gov. control:	Not reported
Enforcement permit tools:	Not reported
Info. devices:	Yes

BART PARKING LOT (Continued) **1008377100**

Video available:	No
Photo available:	Yes
Usage type:	Not reported
Not in state/tribal program:	Not reported
IC data address:	Not reported
IC in place date:	4/28/2006
IC in place flag:	Unknown
IC required flag:	Yes
NFA issue date:	Not reported
State and tribal program date:	Not reported
State and tribal program ID:	Not reported
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Not reported
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Yes
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
None found:	Not reported
None cleaned up:	Not reported
No media found:	Not reported
No media cleaned up:	Not reported
Other found:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
PAHs found:	Not reported
PAHs cleaned up:	Not reported
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water affected:	Not reported
Surface water cleaned:	Not reported
Unknown found:	Not reported
Unknwon cleaned:	Not reported
Unknown media:	Not reported
Unknown media cleaned:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes

Property Description: Over 30 residential and commercial parcels, parking lot

BK242 **AMERICAN NATIONAL CAN** **SLIC** **1007156428**
ESE **3801 E 8TH ST** **ENVIROSTOR** **N/A**
1/4-1/2 **OAKLAND, CA**
0.413 mi.
2183 ft. **Site 1 of 4 in cluster BK**

Relative:
Higher

Actual:
22 ft.

SLIC:
Region: STATE
Facility Status: Completed - Case Closed
Status Date: 1997-12-23 00:00:00
Global Id: SL18267688
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.771469
Longitude: -122.222758
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: SL18267688
File Location: Not reported
Potential Media Affected: Not reported
Potential Contaminants of Concern: Not reported
Site History: No Further Action Letters on January 5, 1998 and December 23, 1997.

SLIC:
Region: 2
Facility ID: SL18267688
Facility Status: Not reported
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

ENVIROSTOR:
Site Type: Corrective Action
Site Type Detailed: Corrective Action
Acres: 0.01
NPL: NO
Regulatory Agencies: RWQCB 2 - San Francisco Bay
Lead Agency: RWQCB 2 - San Francisco Bay
Program Manager: Not reported
Supervisor: Referred - Not Assigned
Division Branch: Berkeley
Facility ID: 80001614
Site Code: Not reported
Assembly: 16
Senate: 16
Special Program: Not reported
Status: Refer: RWQCB
Status Date: 2008-01-01 00:00:00

AMERICAN NATIONAL CAN (Continued) **1007156428**

Restricted Use: NO
Funding: Not reported
Latitude: 37.77091
Longitude: -122.223691
Alias Name: CAD009162116
Alias Type: EPA Identification Number
Alias Name: 80001614
Alias Type: Envirostor ID Number

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported
Completed Document Type: Not reported
Completed Date: Not reported

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: NONE SPECIFIED
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: NONE SPECIFIED

BK243 **AMERICAN NATIONAL CAN CO** **HAZNET** **1006933886**
ESE **3801 E 8TH ST** **Alameda County CS** **N/A**
1/4-1/2 **OAKLAND, CA 94604**
0.413 mi.
2183 ft. **Site 2 of 4 in cluster BK**

Relative:
Higher

Actual:
22 ft.

HAZNET:
Gepaid: CAD009162116
Contact: AMERICAN NATIONAL CAN CO
Telephone: 4157723900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 8770 W BRYN MAWR AVE STE 13J
Mailing City,St,Zip: CHICAGO, IL 606313515
Gen County: 1
TSD EPA ID: CAD043260702
TSD County: San Mateo
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler

AMERICAN NATIONAL CAN CO (Continued) **1006933886**

Tons: 8.7570
Facility County: 1

Gepaid: CAD009162116
Contact: AMERICAN NATIONAL CAN CO
Telephone: 4157723900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 8770 W BRYN MAWR AVE STE 13J
Mailing City,St,Zip: CHICAGO, IL 606313515
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: Not reported
Tons: 4.8372
Facility County: 1

Gepaid: CAD009162116
Contact: AMERICAN NATIONAL CAN CO
Telephone: 4157723900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 8770 W BRYN MAWR AVE STE 13J
Mailing City,St,Zip: CHICAGO, IL 606313515
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: Recycler
Tons: .4587
Facility County: 1

Gepaid: CAD009162116
Contact: AMERICAN NATIONAL CAN CO
Telephone: 4157723900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 8770 W BRYN MAWR AVE STE 13J
Mailing City,St,Zip: CHICAGO, IL 606313515
Gen County: 1
TSD EPA ID: CAT000646117
TSD County: Kings
Waste Category: Contaminated soil from site clean-ups
Disposal Method: Disposal, Other
Tons: 1.7500
Facility County: 1

Gepaid: CAD009162116
Contact: AMERICAN NATIONAL CAN CO
Telephone: 4157723900
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 8770 W BRYN MAWR AVE STE 13J
Mailing City,St,Zip: CHICAGO, IL 606313515
Gen County: 1
TSD EPA ID: CAT000646117

AMERICAN NATIONAL CAN CO (Continued) **1006933886**

TSD County: Kings
Waste Category: Contaminated soil from site clean-ups
Disposal Method: Not reported
Tons: .0000
Facility County: 1

Click this hyperlink while viewing on your computer to access
18 additional CA_HAZNET: record(s) in the EDR Site Report.

CS:
Status: Case Closed
Record Id: RO0000797
PE: 5602

BK244 **AMERICAN NATIONAL CAN CO** **RCRA-SQG** **1000360806**
ESE **3801 EAST 8TH ST** **FINDS** **CAD009162116**
1/4-1/2 **OAKLAND, CA 94601** **RCRA-TSDF**
0.413 mi. **CORRACTS**
2183 ft. **Site 3 of 4 in cluster BK** **CERC-NFRAP**
FTTS

Relative:
Higher

Actual:
22 ft.

RCRA-SQG:
Date form received by agency: 09/01/1996
Facility name: AMERICAN CAN PACKAGING INC
Facility address: 3801 E 8TH ST
OAKLAND, CA 94604
EPA ID: CAD009162116
Mailing address: 3801 EAST EIGHTH STREET PO2092
OAKLAND, CA 94604
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: TSDF
Description: Handler is engaged in the treatment, storage or disposal of hazardous waste
TSD commencement date: Not reported

Owner/Operator Summary:
Owner/operator name: AMERICAN CAN PACKAGING INC
Owner/operator address: AMERICANLN1B9ENVIRONMENTALDEPT
CITY NOT REPORTED, CT 99999
Owner/operator country: Not reported
Owner/operator telephone: (203) 552-2181
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: AMERICAN NATIONAL CAN INC
Owner/operator address: AMERICANLN1B9ENVIRONMENTALDEPT
GREENWICH, CT 06830
Owner/operator country: Not reported

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

Owner/operator telephone: (203) 552-2181
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 09/01/1996
Facility name: AMERICAN CAN PACKAGING INC
Classification: Small Quantity Generator

Date form received by agency: 02/28/1994
Facility name: AMERICAN CAN PACKAGING INC
Site name: AMERICAN NATIONAL CAN CO.
Classification: Large Quantity Generator

Date form received by agency: 02/11/1992
Facility name: AMERICAN CAN PACKAGING INC
Site name: AMERICAN NATIONAL CAN CO
Classification: Large Quantity Generator

Date form received by agency: 08/14/1980
Facility name: AMERICAN CAN PACKAGING INC
Classification: Large Quantity Generator

Corrective Action Summary:
Event date: 09/01/1991
Event: RFA Completed, Assessment was a PA-Plus.

Event date: 09/19/1991
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 09/19/1991
Event: CA029EP

Event date: 09/19/1991
Event: CA049PA

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

Event date: 02/28/1992
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 02/28/1992
Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity at the present time for reasons other than 1- it appears to be technically infeasible or inappropriate (NF) or 2- there is a lack of technical information (IN). Reasons for this conclusion may be the status of closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other administrative considerations.

Event date: 01/01/1994
Event: Stabilization Measures Implemented, Primary measure is source removal and/or treatment (e.g., soil or waste excavation, in-situ soil treatment, off-site treatment).

Event date: 07/01/1995
Event: Stabilization Construction Completed

Event date: 01/01/1996
Event: RFI Imposition

Event date: 06/01/1996
Event: RFI Approved

Event date: 09/25/1997
Event: Current Human Exposures under Control, Yes, Current Human Exposures Under Control has been verified. Based on a review of information contained in the EI determination, current human exposures are expected to be under control at the facility under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

Event date: 09/25/1997
Event: Igration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified. Based on a review of information contained in the EI determination, it has been determined that migration of contaminated groundwater is under control at the facility. Specifically, this determination indicates that the migration of contaminated groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the existing area of contaminated groundwater. This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

Event date: 09/25/1997
Event: CA210WB

Event date: Not reported
Event: CA048RC

Facility Has Received Notices of Violations:
Regulation violated: F - 264.140-150.H
Area of violation: TSD - Financial Requirements

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

Date violation determined: 06/05/1992
Date achieved compliance: 11/07/1994
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 01/16/1992
Date achieved compliance: 04/28/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/13/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 01/16/1992
Date achieved compliance: 04/28/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/13/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 01/16/1992
Date achieved compliance: 04/28/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/13/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.20-23.B
Area of violation: Generators - General
Date violation determined: 01/16/1992

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

Date achieved compliance: 04/28/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/13/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.50-60
Area of violation: Generators - General
Date violation determined: 01/16/1992
Date achieved compliance: 04/28/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/13/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 02/05/1992
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 11/07/1994
Evaluation lead agency: EPA Contractor/Grantee

Evaluation date: 12/11/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 04/28/1992
Evaluation lead agency: State

Evaluation date: 12/11/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 04/28/1992
Evaluation lead agency: State

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110000737837

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

TRIS (Toxics Release Inventory System) contains information from facilities on the amounts of over 300 listed toxic chemicals that

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

these facilities release directly to air, water, land, or that are transported off-site.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

CORRACTS:

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/1/1994
Action: CA600SR - Stabilization Measures Implemented, Primary measure is source removal and/or treatment
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 1/1/1996
Action: CA100 - RFI Imposition
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 2/28/1992
Action: CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: 02/28/1992
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 2/28/1992
Action: CA225NR - Stabilization Measures Evaluation, This facility is, not

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

amenable to stabilization activity at the, present time for reasons other than (1) it appears to be technically, infeasible or inappropriate (NF) or (2) there is a lack of technical, information (IN). Reasons for this conclusion may be the status of, closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other, administrative considerations
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: 02/28/1992
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 6/1/1996
Action: CA200 - RFI Approved
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 7/1/1995
Action: CA650 - Stabilization Construction Completed
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 9/1/1991
Action: CA050PA - RFA Completed, Assessment was a PA-Plus
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 9/19/1991
Action: CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s): 332431 332431 332431

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 9/25/1997
Action: CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 9/25/1997
Action: CA750YE - Migration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CAD009162116
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 9/25/1997
Action: CA210 - CA Responsibility Referred To A Non-RCRA Federal Authority
NAICS Code(s): 332431 332431 332431
Metal Can Manufacturing
Metal Can Manufacturing
Metal Can Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

CERC-NFRAP:
Site ID: 0901183
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: Deferred to RCRA

CERCLIS-NFRAP Site Contact Name(s):
Contact Name: Matt Mitguard
Contact Tel: (415) 972-3096
Contact Title: Site Assessment Manager (SAM)

Contact Name: Nuria Muniz

AMERICAN NATIONAL CAN CO (Continued) **1000360806**

Contact Tel: (415) 972-3811
Contact Title: Site Assessment Manager (SAM)

CERCLIS-NFRAP Site Alias Name(s):
Alias Name: AMERICAN CAN CO.
Alias Address: Not reported
CA
Site Description: Not reported

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 03/23/1990
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 10/21/1991
Priority Level: Deferred to RCRA (Subtitle C)

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 01/23/1996
Priority Level: Not reported

FTTS INSP:
Inspection Number: 1988080901082 2
Region: 09
Inspection Date: 08/09/88
Inspector: CZAJKOWSKI
Violation occurred: No
Investigation Type: Section 6 PCB Federal Conducted
Investigation Reason: Neutral Scheme, Region
Legislation Code: TSCA
Facility Function: User

BK245 **TSK AMERICAN CAN COMPAY** **LUST** **S103472313**
ESE **3801 8TH ST E** **HIST CORTESE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.413 mi.
2183 ft. **Site 4 of 4 in cluster BK**

Relative:
Higher

Actual:
22 ft.

LUST:
Region: STATE
Global Id: T0600100067
Latitude: 37.770479
Longitude: -122.22188
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1997-12-31 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0073
LOC Case Number: Not reported
File Location: Local Agency

TSK AMERICAN CAN COMPAY (Continued) **S103472313**

Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Diesel
Site History: LUFT Con. LC 3,H,s,c,r Site characterization complete. The RWQCB took over the lead i10/27/1997

LUST:
Region: 2
Facility Id: 01-0073
Facility Status: Case Closed
Case Number: 1453
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: 7/11/1989
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: 3/12/1992
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0073

BL246 **EXXON #7-7516 / CONTINENTAL AUTO SALES** **Alameda County CS** **S106661148**
North **2200 INTERNATIONAL BLVD** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.414 mi.
2184 ft. **Site 1 of 2 in cluster BL**

Relative:
Lower

Actual:
18 ft.

CS:
Status: Case Closed
Record Id: RO0001104
PE: 5602

BL247 **ORIENTAL AUTO SALES** **LUST** **S102434725**
North **2200 14TH ST E** **HIST CORTESE** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.414 mi.
2185 ft. **Site 2 of 2 in cluster BL**

Relative:
Lower

Actual:
18 ft.

LUST:
Region: STATE
Global Id: T0600101012
Latitude: 37.784516
Longitude: -122.236594
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-07-15 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported

ORIENTAL AUTO SALES (Continued) **S102434725**

Local Agency: Not reported
RB Case Number: 01-1098
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2HSCAWG 307/15/1996

LUST:
Region: 2
Facility Id: 01-1098
Facility Status: Case Closed
Case Number: 2996
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 2/20/1992
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 4/26/1993
Preliminary Site Assesment Began: 10/10/1989
Pollution Characterization Began: 8/28/1990
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1098

BM248 **JOHN B HENRY ESTATE** **LUST** **S108087037**
SW **1726 PARK** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.418 mi.
2205 ft. **Site 1 of 7 in cluster BM**

Relative:
Higher

Actual:
22 ft.

LUST:
Region: STATE
Global Id: T0600100007
Latitude: 37.767999
Longitude: -122.238094
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1996-10-23 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0008
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG Oa10/23/199609/10/1993

BM249 **JOHN B HENRY ESTATE** **LUST** **S101580062**
SW **1726 PARK ST** **CA FID UST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.419 mi. **SWEEPS UST**
2213 ft. **Site 2 of 7 in cluster BM** **HIST CORTESE**

Relative:
Higher

Actual:
22 ft.

LUST:

Region:	2
Facility Id:	01-0008
Facility Status:	Case Closed
Case Number:	587
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	Not reported
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	5/12/1992
Preliminary Site Assesment Began:	Not reported
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CA FID UST:

Facility ID:	01000879
Regulated By:	UTNKA
Regulated ID:	Not reported
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155219989
Mail To:	Not reported
Mailing Address:	1726 PARK ST
Mailing Address 2:	Not reported
Mailing City,St,Zip:	ALAMEDA 94501
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Active

CS:

Status:	Case Closed
Record Id:	RO0000885
PE:	5602

SWEEPS UST:

Status:	A
Comp Number:	269
Number:	2
Board Of Equalization:	Not reported
Ref Date:	04-02-91
Act Date:	04-02-91
Created Date:	04-02-91
Tank Status:	A
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-000269-000001

JOHN B HENRY ESTATE (Continued) **S101580062**

Actv Date: 04-02-91
Capacity: 150
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: 1

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0008

BM250 **EXXON REGAL** **HAZNET S101580043**
SW **1725 PARK ST** **LUST N/A**
1/4-1/2 **ALAMEDA, CA 94501** **CA FID UST**
0.419 mi. **Alameda County CS**
2213 ft. **Site 3 of 7 in cluster BM** **SWEEPS UST**
HIST CORTESE

Relative:
Higher

Actual:
22 ft.

HAZNET:
Gepaid: CAL000191585
Contact: RAMON ESTRADA
Telephone: 5106690263
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 500
Mailing City,St,Zip: SAN ANTONIO, TX 782920500
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Treatment, Tank
Tons: 0.02
Facility County: Not reported

LUST:
Region: STATE
Global Id: T0600100555
Latitude: 37.768121
Longitude: -122.238251
Case Type: LUST Cleanup Site
Status: Open - Remediation
Status Date: 1991-07-25 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-0602
LOC Case Number: RO0000448
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG Highest detected MTBE using 8260 is 52,000ppb in July 199707/30/199903/24/1994

LUST:

EXXON REGAL (Continued) **S101580043**

Region: 2
Facility Id: 01-0602
Facility Status: Remedial action (cleanup) Underway
Case Number: 3601
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 6/24/1988
Pollution Characterization Began: 3/21/1989
Pollution Remediation Plan Submitted: 9/23/1991
Date Remediation Action Underway: 3/24/1998
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01000727
Regulated By: UTNKA
Regulated ID: 00012451
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155226813
Mail To: Not reported
Mailing Address: 4550 DACOMA
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Pollution Characterization
Record Id: RO0000448
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 12451
Number: 1
Board Of Equalization: 44-000183
Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 70104-RU-1
Swrcb Tank Id: 01-000-012451-000001
Actv Date: 03-07-91
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED

EXXON REGAL (Continued) **S101580043**

Number Of Tanks: 5

Status: A
Comp Number: 12451
Number: 1
Board Of Equalization: 44-000183
Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 70104-REG-1
Swrcb Tank Id: 01-000-012451-000002
Actv Date: 03-07-91
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: LEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 12451
Number: 1
Board Of Equalization: 44-000183
Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 405-R2
Swrcb Tank Id: 01-000-012451-000003
Actv Date: 07-01-85
Capacity: 5000
Tank Use: M.V. FUEL
Stg: P
Content: LEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 12451
Number: 1
Board Of Equalization: 44-000183
Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 70109-SU-1
Swrcb Tank Id: 01-000-012451-000004
Actv Date: 03-07-91
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 12451
Number: 1
Board Of Equalization: 44-000183

EXXON REGAL (Continued) **S101580043**

Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 405-W1
Swrcb Tank Id: 01-000-012451-000005
Actv Date: 07-01-85
Capacity: Not reported
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0602

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251 South 1/4-1/2 0.423 mi. 2236 ft.

Relative: Lower

Actual: 14 ft.

CLIFFORD E MAPES INC **LUST** **S101306285**
2001 VERSAILLES AVE **Alameda County CS** **N/A**
ALAMEDA, CA 94501 **HIST CORTESE**

LUST:
Region: STATE
Global Id: T0600100798
Latitude: 37.76746
Longitude: -122.23028
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1999-02-01 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0864
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Not reported
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCA 02/01/1999

LUST:
Region: 2
Facility Id: 01-0864
Facility Status: Case Closed
Case Number: 607
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: 7/14/1998
Pollution Remediation Plan Submitted: Not reported

CLIFFORD E MAPES INC (Continued) **S101306285**

Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Case Closed
Record Id: RO0000636
PE: 5602

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0864

BM252 **XTRA OIL COMPANY** **HAZNET** **S101623489**
SW **1701 PARK ST** **LUST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **CA FID UST**
0.433 mi. **SWEEPS UST**
2284 ft. **Site 4 of 7 in cluster BM** **HIST CORTESE**

Relative: Higher

Actual: 23 ft.

HAZNET:
Gepaid: CAL000115450
Contact: KEITH SIMAS
Telephone: 5108659505
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2307 PACIFIC AVE
Mailing City,St,Zip: ALAMEDA, CA 945012918
Gen County: Alameda
TSD EPA ID: CAD980887418
TSD County: Alameda
Waste Category: Unspecified oil-containing waste
Disposal Method: H141
Tons: 0.01
Facility County: Alameda

Gepaid: CAL000115450
Contact: KEITH SIMAS
Telephone: 5108659505
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2307 PACIFIC AVE
Mailing City,St,Zip: ALAMEDA, CA 945012918
Gen County: Alameda
TSD EPA ID: CAD980887418
TSD County: Alameda
Waste Category: Unspecified solvent mixture Waste
Disposal Method: H141
Tons: 0.25
Facility County: Alameda

LUST:
Region: STATE
Global Id: T0600101803
Latitude: 37.767985
Longitude: -122.23837

XTRA OIL COMPANY (Continued) **S101623489**

Case Type: LUST Cleanup Site
Status: Open - Remediation
Status Date: 1994-04-08 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-1950
LOC Case Number: RO0000191
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 23SCA 9,700ppb MTBE with Method 802006/30/199811/13/1997

LUST:
Region: 2
Facility Id: 01-1950
Facility Status: Remedial action (cleanup) Underway
Case Number: 3836
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 7/5/1994
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: 1/29/1998
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01002657
Regulated By: UTNKA
Regulated ID: 00029824
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 5105211665
Mail To: Not reported
Mailing Address: 2307 PACIFIC AVE
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

SWEEPS UST:
Status: A
Comp Number: 29824
Number: 1
Board Of Equalization: 44-002652
Ref Date: 04-23-92
Act Date: 04-14-93

XTRA OIL COMPANY (Continued) **S101623489**

Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-029824-000001
Actv Date: 04-23-92
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: 4

Status: A
Comp Number: 29824
Number: 1
Board Of Equalization: 44-002652
Ref Date: 04-23-92
Act Date: 04-14-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 2
Swrcb Tank Id: 01-000-029824-000002
Actv Date: 04-23-92
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: PRM UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 29824
Number: 1
Board Of Equalization: 44-002652
Ref Date: 04-23-92
Act Date: 04-14-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 3
Swrcb Tank Id: 01-000-029824-000003
Actv Date: 04-23-92
Capacity: 10000
Tank Use: M.V. FUEL
Stg: P
Content: PRM UNLEADED
Number Of Tanks: Not reported

Status: A
Comp Number: 29824
Number: 1
Board Of Equalization: 44-002652
Ref Date: 04-23-92
Act Date: 04-14-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 4
Swrcb Tank Id: 01-000-029824-000004
Actv Date: 04-23-92
Capacity: 10000

XTRA OIL COMPANY (Continued) **S101623489**

Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1950

BM253 **XTRA OIL** **Alameda County CS** **S105913702**
SW **1701 PARK ST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.433 mi.
2284 ft. **Site 5 of 7 in cluster BM**

Relative:
Higher

Actual:
23 ft.

CS:
Status: Remedial action (cleanup) Underway
Record Id: RO0000191
PE: 5602

Status: Pollution Characterization
Record Id: RO0000191
PE: 5602

BN254 **AAAAA RENT-A-SPACE** **CERCLIS** **1007646607**
WSW **2201 CLEMENT AVENUE** **CAN000906115**
1/4-1/2 **ALAMEDA, CA 94501**
0.435 mi.
2297 ft. **Site 1 of 3 in cluster BN**

Relative:
Lower

Actual:
14 ft.

CERCLIS:
Site ID: 0906115
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP

CERCLIS Site Contact Name(s):
Contact Name: Philip Armstrong
Contact Tel: (415) 972-3098
Contact Title: Site Assessment Manager (SAM)

Contact Name: Karen Jurist
Contact Tel: (415) 972-3219
Contact Title: Site Assessment Manager (SAM)

Contact Name: Jeff Inglis
Contact Tel: (415) 972-3095
Contact Title: Site Assessment Manager (SAM)

Contact Name: Carl Brickner
Contact Tel: (415) 972-3814
Contact Title: Site Assessment Manager (SAM)

AAAAA RENT-A-SPACE (Continued) **1007646607**

CERCLIS Site Alias Name(s):
Alias Name: J.H. BAXTER CO.
Alias Address: Not reported
Not reported
Site Description: DTSC PA reissued to Weston in 10/04

CERCLIS Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 09/23/2004
Priority Level: Not reported

Action: PRE-CERCLIS SCREENING
Date Started: Not reported
Date Completed: 09/23/2004
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: 10/18/2004
Date Completed: 05/21/2007
Priority Level: NFRAP: No further Remedial Action planned

BN255 **FORMER J. H. BAXTER FACILITY, ALAMEDA** **Cortese** **S106568693**
WSW **2201 CLEMENT AVENUE** **RESPONSE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.435 mi. **ENVIROSTOR**
2297 ft. **Site 2 of 3 in cluster BN** **HIST Cal-Sites**

Relative:
Lower

Actual:
14 ft.

Cortese:
Region: CORTESE
Envirostor Id: 1240036
Site/Facility Type: STATE RESPONSE
Cleanup Status: ACTIVE
Status Date: 10/26/2005
Site Code: Not reported
Latitude: 37.7737248398034
Longitude: -122.24217221923

AWP:
AWP Facility ID: 01240036
Region Code: 2
Region: BERKELEY
SMBR Branch Code: NC
SMBR Branch Unit: NORTH COAST
Site Name.: Not reported
Current Status Date: 05282004
Current Status: ANNUAL WORKPLAN - ACTIVE SITE
Lead Agency Code: DTSC
Lead Agency: DEPT OF TOXIC SUBSTANCES CONTROL
Facility Type: responsible party
Awp Site Type: RESPONSIBLE PARTY
NPL: Not Listed
Tier Of AWP Site: Not reported
Source Of Funding: Not reported
Responsible Staff Member: EGILLERA
Supervisor Responsible: Not reported

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

SIC Code:	24
Facility SIC:	MANU - LUMBER & WOOD PRODUCTS
RWQCB Code:	SF
RWQCB Associated With Site:	SAN FRANCISCO BAY
Site Access Controlled:	Controlled
Site Listed HWS List:	Not reported
Hazard Ranking Score:	Not reported
Date Site Hazard Ranked:	Not reported
Groundwater Contamination:	Not reported
# Of Contamination Sources:	0
Lat/Long:	Not reported
Lat/Long (dms):	0 0 0 / 0 0 0
Lat/long Method:	Not reported
Description Of Entity:	Not reported
State Assembly Distt Code:	16
State Senate District:	09

RESPONSE:

Facility ID:	01240036
Site Type:	State Response
Site Type Detail:	State Response or NPL
Acres:	12.3
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	HOMAYUNE ATIQEE
Supervisor:	Karen Toth
Division Branch:	Berkeley
Site Code:	201796 (2229 Clement - Collins Property)
Assembly:	16
Senate:	09
Special Program Status:	Not reported
Status:	Active
Status Date:	2005-10-26 00:00:00
Restricted Use:	NO
Funding:	Responsible Party
Latitude:	37.7737248398034
Longitude:	-122.24217221923
Alias Name:	01240036
Alias Type:	Envirostor ID Number
Alias Name:	071-0289-006-01
Alias Type:	APN
Alias Name:	201790 (2201 & 2189 Clement - Extra Space Property)
Alias Type:	Project Code (Site Code)
Alias Name:	201525
Alias Type:	Project Code (Site Code)
Alias Name:	201796 (2229 Clement - Collins Property)
Alias Type:	Project Code (Site Code)
Alias Name:	201575 (2229 Clement - Fox Property)
Alias Type:	Project Code (Site Code)
Alias Name:	201626 (2201 & 2189 Clement - 5A Rent-a-Space)
Alias Type:	Project Code (Site Code)
Alias Name:	201632 (2199 Clement - Dutra Property)
Alias Type:	Project Code (Site Code)
Alias Name:	70000116
Alias Type:	Former Project ID

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Alias Name: 5A Rent-A-Space
Alias Type: Alternate Name
Alias Name: 110020034121
Alias Type: EPA (FRS #)
Alias Name: 110033614550
Alias Type: EPA (FRS #)
Alias Name: 071-0289-004-00
Alias Type: APN
Alias Name: 071-0289-007-03
Alias Type: APN
Alias Name: 071-0289-005-00
Alias Type: APN

APN: 071-0289-004-00 , 071-0289-007-03 , 071-0289-005-00 , 071-0289-006-01
APN Description: Not reported
APN Description: Not reported
APN Description: Not reported
APN Description: Not reported
Comments: Soil gas sampling completed.Imminent and/or Substantial Endangerment and Remedial Action Order issued to J.H. Baxter & Co., Bill Dutra, Richard Wright, and 5A Rent-a-Space, Inc.Order amended to change the effective date.In 2003, a dark, tarry substance was observed emanating from beneath the driveway in the north-eastern section of the site. Surface soil samples collected from the area revealed the presence of various hazardous substances at levels above regulatorRevised Data Report approved on 8/11/2006.Results from the indoor air sampling accepted. Concentrations of naphthalene in indoor air are within acceptable levels based on site use.Final RI Report approved.Workplan approved.Soil sampling activities completed.Benzene levels in soil gas were above residential CHHSLs. No other VOCs were found to be above the residential CHHSLs standards.Report approved and signed.y screening levels.

Completed Info:
Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2006-10-05 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2008-11-21 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Unilateral Order (I/SE, RAO, CAO, EPA AO)
Completed Date: 2004-09-24 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Amendment - Order/Agreement
Completed Date: 2005-07-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 2003-08-01 00:00:00

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Completed Area Name: Fox/Collins Property
Completed Sub Area Name: Not reported
Completed Document Type: Consent Order/Agreement/Decree/Settlement
Completed Date: 2009-02-09 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: Consent Order/Agreement/Decree/Settlement
Completed Date: 2008-10-06 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2008-10-06 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2006-08-11 00:00:00

Completed Area Name: Fox/Collins Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2006-12-07 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2005-12-20 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2007-09-12 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2006-08-16 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2006-11-28 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Technical Workplan
Completed Date: 2007-05-29 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2008-07-03 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Completed Document Type:	Remedial Investigation Report
Completed Date:	2007-04-26 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Technical Report
Completed Date:	2008-10-09 00:00:00
Completed Area Name:	5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name:	Not reported
Completed Document Type:	Public Notice
Completed Date:	2008-10-31 00:00:00
Completed Area Name:	5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name:	Not reported
Completed Document Type:	Removal Action Workplan
Completed Date:	2008-10-08 00:00:00
Confirmed:	30019,30025,30593,30448,30001,30003,30005,30009,30013
Confirmed Description:	Polynuclear aromatic hydrocarbons (PAHs)
Confirmed Description:	TPH-gas
Confirmed Description:	Xylenes
Confirmed Description:	Pentachlorophenol
Confirmed Description:	Arsenic
Confirmed Description:	Benzene
Confirmed Description:	Total Chromium (1:6 ratio Cr VI:Cr III)
Confirmed Description:	Dioxin (as 2,3,7,8-TCDD TEQ)
Confirmed Description:	Lead
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	Remedial Action Completion Report
Future Due Date:	2010
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	Public Notice
Future Due Date:	2009
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	Remedial Action Plan
Future Due Date:	2010
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Public Notice
Future Due Date:	2009
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	Fact Sheets
Future Due Date:	2009
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Fact Sheets
Future Due Date:	2010
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Completion Report
Future Due Date:	2011
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Workplan
Future Due Date:	2010
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Public Notice
Future Due Date:	2010
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Remedial Investigation Report
Future Due Date:	2009
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Completion Report
Future Due Date:	2009
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Completion Report
Future Due Date:	2010
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Fact Sheets
Future Due Date:	2009
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Workplan
Future Due Date:	2009
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	CEQA - Initial Study/ Neg. Declaration
Future Due Date:	2010
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Certification
Future Due Date:	2011
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	Certification
Future Due Date:	2011
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	CEQA - Initial Study/ Neg. Declaration
Future Due Date:	2009
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Land Use Restriction
Future Due Date:	2011
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Certification
Future Due Date:	2011
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	CEQA - Initial Study/ Neg. Declaration
Future Due Date:	2010
Media Affected:	30001, 30003, 30005, 30009, 30013, 30019, 30025, 30448, 30593
Media Affected Desc:	Not reported

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MANUFACTURING - LUMBER/WOOD PRODUCTS

CS:
Status: Case Transferred
Record Id: RO0002581
PE: 5502

ENVIROSTOR:
Site Type: State Response
Site Type Detailed: State Response or NPL
Acres: 12.3
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: HOMAYUNE ATIQEE
Supervisor: Karen Toth
Division Branch: Berkeley
Facility ID: 01240036
Site Code: 201796 (2229 Clement - Collins Property)
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Active
Status Date: 2005-10-26 00:00:00
Restricted Use: NO
Funding: Responsible Party
Latitude: 37.7737248398034
Longitude: -122.24217221923
Alias Name: 01240036
Alias Type: Envirostor ID Number
Alias Name: 071-0289-006-01
Alias Type: APN
Alias Name: 201790 (2201 & 2189 Clement - Extra Space Property)
Alias Type: Project Code (Site Code)
Alias Name: 201525
Alias Type: Project Code (Site Code)
Alias Name: 201796 (2229 Clement - Collins Property)

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Alias Type:	Project Code (Site Code)
Alias Name:	201575 (2229 Clement - Fox Property)
Alias Type:	Project Code (Site Code)
Alias Name:	201626 (2201 & 2189 Clement - 5A Rent-a-Space)
Alias Type:	Project Code (Site Code)
Alias Name:	201632 (2199 Clement - Dutra Property)
Alias Type:	Project Code (Site Code)
Alias Name:	70000116
Alias Type:	Former Project ID
Alias Name:	5A Rent-A-Space
Alias Type:	Alternate Name
Alias Name:	110020034121
Alias Type:	EPA (FRS #)
Alias Name:	110033614550
Alias Type:	EPA (FRS #)
Alias Name:	071-0289-004-00
Alias Type:	APN
Alias Name:	071-0289-007-03
Alias Type:	APN
Alias Name:	071-0289-005-00
Alias Type:	APN
APN:	071-0289-004-00 , 071-0289-007-03 , 071-0289-005-00 , 071-0289-006-01
APN Description:	Not reported
APN Description:	Not reported
APN Description:	Not reported
APN Description:	Not reported
Comments:	Soil gas sampling completed.Imminent and/or Substantial Endangerment and Remedial Action Order issued to J.H. Baxter & Co., Bill Dutra, Richard Wright, and 5A Rent-a-Space, Inc.Order amended to change the effective date.In 2003, a dark, tarry substance was observed emanating from beneath the driveway in the north-eastern section of the site. Surface soil samples collected from the area revealed the presence of various hazardous substances at levels above regulatorRevised Data Report approved on 8/11/2006.Results from the indoor air sampling accepted. Concentrations of naphthalene in indoor air are within acceptable levels based on site use.Final RI Report approved.Workplan approved.Soil sampling activities completed.Benzene levels in soil gas were above residential CHHSLs. No other VOCs were found to be above the residential CHHSLs standards.Report approved and signed.y screening levels.

Completed Info:

Completed Area Name:	Dutra Property
Completed Sub Area Name:	Not reported
Completed Document Type:	Fieldwork
Completed Date:	2006-10-05 00:00:00
Completed Area Name:	5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name:	Not reported
Completed Document Type:	Fieldwork
Completed Date:	2008-11-21 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Unilateral Order (I/SE, RAO, CAO, EPA AO)
Completed Date:	2004-09-24 00:00:00

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Amendment - Order/Agreement
Completed Date: 2005-07-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 2003-08-01 00:00:00

Completed Area Name: Fox/Collins Property
Completed Sub Area Name: Not reported
Completed Document Type: Consent Order/Agreement/Decree/Settlement
Completed Date: 2009-02-09 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: Consent Order/Agreement/Decree/Settlement
Completed Date: 2008-10-06 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2008-10-06 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2006-08-11 00:00:00

Completed Area Name: Fox/Collins Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2006-12-07 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2005-12-20 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Fieldwork
Completed Date: 2007-09-12 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2006-08-16 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2006-11-28 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Completed Document Type: Technical Workplan
Completed Date: 2007-05-29 00:00:00

Completed Area Name: Dutra Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2008-07-03 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2007-04-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Technical Report
Completed Date: 2008-10-09 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: Public Notice
Completed Date: 2008-10-31 00:00:00

Completed Area Name: 5A Rent-A-Space/Extra Space Storage Property
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2008-10-08 00:00:00

Confirmed: 30019,30025,30593,30448,30001,30003,30005,30009,30013
Confirmed Description: Polynuclear aromatic hydrocarbons (PAHs)
Confirmed Description: TPH-gas
Confirmed Description: Xylenes
Confirmed Description: Pentachlorophenol
Confirmed Description: Arsenic
Confirmed Description: Benzene
Confirmed Description: Total Chromium (1:6 ratio Cr VI:Cr III)
Confirmed Description: Dioxin (as 2,3,7,8-TCDD TEQ)
Confirmed Description: Lead
Future Area Name: Fox/Collins Property
Future Sub Area Name: Not reported
Future Document Type: Remedial Action Completion Report
Future Due Date: 2010
Future Area Name: Fox/Collins Property
Future Sub Area Name: Not reported
Future Document Type: Public Notice
Future Due Date: 2009
Future Area Name: Fox/Collins Property
Future Sub Area Name: Not reported
Future Document Type: Remedial Action Plan
Future Due Date: 2010
Future Area Name: Dutra Property
Future Sub Area Name: Not reported
Future Document Type: Public Notice
Future Due Date: 2009
Future Area Name: Fox/Collins Property
Future Sub Area Name: Not reported
Future Document Type: Fact Sheets

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Future Due Date:	2009
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Fact Sheets
Future Due Date:	2010
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Completion Report
Future Due Date:	2011
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Workplan
Future Due Date:	2010
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Public Notice
Future Due Date:	2010
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Remedial Investigation Report
Future Due Date:	2009
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Completion Report
Future Due Date:	2009
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Completion Report
Future Due Date:	2010
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Fact Sheets
Future Due Date:	2009
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Removal Action Workplan
Future Due Date:	2009
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	CEQA - Initial Study/ Neg. Declaration
Future Due Date:	2010
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	Certification
Future Due Date:	2011
Future Area Name:	Fox/Collins Property
Future Sub Area Name:	Not reported
Future Document Type:	Certification
Future Due Date:	2011
Future Area Name:	Dutra Property
Future Sub Area Name:	Not reported
Future Document Type:	CEQA - Initial Study/ Neg. Declaration
Future Due Date:	2009
Future Area Name:	5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name:	Not reported
Future Document Type:	Land Use Restriction
Future Due Date:	2011

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Future Area Name: 5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name: Not reported
Future Document Type: Certification
Future Due Date: 2011
Future Area Name: 5A Rent-A-Space/Extra Space Storage Property
Future Sub Area Name: Not reported
Future Document Type: CEQA - Initial Study/ Neg. Declaration
Future Due Date: 2010
Media Affected: 30001, 30003, 30005, 30009, 30013, 30019, 30025, 30448, 30593
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MANUFACTURING - LUMBER/WOOD PRODUCTS

HISTORICAL CAL-SITES:
Facility ID: 01240036
Region: 2
Region Name: BERKELEY
Branch: NC
Branch Name: NORTH COAST
File Name: Not reported
State Senate District: 05282004
Status: AWP - ANNUAL WORKPLAN (AWP) - ACTIVE SITE
Status Name: ANNUAL WORKPLAN - ACTIVE SITE
Lead Agency: DTSC
Lead Agency: DEPT OF TOXIC SUBSTANCES CONTROL
Facility Type: RP
Type Name: RESPONSIBLE PARTY
NPL: Not Listed
SIC Code: 24
SIC Name: MANU - LUMBER & WOOD PRODUCTS
Access: Controlled
Cortese: Not reported
Hazardous Ranking Score: Not reported
Date Site Hazard Ranked: Not reported
Groundwater Contamination: Not reported
Staff Member Responsible for Site: EGILLERA
Supervisor Responsible for Site: Not reported
Region Water Control Board: SF

FORMER J. H. BAXTER FACILITY, ALAMEDA (Continued) **S106568693**

Region Water Control Board Name:	SAN FRANCISCO BAY
Lat/Long Direction:	Not reported
Lat/Long (dms):	0 0 0 / 0 0 0
Lat/long Method:	Not reported
Lat/Long Description:	Not reported
State Assembly District Code:	16
State Senate District Code:	09
Facility ID:	Not reported
Activity:	Not reported
Activity Name:	Not reported
AWP Code:	Not reported
Proposed Budget:	Not reported
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	Not reported
Est Person-Yrs to complete:	Not reported
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	Not reported
Definition of Status:	Not reported
Liquids Removed (Gals):	Not reported
Liquids Treated (Gals):	Not reported
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	Not reported
For Industrial Reuse:	Not reported
For Residential Reuse:	Not reported
Unknown Type:	Not reported
Alternate Address:	2201 CLEMENT AVENUE
Alternate City,St,Zip:	ALAMEDA, CA 94501
Background Info:	The site was once part of large wood treatment facility operated by J. H. Baxter and Co. Baxter treated wood utilized for poles, posts, and railroad ties with coal tar derived creosote and fuel oil. Creosote and fuel were stored in above ground storage tanks. Several treatment pits and separation sumps were located on the property. Various other chemicals were stored and generated at the site. DTSC collected surface soil samples at an area within the former wood treatment operations area in August 2003. Analysis of the samples indicated the presence of polynuclear aromatic hydrocarbons such as benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d) pyrene at concentrations up to 27 mg/kg, 24 mg/kg, 84 mg/kg, 3mg/kg, and 13 mg/kg, respectively. Metals such as arsenic, chromium, and lead were detected at concentrations up to 95 mg/kg 199 mg/kg, and 8170 mg/kg, respectively.
Comments Date:	Not reported
Comments:	Not reported
ID Name:	CALSTARS CODE
ID Value:	201525
Alternate Name:	FORMER J. H. BAXTER FACILITY, ALAMEDA
Special Programs Code:	Not reported
Special Programs Name:	Not reported

BN256 **SMITH-RICE COMPANY YARD** **HAZNET** **S101623482**
WSW **2199 CLEMENT AVE** **CA FID UST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.435 mi. **SWEEPS UST**
2297 ft. **Site 3 of 3 in cluster BN**

Relative:
Lower

Actual:
14 ft.

HAZNET:

Gepaid:	CAL912125983
Contact:	CLIFF HUNT/SAFETY DIRECTOR
Telephone:	4154585499
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2199 CLEMENT AVE
Mailing City,St,Zip:	ALAMEDA, CA 945010000
Gen County:	Alameda
TSD EPA ID:	CAD980884183
TSD County:	Sacramento
Waste Category:	Unspecified oil-containing waste
Disposal Method:	Transfer Station
Tons:	0.2
Facility County:	1

Gepaid:	CAL912125983
Contact:	CLIFF HUNT/SAFETY DIRECTOR
Telephone:	4154585499
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2199 CLEMENT AVE
Mailing City,St,Zip:	ALAMEDA, CA 945010000
Gen County:	Alameda
TSD EPA ID:	CAD028409019
TSD County:	Los Angeles
Waste Category:	Off-specification, aged, or surplus organics
Disposal Method:	H061
Tons:	2.14
Facility County:	Alameda

Gepaid:	CAL912125983
Contact:	CLIFF HUNT/SAFETY DIRECTOR
Telephone:	4154585499
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2199 CLEMENT AVE
Mailing City,St,Zip:	ALAMEDA, CA 945010000
Gen County:	Alameda
TSD EPA ID:	CAD980884183
TSD County:	Sacramento
Waste Category:	Unspecified oil-containing waste
Disposal Method:	H141
Tons:	3.05
Facility County:	Alameda

Gepaid:	CAL912125983
Contact:	CLIFF HUNT/SAFETY DIRECTOR
Telephone:	4154585499
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	2199 CLEMENT AVE
Mailing City,St,Zip:	ALAMEDA, CA 945010000

SMITH-RICE COMPANY YARD (Continued) **S101623482**

Gen County: Alameda
TSD EPA ID: CAD980884183
TSD County: Sacramento
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: H141
Tons: 0.89
Facility County: Alameda

Gepaid: CAL912125983
Contact: CLIFF HUNT/SAFETY DIRECTOR
Telephone: 4154585499
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2199 CLEMENT AVE
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: Alameda
TSD EPA ID: CAD980887418
TSD County: Alameda
Waste Category: Waste oil and mixed oil
Disposal Method: H141
Tons: 17.29
Facility County: Alameda

Click this hyperlink while viewing on your computer to access
6 additional CA_HAZNET: record(s) in the EDR Site Report.

CA FID UST:
Facility ID: 01002527
Regulated By: UTNKA
Regulated ID: 00002188
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155235925
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Case Transferred
Record Id: RO0002596
PE: 5502

SWEEPS UST:
Status: A
Comp Number: 2188
Number: 1
Board Of Equalization: 44-000038
Ref Date: 03-06-91

SMITH-RICE COMPANY YARD (Continued) **S101623482**

Act Date:	03-06-91
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	1
Swrcb Tank Id:	01-000-002188-000001
Actv Date:	03-06-91
Capacity:	6000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	1

BM257 **CAVANAUGH MOTORS** **LUST** **1000151049**
SW **1700 PARK ST** **CA FID UST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **HIST UST**
0.436 mi. **SWEEPS UST**
2301 ft. **Site 6 of 7 in cluster BM** **HIST CORTESE**

Relative:
Higher

Actual:
23 ft.

LUST:

Region:	STATE
Global Id:	T0600100270
Latitude:	37.768158
Longitude:	-122.239359
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1996-12-09 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0291
LOC Case Number:	Not reported
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 3HSCAW 1512/09/199606/01/1993

LUST:

Region:	2
Facility Id:	01-0291
Facility Status:	Case Closed
Case Number:	596
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	Not reported
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	4/13/1990
Preliminary Site Assesment Began:	6/8/1990
Pollution Characterization Began:	4/15/1991
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CA FID UST:

Facility ID:	01000424
Regulated By:	UTNKI
Regulated ID:	00046145

CAVANAUGH MOTORS (Continued) **1000151049**

Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: Not reported
Mail To: Not reported
Mailing Address: P O BOX
Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Inactive

HIST UST:
Region: STATE
Facility ID: 00000046145
Facility Type: Other
Other Type: CAR DEALERSHIP
Total Tanks: 0002
Contact Name: DAVID CAVANAUGH
Telephone: 4155235246
Owner Name: CAVANAUGH MOTORS, INC.
Owner Address: 1700 PARK ST.
Owner City,St,Zip: ALAMEDA, CA 94501

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000300
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 002
Container Num: 2
Year Installed: 1948
Tank Capacity: 00000550
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Stock Inventor

SWEEPS UST:
Status: Not reported
Comp Number: 46145
Number: Not reported
Board Of Equalization: 44-000443
Ref Date: Not reported
Act Date: Not reported
Created Date: Not reported
Tank Status: Not reported
Owner Tank Id: Not reported
Swrcb Tank Id: 01-000-046145-000001

CAVANAUGH MOTORS (Continued) **1000151049**

Actv Date:	Not reported
Capacity:	300
Tank Use:	OIL
Stg:	WASTE
Content:	WASTE OIL
Number Of Tanks:	2
Status:	Not reported
Comp Number:	46145
Number:	Not reported
Board Of Equalization:	44-000443
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	01-000-046145-000002
Actv Date:	Not reported
Capacity:	550
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0291

BM258 **CAVANAUGH MOTORS INC** **HAZNET** **1001266892**
SW **1700 PARK ST** **Alameda County CS** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.436 mi.
2301 ft. **Site 7 of 7 in cluster BM**

Relative:
Higher

Actual:
23 ft.

HAZNET:

Gepaid:	CAD982019994
Contact:	CAVANAUGH MOTORS INC
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1700 PARK ST
Mailing City,St,Zip:	ALAMEDA, CA 945010000
Gen County:	1
TSD EPA ID:	CAD009452657
TSD County:	San Mateo
Waste Category:	Unspecified organic liquid mixture
Disposal Method:	Recycler
Tons:	1.5637
Facility County:	1
Gepaid:	CAD982019994
Contact:	CAVANAUGH MOTORS INC
Telephone:	0000000000
Facility Addr2:	Not reported
Mailing Name:	Not reported

CAVANAUGH MOTORS INC (Continued) **1001266892**

Mailing Address: 1700 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAD093459485
TSD County: Fresno
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Treatment, Tank
Tons: .0832
Facility County: 1

Gepaid: CAD982019994
Contact: CAVANAUGH MOTORS INC
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1700 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAD009452657
TSD County: San Mateo
Waste Category: Unspecified organic liquid mixture
Disposal Method: Recycler
Tons: 2.2935
Facility County: 1

Gepaid: CAD982019994
Contact: CAVANAUGH MOTORS INC
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1700 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: 1
TSD EPA ID: CAD093459485
TSD County: Fresno
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .0208
Facility County: 1

Gepaid: CAD982019994
Contact: DAVID CAVANAUGH
Telephone: 5105235246
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1700 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945010000
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Sacramento
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: 0.52
Facility County: Not reported

CAVANAUGH MOTORS INC (Continued) **1001266892**

Click this hyperlink while viewing on your computer to access
23 additional CA_HAZNET: record(s) in the EDR Site Report.

CS:
Status: Case Closed
Record Id: RO0001029
PE: 5602

259
WSW
1/4-1/2
0.440 mi.
2322 ft.

BLYMYER ENGINEERS,INC.
1829 CLEMENT AVE.,
ALAMEDA, CA 92405

Notify 65 **S100178778**
N/A

Relative:
Lower

Actual:
17 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92405

BO260
NNW
1/4-1/2
0.445 mi.
2350 ft.

ARCO
2032 12TH ST E
OAKLAND, CA 94606

LUST **S104396753**
HIST CORTESE **N/A**

Site 1 of 3 in cluster BO

Relative:
Lower

Actual:
13 ft.

LUST:
Region: STATE
Global Id: T0600100086
Latitude: 37.798386
Longitude: -122.25733
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1995-12-22 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0093
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2SCAW 12/22/1995

LUST:
Region: 2
Facility Id: 01-0093
Facility Status: Case Closed
Case Number: 198
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: 6/16/1993

ARCO (Continued) **S104396753**

Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0093

BO261 **ARCO SERVICE** **HIST UST** **U001599109**
NNW **2032 E 12TH ST** **Alameda County CS** **N/A**
1/4-1/2 **OAKLAND, CA 94606**
0.445 mi.
2350 ft. **Site 2 of 3 in cluster BO**

Relative:
Lower

Actual:
13 ft.

HIST UST:
Region: STATE
Facility ID: 00000052390
Facility Type: Gas Station
Other Type: Not reported
Total Tanks: 0004
Contact Name: WILLIAM DAVIS
Telephone: 4155367098
Owner Name: WILLIAM DAVIS
Owner Address: 2032 E 12TH
Owner City,St,Zip: OAKLAND, CA 94606

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00004000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: Pressure Test

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00004000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

Tank Num: 003
Container Num: 3
Year Installed: Not reported
Tank Capacity: 00004000
Tank Used for: PRODUCT
Type of Fuel: PREMIUM
Tank Construction: Not reported

ARCO SERVICE (Continued) **U001599109**

Leak Detection: None

Tank Num: 004
Container Num: 4
Year Installed: Not reported
Tank Capacity: 00000000
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: None

CS:
Status: Case Closed
Record Id: RO0000529
PE: 5602

BP262 **ALAMEDA USD CORP YARD** **HAZNET** **1000297244**
South **2615 EAGLE** **HIST CORTESE** **N/A**
1/4-1/2 **ALAMEDA, CA 94501**
0.452 mi.
2385 ft. **Site 1 of 2 in cluster BP**

Relative:
Lower

Actual:
18 ft.

HAZNET:
Gepaid: CAD981666001
Contact: ALAMEDA UNIFIED SCHOOL DIST
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2200 CENTRAL AVE
Mailing City,St,Zip: ALAMEDA, CA 945014411
Gen County: 1
TSD EPA ID: CAD982444481
TSD County: San Bernardino
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: Not reported
Tons: .2293
Facility County: 1

Gepaid: CAD981666001
Contact: ALAMEDA UNIFIED SCHOOL DIST
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2200 CENTRAL AVE
Mailing City,St,Zip: ALAMEDA, CA 945014411
Gen County: 1
TSD EPA ID: CAD981382732
TSD County: 1
Waste Category: Asbestos-containing waste
Disposal Method: Disposal, Land Fill
Tons: 2.5284
Facility County: 1

Gepaid: CAD981666001
Contact: ALAMEDA UNIFIED SCHOOL DIST
Telephone: 0000000000
Facility Addr2: Not reported

ALAMEDA USD CORP YARD (Continued) **1000297244**

Mailing Name: Not reported
Mailing Address: 2200 CENTRAL AVE
Mailing City,St,Zip: ALAMEDA, CA 945014411
Gen County: 1
TSD EPA ID: CAD000088252
TSD County: Los Angeles
Waste Category: Off-specification, aged, or surplus organics
Disposal Method: Transfer Station
Tons: .2293
Facility County: 1

Gepaid: CAD981666001
Contact: ALAMEDA UNIFIED SCHOOL DIST
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2200 CENTRAL AVE
Mailing City,St,Zip: ALAMEDA, CA 945014411
Gen County: 1
TSD EPA ID: CAD000088252
TSD County: Los Angeles
Waste Category: Liquids with pH <UN-> 2
Disposal Method: Transfer Station
Tons: .0166
Facility County: 1

Gepaid: CAD981666001
Contact: ALAMEDA UNIFIED SCHOOL DIST
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 2200 CENTRAL AVE
Mailing City,St,Zip: ALAMEDA, CA 945014411
Gen County: 1
TSD EPA ID: CAD982444481
TSD County: San Bernardino
Waste Category: Latex waste
Disposal Method: Not reported
Tons: .2293
Facility County: 1

Click this hyperlink while viewing on your computer to access
34 additional CA_HAZNET: record(s) in the EDR Site Report.

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0797

BP263 **ALAMEDA UNIFIED SCHOOL DISTRICT** **LUST** **S101579936**
South **2615 EAGLE AVE** **CA FID UST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **Alameda County CS**
0.452 mi. **SWEEPS UST**
2385 ft. **Site 2 of 2 in cluster BP**

Relative:
Lower

Actual:
18 ft.

LUST:

Region:	STATE
Global Id:	T0600100733
Latitude:	37.76661
Longitude:	-122.233668
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1993-08-11 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0797
LOC Case Number:	Not reported
File Location:	Local Agency
Potential Media Affect:	Not reported
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 906/01/1993

LUST:

Region:	2
Facility Id:	01-0797
Facility Status:	Case Closed
Case Number:	3940
How Discovered:	Tank Closure
Leak Cause:	Structure Failure
Leak Source:	Tank
Date Leak Confirmed:	7/7/1992
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	Not reported
Preliminary Site Assesment Began:	Not reported
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

CA FID UST:

Facility ID:	01000172
Regulated By:	UTNKA
Regulated ID:	00059912
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4157484092
Mail To:	Not reported
Mailing Address:	2200 CENTRAL AVE
Mailing Address 2:	Not reported
Mailing City,St,Zip:	ALAMEDA 94501
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported

ALAMEDA UNIFIED SCHOOL DISTRICT (Continued) **S101579936**

Status: Active

CS:
Status: Case Closed
Record Id: RO0000524
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 59912
Number: 4
Board Of Equalization: 44-000601
Ref Date: 03-06-91
Act Date: 03-06-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 54902-1
Swrcb Tank Id: 01-000-059912-000001
Actv Date: 03-06-91
Capacity: 550
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: 1

BQ264 **WALT'S TRANSMISSION** **LUST** **S108245770**
NE **1723 FRUITVALE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.459 mi.
2426 ft. **Site 1 of 2 in cluster BQ**

Relative:
Higher

Actual:
65 ft.

LUST:
Region: STATE
Global Id: T06019762689
Latitude: 37.781633
Longitude: -122.224238
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1967-01-01 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
LOC Case Number: RO0000172
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Tetrachloroethylene (PCE)
Site History: LUFT Con. LC MTBE<5 ug/L

BQ265
NE
1/4-1/2
0.459 mi.
2426 ft.

WALT'S TRANSMISSION
1723 FRUITVALE AVE
OAKLAND, CA 94601

Site 2 of 2 in cluster BQ

Alameda County CS **S105871019**
N/A

Relative:
Higher

Actual:
65 ft.

CS:
Status: Leak being confirmed
Record Id: RO0000172
PE: 5602

Status: Pollution Characterization
Record Id: RO0000172
PE: 5602

Status: Preliminary site assessment underway
Record Id: RO0000172
PE: 5602

266
ESE
1/4-1/2
0.463 mi.
2447 ft.

ON TIME TOWING
3800 WATTLING ST
OAKLAND, CA 94601

LUST **S101580311**
CHMIRS **N/A**
CA FID UST
Alameda County CS
SWEEPS UST
HIST CORTESE

Relative:
Higher

Actual:
24 ft.

LUST:
Region: STATE
Global Id: T0600101917
Latitude: 37.771628
Longitude: -122.220917
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1995-08-15 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2086
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Not reported
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2HSCA 04/25/1996

LUST:
Region: 2
Facility Id: 01-2086
Facility Status: Case Closed
Case Number: 1486
How Discovered: OM
Leak Cause: UNK
Leak Source: Tank
Date Leak Confirmed: 6/27/1995
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported

ON TIME TOWING (Continued) **S101580311**

Date Post Remedial Action Monitoring Began: Not reported

CHMIRS:

OES Incident Number:	26708
OES notification:	Not reported
OES Date:	1/26/1993
OES Time:	04:00:00 PM
Incident Date:	Not reported
Date Completed:	**Not reported**
Property Use:	Not reported
Agency Id Number:	Not reported
Agency Incident Number:	Not reported
Time Notified:	Not reported
Time Completed:	Not reported
Surrounding Area:	Not reported
Estimated Temperature:	Not reported
Property Management:	Not reported
Special Studies 1:	Not reported
Special Studies 2:	Not reported
Special Studies 3:	Not reported
Special Studies 4:	Not reported
Special Studies 5:	Not reported
Special Studies 6:	Not reported
More Than Two Substances Involved?:	Not reported
Resp Agncy Personel # Of Decontaminated:	Not reported
Responding Agency Personel # Of Injuries:	Not reported
Responding Agency Personel # Of Fatalities:	Not reported
Others Number Of Decontaminated:	Not reported
Others Number Of Injuries:	Not reported
Others Number Of Fatalities:	Not reported
Vehicle Make/year:	Not reported
Vehicle License Number:	Not reported
Vehicle State:	Not reported
Vehicle Id Number:	Not reported
CA/DOT/PUC/ICC Number:	Not reported
Company Name:	Not reported
Reporting Officer Name/ID:	Not reported
Report Date:	Not reported
Comments:	Not reported
Facility Telephone:	Not reported
Waterway Involved:	Not reported
Waterway:	Not reported
Spill Site:	Not reported
Cleanup By:	NO SPILL CONTRACT REMOVAL
Containment:	Not reported
What Happened:	Not reported
Type:	CHEMICAL
Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	1993
Agency:	OAKLAND FD
Incident Date:	Not reported
Admin Agency:	Not reported
Amount:	7 DRUMS 55 GALS EACH
Contained:	Not reported
Site Type:	Not reported

ON TIME TOWING (Continued) **S101580311**

E Date:	Not reported
Substance:	LAQUER THINNER
Quantity Released:	Not reported
BBLS:	Not reported
Cups:	Not reported
CUFT:	Not reported
Gallons:	Not reported
Grams:	Not reported
Pounds:	Not reported
Liters:	Not reported
Ounces:	Not reported
Pints:	Not reported
Quarts:	Not reported
Sheen:	Not reported
Tons:	Not reported
Unknown:	Not reported
Description:	SEALED DRUMS LEFT ON A DOOHSTEP
Evacuations:	Not reported
Number of Injuries:	Not reported
Number of Fatalities:	Not reported
Description:	Not reported

CA FID UST:

Facility ID:	01002481
Regulated By:	UTNKA
Regulated ID:	Not reported
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	4155306664
Mail To:	Not reported
Mailing Address:	1228 36TH AVE
Mailing Address 2:	Not reported
Mailing City,St,Zip:	OAKLAND 94601
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Active

CS:

Status:	Case Closed
Record Id:	RO0000658
PE:	5602

SWEEPS UST:

Status:	Not reported
Comp Number:	248
Number:	Not reported
Board Of Equalization:	Not reported
Ref Date:	Not reported
Act Date:	Not reported
Created Date:	Not reported
Tank Status:	Not reported
Owner Tank Id:	Not reported

ON TIME TOWING (Continued) **S101580311**

Swrcb Tank Id:	01-000-000248-000001
Actv Date:	Not reported
Capacity:	1000
Tank Use:	M.V. FUEL
Stg:	PRODUCT
Content:	REG UNLEADED
Number Of Tanks:	1
Status:	A
Comp Number:	248
Number:	2
Board Of Equalization:	Not reported
Ref Date:	07-20-93
Act Date:	05-02-94
Created Date:	03-29-91
Tank Status:	Not reported
Owner Tank Id:	Not reported
Swrcb Tank Id:	Not reported
Actv Date:	Not reported
Capacity:	Not reported
Tank Use:	Not reported
Stg:	Not reported
Content:	Not reported
Number Of Tanks:	Not reported

CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-2086

BO267 **WILLIAM WURZBACH COMPANY** **LUST** **S102437547**
NNW **1200 20TH AVE** **Alameda County CS** **N/A**
1/4-1/2 **OAKLAND, CA 94606** **HIST CORTESE**
0.464 mi.
2449 ft. **Site 3 of 3 in cluster BO**

Relative:
Lower

Actual:
13 ft.

LUST:

Region:	STATE
Global Id:	T0600101898
Latitude:	37.784995
Longitude:	-122.239519
Case Type:	LUST Cleanup Site
Status:	Open - Remediation
Status Date:	1994-01-19 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	01-2066
LOC Case Number:	RO0000504
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 2 MTBE= 120ppb in MW1, within 10' of the former USTs., ND further07/06/1999

WILLIAM WURZBACH COMPANY (Continued) **S102437547**

LUST:
- Region: 2
- Facility Id: 01-2066
- Facility Status: Preliminary site assessment underway
- Case Number: 4868
- How Discovered: OM
- Leak Cause: UNK
- Leak Source: UNK
- Date Leak Confirmed: Not reported
- Oversight Program: LUST
- Prelim. Site Assesment Wokplan Submitted: 3/31/1995
- Preliminary Site Assesment Began: 1/2/1965
- Pollution Characterization Began: Not reported
- Pollution Remediation Plan Submitted: Not reported
- Date Remediation Action Underway: Not reported
- Date Post Remedial Action Monitoring Began: Not reported

CS:
- Status: Pollution Characterization
- Record Id: RO0000504
- PE: 5602

- Status: Leak being confirmed
- Record Id: RO0000504
- PE: 5602

CORTESE:
- Region: CORTESE
- Facility County Code: 1
- Reg By: LTNKA
- Reg Id: 01-2066

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268 East 1/4-1/2 0.478 mi. 2525 ft. **DEWEY SENIOR HIGH SCHOOL**
3709 E 12TH ST
OAKLAND, CA 94601

RCRA-SQG **1004677278**
FINDS **CAR000095323**
SCH
ENVIROSTOR

Relative: Higher

Actual: 31 ft.

RCRA-SQG:
- Date form received by agency: 04/19/2001
- Facility name: DEWEY SENIOR HIGH SCHOOL
- Facility address: 3709 E 12TH ST
  OAKLAND, CA 94601
- EPA ID: CAR000095323
- Contact: LUIS FREESE
- Contact address: 955 HIGH ST
  OAKLAND, CA 94601
- Contact country: US
- Contact telephone: (510) 879-8397
- Contact email: Not reported
- EPA Region: 09
- Classification: Small Small Quantity Generator
- Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: OAKLAND UNIFIED SCHOOL DIST
Owner/operator address: 1025 2ND AVE
OAKLAND, CA 94606
Owner/operator country: Not reported
Owner/operator telephone: (510) 879-8100
Legal status: State
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Waste code: D003
Waste name: A MATERIAL IS CONSIDERED TO BE A REACTIVE HAZARDOUS WASTE IF IT IS NORMALLY UNSTABLE, REACTS VIOLENTLY WITH WATER, GENERATES TOXIC GASES WHEN EXPOSED TO WATER OR CORROSIVE MATERIALS, OR IF IT IS CAPABLE OF DETONATION OR EXPLOSION WHEN EXPOSED TO HEAT OR A FLAME. ONE EXAMPLE OF SUCH WASTE WOULD BY WASTE GUNPOWDER.

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

Waste code: D005
Waste name: BARIUM

Waste code: D008
Waste name: LEAD

Waste code: D011
Waste name: SILVER

Waste code: D027
Waste name: 1,4-DICHLOROBENZENE

Waste code: U002
Waste name: ACETONE (I)

Waste code: U031
Waste name: 1-BUTANOL (I)

Waste code: U056
Waste name: BENZENE, HEXAHYDRO- (I)

Waste code: U059
Waste name: DAUNOMYCIN

Waste code: U072
Waste name: BENZENE, 1,4-DICHLORO-

Waste code: U123
Waste name: FORMIC ACID (C,T)

Waste code: U154
Waste name: METHANOL (I)

Waste code: U159
Waste name: 2-BUTANONE (I,T)

Waste code: U220
Waste name: BENZENE, METHYL-

Waste code: U239
Waste name: BENZENE, DIMETHYL- (I,T)

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110012196685

California - Hazardous Waste Tracking System - Datamart

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

SCH:

Facility ID:	01880004
Site Type:	School Cleanup
Site Type Detail:	School
Acres:	2.7
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	KAMILI SIGLOWIDE
Supervisor:	Mark Malinowski
Division Branch:	Sacramento
Site Code:	204065-11
Assembly:	16
Senate:	09
Special Program Status:	Not reported
Status:	Certified
Status Date:	2006-12-21 00:00:00
Restricted Use:	NO
Funding:	School District
Latitude:	37.7733898468446
Longitude:	-122.220755078711
Alias Name:	DEWEY SCHOOL EXPANSION SITE
Alias Type:	Alternate Name
Alias Name:	01880004
Alias Type:	Envirostor ID Number
Alias Name:	AKA: DEWEY EXPANSION SITE
Alias Type:	Alternate Name
Alias Name:	OAKLAND UNIFIED SCHOOL DISTRICT
Alias Type:	Alternate Name
Alias Name:	033-2160-001-00
Alias Type:	APN
Alias Name:	ASCEND SITE
Alias Type:	Alternate Name
Alias Name:	204065-11
Alias Type:	Project Code (Site Code)
Alias Name:	110021997703
Alias Type:	EPA (FRS #)

APN:	033-2160-001-00
APN Description:	Not reported
Comments:	Meeting to discuss additional work effort- the removal for soil impacted with lead from lead-based paint in the former housing area.DTSC approved the PEA report recommending further action in the form of a Removal Action Workplan to address arsenic and benzo(a)pyrene impacted soil.DTSC entered into an Environmental Oversight Agreement (Docket Number HSA-A 00/01-194) with Oakland Unified School District to provide oversight for a Preliminary Endangerment Assessment for the proposed Dewey School Expansion Site.DTSC entered into a Voluntary Cleanup Agreement (VCA) (Docket Number HSA-A 00/01-194-A) with the Oakland Unified School District (Proponent). The purpose of this VCA is for the Proponent to complete a Removal Action Workplan (RAW) for lead impactedProject scope changed for arsenic removal. Additional area of lead contamination added to project which caused an increase in the volume needed to be removed.Arsenic RAW Fact SheetFact Sheet was approved

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

and distributed in the Oakland communityCertication was signed 2/15/07HSA-A 00/01 194-A2. Ammended VCA to address additional actions for lead impacted soils.Field Oversight of PEA samplingDTSC issued a Cost Recovery Memorandum to the Accounting Department to close out the project.Project was closed due to inactivity.DTSC completed review of the Phase I and determined a Preliminary Environmental Assessment is required.On 12/23/03, DTSC issued a final RAW approval based on resolution of the conditional approval issued on June 18, 2003 and the inclusion of 0.3 acre parcel investigated and reported in a Technical Memorandum dated May 13, 2003. The 0.3 acres was notDTSC approved the RACR and certifies that all removal actions have been completed.DTSC approved the workplan submittal with modifications listed in the letter.DTSC approved the Tech Memo with the recommendation that arsenic impacted soils will be addressed in the Removal Action Workplan.available during the PEA. The parcel is a portion of a railroad right-of-way and is also contaminated with elevated arsenic.soils, and conduct a removal action, under the oversight of DTSC in an effort to satisfy DTSC's requirements, such that a No Further Remediation and Site Certification, regarding the Ascend Site (aka Dewey School Expansion), may be obtained from DTSC.

Completed Info:

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Other Report
Completed Date: 2004-01-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Phase 1
Completed Date: 2001-02-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2003-05-22 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2004-02-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Environmental Oversight Agreement
Completed Date: 2001-03-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2003-04-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2003-01-13 00:00:00

Completed Area Name: PROJECT WIDE

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2004-03-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 2007-02-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Amendment - Order/Agreement
Completed Date: 2004-09-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2001-04-18 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2007-06-22 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2005-09-27 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2006-12-21 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Workplan
Completed Date: 2001-04-18 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 2003-12-23 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2003-12-23 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2004-03-01 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

Completed Date: 2003-01-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 2003-05-28 00:00:00

Confirmed: 30001,30013
Confirmed Description: Arsenic
Confirmed Description: Lead
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30001, 30013
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: RESIDENTIAL AREA

ENVIROSTOR:
Site Type: School Cleanup
Site Type Detailed: School
Acres: 2.7
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: KAMILI SIGLOWIDE
Supervisor: Mark Malinowski
Division Branch: Sacramento
Facility ID: 01880004
Site Code: 204065-11
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Certified
Status Date: 2006-12-21 00:00:00
Restricted Use: NO
Funding: School District
Latitude: 37.7733898468446
Longitude: -122.220755078711
Alias Name: DEWEY SCHOOL EXPANSION SITE
Alias Type: Alternate Name
Alias Name: 01880004
Alias Type: Envirostor ID Number
Alias Name: AKA: DEWEY EXPANSION SITE
Alias Type: Alternate Name

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

Alias Name:	OAKLAND UNIFIED SCHOOL DISTRICT
Alias Type:	Alternate Name
Alias Name:	033-2160-001-00
Alias Type:	APN
Alias Name:	ASCEND SITE
Alias Type:	Alternate Name
Alias Name:	204065-11
Alias Type:	Project Code (Site Code)
Alias Name:	110021997703
Alias Type:	EPA (FRS #)

APN:	033-2160-001-00
APN Description:	Not reported
Comments:	Meeting to discuss additional work effort- the removal for soil impacted with lead from lead-based paint in the former housing area.DTSC approved the PEA report recommending further action in the form of a Removal Action Workplan to address arsenic and benzo(a)pyrene impacted soil.DTSC entered into an Environmental Oversight Agreement (Docket Number HSA-A 00/01-194) with Oakland Unified School District to provide oversight for a Preliminary Endangerment Assessment for the proposed Dewey School Expansion Site.DTSC entered into a Voluntary Cleanup Agreement (VCA) (Docket Number HSA-A 00/01-194-A) with the Oakland Unified School District (Proponent). The purpose of this VCA is for the Proponent to complete a Removal Action Workplan (RAW) for lead impactedProject scope changed for arsenic removal. Additional area of lead contamination added to project which caused an increase in the volume needed to be removed.Arsenic RAW Fact SheetFact Sheet was approved and distributed in the Oakland communityCertication was signed 2/15/07HSA-A 00/01 194-A2. Ammended VCA to address additional actions for lead impacted soils.Field Oversight of PEA samplingDTSC issued a Cost Recovery Memorandum to the Accounting Department to close out the project.Project was closed due to inactivity.DTSC completed review of the Phase I and determined a Preliminary Environmental Assessment is required.On 12/23/03, DTSC issued a final RAW approval based on resolution of the conditional approval issued on June 18, 2003 and the inclusion of 0.3 acre parcel investigated and reported in a Technical Memorandum dated May 13, 2003. The 0.3 acres was notDTSC approved the RACR and certifies that all removal actions have been completed.DTSC approved the workplan submittal with modifications listed in the letter.DTSC approved the Tech Memo with the recommendation that arsenic impacted soils will be addressed in the Removal Action Workplan.available during the PEA. The parcel is a portion of a railroad right-of-way and is also contaminated with elevated arsenic.soils, and conduct a removal action, under the oversight of DTSC in an effort to satisfy DTSC's requirements, such that a No Further Remediation and Site Certification, regarding the Ascend Site (aka Dewey School Expansion), may be obtained from DTSC.

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Other Report
Completed Date:	2004-01-07 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

Completed Date: 2001-02-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2003-05-22 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2004-02-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Environmental Oversight Agreement
Completed Date: 2001-03-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2003-04-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2003-01-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2004-03-20 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 2007-02-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Amendment - Order/Agreement
Completed Date: 2004-09-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2001-04-18 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2007-06-22 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2005-09-27 00:00:00

DEWEY SENIOR HIGH SCHOOL (Continued) **1004677278**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2006-12-21 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Workplan
Completed Date: 2001-04-18 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 2003-12-23 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2003-12-23 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2004-03-01 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2003-01-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 2003-05-28 00:00:00

Confirmed: 30001,30013
Confirmed Description: Arsenic
Confirmed Description: Lead
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30001, 30013
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: RESIDENTIAL AREA

BR269 **ALAMEDA FORD** **RCRA-SQG** **1000313312**
SW **1650 PARK ST** **FINDS** **CAD981581309**
1/4-1/2 **ALAMEDA, CA 94501** **HAZNET**
0.481 mi. **LUST**
2538 ft. **Site 1 of 3 in cluster BR** **CA FID UST**
Alameda County CS
Relative: **SWEEPS UST**
Higher **HIST CORTESE**

Actual: **25 ft.**

RCRA-SQG:

Date form received by agency:	12/04/1997
Facility name:	ALAMEDA FORD
Facility address:	1650 PARK ST ALAMEDA, CA 94501
EPA ID:	CAD981581309
Contact:	MICHAEL ALFRED
Contact address:	1650 PARK ST ALAMEDA, CA 94501
Contact country:	US
Contact telephone:	(510) 865-3673
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	MICHAEL A ALFRED
Owner/operator address:	1650 PARK ST ALAMEDA, CA 94501
Owner/operator country:	Not reported
Owner/operator telephone:	(510) 865-3673
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	Unknown
Mixed waste (haz. and radioactive):	Unknown
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	Unknown
Furnace exemption:	Unknown
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No
Off-site waste receiver:	Commercial status unknown

ALAMEDA FORD (Continued) **1000313312**

Historical Generators:
Date form received by agency: 09/01/1996
Facility name: ALAMEDA FORD
Classification: Small Quantity Generator

Date form received by agency: 11/21/1986
Facility name: ALAMEDA FORD
Classification: Large Quantity Generator

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002722420

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Gepaid: CAD982329690
Contact: MICHAEL ALFRED
Telephone: 5108653673
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1650 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945012921
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station

ALAMEDA FORD (Continued) **1000313312**

Tons: 5.9004
Facility County: 1

Gepaid: CAD982329690
Contact: MICHAEL ALFRED
Telephone: 5108653673
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1650 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945012921
Gen County: 1
TSD EPA ID: CAD093459485
TSD County: Fresno
Waste Category: Unspecified solvent mixture Waste
Disposal Method: Transfer Station
Tons: .0166
Facility County: 1

Gepaid: CAD982329690
Contact: MICHAEL ALFRED
Telephone: 5108653673
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1650 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945012921
Gen County: 1
TSD EPA ID: CAD093459485
TSD County: Fresno
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: .0208
Facility County: 1

Gepaid: CAD982329690
Contact: MICHAEL ALFRED
Telephone: 5108653673
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1650 PARK ST
Mailing City,St,Zip: ALAMEDA, CA 945012921
Gen County: 1
TSD EPA ID: CAD093459485
TSD County: Fresno
Waste Category: Organic liquids with metals Alkaline solution (pH <UN-> 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
Disposal Method: Transfer Station
Tons: .3585
Facility County: 1

Gepaid: CAD982329690
Contact: MICHAEL ALFRED
Telephone: 5108653673
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1650 PARK ST

ALAMEDA FORD (Continued) **1000313312**

Mailing City,St,Zip: ALAMEDA, CA 945012921
Gen County: 1
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: 5.3376
Facility County: 1

Click this hyperlink while viewing on your computer to access
18 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: STATE
Global Id: T0600102015
Latitude: 37.767565
Longitude: -122.239826
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2001-04-13 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-2193
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC -3HSCAW MtBE up to 331ppb06/02/199810/07/1998

LUST:
Region: 2
Facility Id: 01-2193
Facility Status: Remedial action (cleanup) Underway
Case Number: 622
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 11/11/1996
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: 1/22/1998
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01002574
Regulated By: UTNKA
Regulated ID: 00009601
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4158653673
Mail To: Not reported
Mailing Address: 625 MARKET ST

ALAMEDA FORD (Continued) **1000313312**

Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Case Closed
Record Id: RO0000283
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 9601
Number: 1
Board Of Equalization: 44-000140
Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 2
Swrcb Tank Id: 01-000-009601-000001
Actv Date: 03-07-91
Capacity: 500
Tank Use: M.V. FUEL
Stg: P
Content: REG UNLEADED
Number Of Tanks: 2

Status: A
Comp Number: 9601
Number: 1
Board Of Equalization: 44-000140
Ref Date: 03-07-91
Act Date: 03-07-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-009601-000002
Actv Date: 03-07-91
Capacity: 150
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2193

BS270 **TONY'S EXPRESS AUTO SERVICE** **LUST** **U003301043**
East **3609 14TH ST E** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.481 mi.
2542 ft. **Site 1 of 2 in cluster BS**

Relative:
Higher

Actual:
36 ft.

LUST:

Region:	STATE
Global Id:	T0600101680
Latitude:	37.775632614
Longitude:	-122.222085
Case Type:	LUST Cleanup Site
Status:	Open - Remediation
Status Date:	1996-04-19 00:00:00
Lead Agency:	ALAMEDA COUNTY LOP
Case Worker:	Not reported
Local Agency:	ALAMEDA COUNTY LOP
RB Case Number:	01-1812
LOC Case Number:	RO0000265
File Location:	Local Agency
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern:	Gasoline
Site History:	LUFT Con. LC 2 MTBE=276ppb onsite, off-site 229ppb approximately 220' ft downg07/29/199902/16/2000

LUST:

Region:	2
Facility Id:	01-1812
Facility Status:	Preliminary site assessment underway
Case Number:	3337
How Discovered:	Tank Closure
Leak Cause:	UNK
Leak Source:	Tank
Date Leak Confirmed:	2/26/1998
Oversight Program:	LUST
Prelim. Site Assesment Wokplan Submitted:	Not reported
Preliminary Site Assesment Began:	1/2/1965
Pollution Characterization Began:	Not reported
Pollution Remediation Plan Submitted:	Not reported
Date Remediation Action Underway:	Not reported
Date Post Remedial Action Monitoring Began:	Not reported

BS271 **MOSTLY JAPANESE AUTO SERVICE** **HAZNET** **S103655372**
East **3609 INTERNATIONAL BLVD** **EMI** **N/A**
1/4-1/2 **OAKLAND, CA 94601** **Alameda County CS**
0.482 mi.
2546 ft. **Site 2 of 2 in cluster BS**

Relative:
Higher

Actual:
36 ft.

HAZNET:

Gepaid:	CAL000181789
Contact:	BOUNBOUM PHARPHAKDY
Telephone:	5102614444
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	3609 INTERNATIONAL BLVD
Mailing City,St,Zip:	OAKLAND, CA 946010000
Gen County:	1
TSD EPA ID:	CAD050099696
TSD County:	Los Angeles

MOSTLY JAPANESE AUTO SERVICE (Continued) **S103655372**

Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Recycler
Tons: .2293
Facility County: 1

EMI:

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	12111
Air District Name:	BA
SIC Code:	7538
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	12111
Air District Name:	BA
SIC Code:	7538
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	12111
Air District Name:	BA
SIC Code:	7538
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.002
Reactive Organic Gases Tons/Yr:	0.0000132
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

MOSTLY JAPANESE AUTO SERVICE (Continued) **S103655372**

Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	12111
Air District Name:	BA
SIC Code:	7538
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.007
Reactive Organic Gases Tons/Yr:	.0000462
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	12111
Air District Name:	BA
SIC Code:	7538
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.007
Reactive Organic Gases Tons/Yr:	.0000462
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

CS:

Status:	Leak being confirmed
Record Id:	RO0000265
PE:	5602

Status:	Remedial action (cleanup) Underway
Record Id:	RO0000265
PE:	5602

Status:	Pollution Characterization
Record Id:	RO0000265
PE:	5602

272
WSW
1/4-1/2
0.483 mi.
2548 ft.

ALAMEDA, NAVAL AND MARINE RESERVE CENTER
2144 CLEMENT AVENUE
ALAMEDA, CA 94501

Cortese **S107735815**
RESPONSE **N/A**
ENVIROSTOR

Relative:
Lower

Actual:
15 ft.

Cortese:

Region:	CORTESE
Envirostor Id:	71000003
Site/Facility Type:	STATE RESPONSE

ALAMEDA, NAVAL AND MARINE RESERVE CENTER (Continued) **S107735815**

Cleanup Status: ACTIVE
Status Date: 1/1/2003
Site Code: 201109
Latitude: 37.772219999999997
Longitude: -122.24420000000001

RESPONSE:
Facility ID: 71000003
Site Type: State Response
Site Type Detail: Open Base
Acres: approx. 5
National Priorities List: NO
Cleanup Oversight Agencies: SMBRP, RWQCB 2 - San Francisco Bay
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager: CHRISTINE PARENT
Supervisor: Donn Diebert
Division Branch: Sacramento
Site Code: 201109
Assembly: 16
Senate: 09
Special Program Status: Not reported
Status: Active
Status Date: 2003-01-01 00:00:00
Restricted Use: NO
Funding: DERA
Latitude: 37.77222
Longitude: -122.2442
Alias Name: 201109
Alias Type: Project Code (Site Code)
Alias Name: 71000003
Alias Type: Envirostor ID Number
Alias Name: 110033614060
Alias Type: EPA (FRS #)

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Additional areas on the property were identified for further evaluation.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 2007-07-16 00:00:00

Confirmed: 30013,30024,30025
Confirmed Description: Lead
Confirmed Description: TPH-diesel
Confirmed Description: TPH-gas
Future Area Name: PROJECT WIDE
Future Sub Area Name: Not reported
Future Document Type: Preliminary Assessment/Site Inspection Report (PA/SI)
Future Due Date: 2010
Future Area Name: PROJECT WIDE
Future Sub Area Name: Not reported
Future Document Type: Certification

ALAMEDA, NAVAL AND MARINE RESERVE CENTER (Continued) **S107735815**

Future Due Date: 2011
Media Affected: 30013, 30024, 30025
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: DRY DOCKS, FUEL - VEHICLE STORAGE/ REFUELING, PORT

ENVIROSTOR:
Site Type: State Response
Site Type Detailed: Open Base
Acres: approx. 5
NPL: NO
Regulatory Agencies: SMBRP, RWQCB 2 - San Francisco Bay
Lead Agency: SMBRP
Program Manager: CHRISTINE PARENT
Supervisor: Donn Diebert
Division Branch: Sacramento
Facility ID: 71000003
Site Code: 201109
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Active
Status Date: 2003-01-01 00:00:00
Restricted Use: NO
Funding: DERA
Latitude: 37.77222
Longitude: -122.2442
Alias Name: 201109
Alias Type: Project Code (Site Code)
Alias Name: 71000003
Alias Type: Envirostor ID Number
Alias Name: 110033614060
Alias Type: EPA (FRS #)

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Additional areas on the property were identified for further evaluation.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 2007-07-16 00:00:00

ALAMEDA, NAVAL AND MARINE RESERVE CENTER (Continued) **S107735815**

Confirmed:	30013,30024,30025
Confirmed Description:	Lead
Confirmed Description:	TPH-diesel
Confirmed Description:	TPH-gas
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	Preliminary Assessment/Site Inspection Report (PA/SI)
Future Due Date:	2010
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	Certification
Future Due Date:	2011
Media Affected:	30013, 30024, 30025
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported

Management:

Management Required:	NONE SPECIFIED
Management Required Desc:	Not reported
Potential:	OTH, SOIL
Potenital Description:	Not reported
Potenital Description:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported
PastUse:	DRY DOCKS, FUEL - VEHICLE STORAGE/ REFUELING, PORT

BT273 **LERNER COMPANY** **LUST** **S102432611**
SE **3675 ALAMEDA AVE** **HIST CORTESE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.483 mi.
2549 ft. **Site 1 of 2 in cluster BT**

Relative:
Lower

Actual:
15 ft.

LUST:

Region:	STATE
Global Id:	T0600100824
Latitude:	37.768041
Longitude:	-122.226204
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	1995-02-01 00:00:00
Lead Agency:	SAN FRANCISCO BAY RWQCB (REGION 2)
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	01-0894
LOC Case Number:	Not reported
File Location:	Not reported
Potential Media Affect:	Soil
Potential Contaminats of Concern:	Gasoline
Site History:	Not reported

LUST:

Region:	2
Facility Id:	01-0894
Facility Status:	Case Closed

LERNER COMPANY (Continued) **S102432611**

Case Number: 01-0894
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0894

BT274 **LEARNER COMPANY** **SLIC** **S101306622**
SE **3675 ALAMEDA AVE** **N/A**
1/4-1/2 **OAKLAND, CA 94601**
0.483 mi.
2549 ft. **Site 2 of 2 in cluster BT**

Relative:
Lower

Actual:
15 ft.

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 2000-01-01 00:00:00
Global Id: T0600191507
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.7673926666667
Longitude: -122.225863666667
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01S0170
File Location: Not reported
Potential Media Affected: Soil
Potential Contaminants of Concern: Diesel
Site History: Not reported

SLIC:
Region: 2
Facility ID: 01S0170
Facility Status: Case Closed
Date Closed: 1/1/2000
Local Case #: Not reported
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Confirmed: 6/2/1988
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported

LEARNER COMPANY (Continued) **S101306622**

Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

BR275 **GOOD CHEVROLET** **HAZNET** **1000182811**
SW **1630 PARK ST** **LUST** **N/A**
1/4-1/2 **ALAMEDA, CA 94501** **CA FID UST**
0.496 mi. **HIST UST**
2619 ft. **Site 2 of 3 in cluster BR** **HIST CORTESE**

Relative:
Higher

Actual:
26 ft.

HAZNET:

Gepaid:	CAD981448582
Contact:	GOOD CHEVROLET
Telephone:	5105229221
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1730
Mailing City,St,Zip:	ALAMEDA, CA 945010206
Gen County:	1
TSD EPA ID:	CAD980887418
TSD County:	1
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Transfer Station
Tons:	1.8765
Facility County:	1

Gepaid:	CAD981448582
Contact:	GOOD CHEVROLET
Telephone:	5105229221
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1730
Mailing City,St,Zip:	ALAMEDA, CA 945010206
Gen County:	1
TSD EPA ID:	CAD093459485
TSD County:	Fresno
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	Treatment, Tank
Tons:	.0624
Facility County:	1

Gepaid:	CAD981448582
Contact:	JO ANN STEWART
Telephone:	5105229221
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	PO BOX 1730
Mailing City,St,Zip:	ALAMEDA, CA 945010206
Gen County:	Alameda
TSD EPA ID:	CA0000084517
TSD County:	Sacramento
Waste Category:	Aqueous solution with less than 10% total organic residues
Disposal Method:	H141
Tons:	0.56
Facility County:	Alameda

Gepaid:	CAD981448582
Contact:	JO ANN STEWART
Telephone:	5105229221

GOOD CHEVROLET (Continued) **1000182811**

Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1730
Mailing City,St,Zip: ALAMEDA, CA 945010206
Gen County: Alameda
TSD EPA ID: CAD097030993
TSD County: Los Angeles
Waste Category: Other organic solids
Disposal Method: H141
Tons: 0.12
Facility County: Alameda

Gepaid: CAD981448582
Contact: JO ANN STEWART
Telephone: 5105229221
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1730
Mailing City,St,Zip: ALAMEDA, CA 945010206
Gen County: Alameda
TSD EPA ID: Not reported
TSD County: Sacramento
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Not reported
Tons: 0.37
Facility County: Not reported

Click this hyperlink while viewing on your computer to access
22 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: 2
Facility Id: 01-0711
Facility Status: Preliminary site assessment underway
Case Number: 906
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 4/29/1987
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01000834
Regulated By: UTNKA
Regulated ID: 00020039
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4155229221
Mail To: Not reported
Mailing Address: 1630 PARK ST

GOOD CHEVROLET (Continued) **1000182811**

Mailing Address 2: Not reported
Mailing City,St,Zip: ALAMEDA 94501
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

HIST UST:
Region: STATE
Facility ID: 00000020039
Facility Type: Other
Other Type: AUTO DEALERSHIP
Total Tanks: 0005
Contact Name: J.T. HARRISON
Telephone: 4155229221
Owner Name: GOOD CHEVROLET
Owner Address: 1630 PARK STREET
Owner City,St,Zip: ALAMEDA, CA 94501

Tank Num: 001
Container Num: 1
Year Installed: Not reported
Tank Capacity: 00000300
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: Stock Inventor

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00000550
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Tank Construction: Not reported
Leak Detection: None

Tank Num: 003
Container Num: 1
Year Installed: 1985
Tank Capacity: 00004000
Tank Used for: PRODUCT
Type of Fuel: PREMIUM
Tank Construction: Not reported
Leak Detection: None

Tank Num: 004
Container Num: 2
Year Installed: 1985
Tank Capacity: 00010000
Tank Used for: PRODUCT
Type of Fuel: UNLEADED
Tank Construction: Not reported
Leak Detection: None

GOOD CHEVROLET (Continued) **1000182811**

Tank Num: 005
Container Num: 3
Year Installed: Not reported
Tank Capacity: 00000500
Tank Used for: WASTE
Type of Fuel: WASTE OIL
Tank Construction: Not reported
Leak Detection: None

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0711

BR276 **GOOD CHEVROLET** **HAZNET** **U003300240**
SW **1630 PARK ST** **LUST** **N/A**
1/4-1/2 **ALAMEDA, CA** **UST**
0.496 mi. **Alameda County CS**
2619 ft. **Site 3 of 3 in cluster BR** **SWEEPS UST**

Relative:
Higher

Actual:
26 ft.

HAZNET:
Gepaid: CAD981448582
Contact: JO ANN STEWART
Telephone: 5105229221
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1730
Mailing City,St,Zip: ALAMEDA, CA 945010206
Gen County: Alameda
TSD EPA ID: CAT080033681
TSD County: Alameda
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Recycler
Tons: 0.22
Facility County: 1

Gepaid: CAD981448582
Contact: JO ANN STEWART
Telephone: 5105229221
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: PO BOX 1730
Mailing City,St,Zip: ALAMEDA, CA 945010206
Gen County: Alameda
TSD EPA ID: CA0000084517
TSD County: Alameda
Waste Category: Aqueous solution with less than 10% total organic residues
Disposal Method: Transfer Station
Tons: 0.71
Facility County: 1

LUST:
Region: STATE
Global Id: T0600100655
Latitude: 37.767156
Longitude: -122.238904

GOOD CHEVROLET (Continued) **U003300240**

Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1991-11-15 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-0711
LOC Case Number: RO0000008
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG ND for MTBE03/16/199912/16/1997

UST:
Facility ID: FA0300008
Program Element: 4103
Facility Status: Active
Description: UST - 3
Inspection Date: 10/20/2009
Closed: Not reported
Owner Name: JOHN F. BUONO JR.

CS:
Status: Pollution Characterization
Record Id: RO0000008
PE: 5602

Status: Leak being confirmed
Record Id: RO0000008
PE: 5602

SWEEPS UST:
Status: A
Comp Number: 20039
Number: 1
Board Of Equalization: 44-000257
Ref Date: 05-24-93
Act Date: 12-10-93
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-020039-000001
Actv Date: 07-01-85
Capacity: 300
Tank Use: OIL
Stg: W
Content: WASTE OIL
Number Of Tanks: 5

Status: A
Comp Number: 20039
Number: 1
Board Of Equalization: 44-000257
Ref Date: 05-24-93
Act Date: 12-10-93
Created Date: 02-29-88

GOOD CHEVROLET (Continued) **U003300240**

Tank Status:	A
Owner Tank Id:	2
Swrcb Tank Id:	01-000-020039-000002
Actv Date:	03-07-91
Capacity:	4000
Tank Use:	M.V. FUEL
Stg:	P
Content:	LEADED
Number Of Tanks:	Not reported

Status:	A
Comp Number:	20039
Number:	1
Board Of Equalization:	44-000257
Ref Date:	05-24-93
Act Date:	12-10-93
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	4M
Swrcb Tank Id:	01-000-020039-000003
Actv Date:	07-01-85
Capacity:	4000
Tank Use:	M.V. FUEL
Stg:	P
Content:	PRM UNLEADED
Number Of Tanks:	Not reported

Status:	A
Comp Number:	20039
Number:	1
Board Of Equalization:	44-000257
Ref Date:	05-24-93
Act Date:	12-10-93
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	10M
Swrcb Tank Id:	01-000-020039-000004
Actv Date:	05-24-93
Capacity:	10000
Tank Use:	M.V. FUEL
Stg:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

Status:	A
Comp Number:	20039
Number:	1
Board Of Equalization:	44-000257
Ref Date:	05-24-93
Act Date:	12-10-93
Created Date:	02-29-88
Tank Status:	A
Owner Tank Id:	550
Swrcb Tank Id:	01-000-020039-000005
Actv Date:	05-24-93
Capacity:	550
Tank Use:	OIL

GOOD CHEVROLET (Continued) **U003300240**

Stg: W
Content: WASTE OIL
Number Of Tanks: Not reported

277
East
1/4-1/2
0.500 mi.
2639 ft.

GUY'S SERVICE STATION
3820 SAN LEANDRO ST
OAKLAND, CA 94601

LUST **S101624285**
CA FID UST **N/A**
Alameda County CS
HIST CORTESE

Relative:
Higher

Actual:
28 ft.

LUST:
Region: STATE
Global Id: T0600102250
Latitude: 37.772399
Longitude: -122.221142
Case Type: LUST Cleanup Site
Status: Open - Site Assessment
Status Date: 1998-04-04 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: 01-2442
LOC Case Number: RO0000089
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 2hscaG MTBE=13,000 ppb in MW-3 installed and sampled on 7/6/98. MTBE=34,000 ppb in MW3, 4/17/03

LUST:
Region: 2
Facility Id: 01-2442
Facility Status: Preliminary site assessment underway
Case Number: 4055
How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: 3/4/1998
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 1/2/1965
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CA FID UST:
Facility ID: 01002641
Regulated By: UTNKA
Regulated ID: 00024612
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: Not reported
Mail To: Not reported
Mailing Address: 362 RIVIERA DR
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601

GUY'S SERVICE STATION (Continued) **S101624285**

Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

CS:
Status: Leak being confirmed
Record Id: RO0000089
PE: 5602

Status: Preliminary site assessment workplan submitted
Record Id: RO0000089
PE: 5602

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-2442

278
NNE
1/2-1
0.526 mi.
2776 ft.

LALO'S AUTOBODY REPAIR **Notify 65** **S100179543**
2801 FOOTHILLL BLVD **N/A**
OAKLAND, CA 92626

Relative:
Higher

Actual:
78 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

279
SE
1/2-1
0.603 mi.
3184 ft.

EKOTEK LUBE (FORMER) **CA BOND EXP. PLAN** **S100833502**
4200 ALAMEDA AVENUE **SLIC** **N/A**
OAKLAND, CA **ENVIROSTOR**

Relative:
Lower

Actual:
16 ft.

CA BOND EXP. PLAN:
Reponsible Party: BACKLOG SITE CLEANUP PLANNING REPORT
Project Revenue Source Company: Not reported
Project Revenue Source Addr: Not reported
Project Revenue Source City,St,Zip: Not reported
Project Revenue Source Desc: This site is projected to be remediated by the responsible parties with reimbursement to DHS for its oversight and monitoring costs. If the RPs are unable to pay for remediation, another source of funds will need to be identified.
Site Description: Ekotek is a waste oil recovery and recycling facility. Waste oil and Stoddard's solvent were treated and stored onsite. Some of the hazardous waste may have spilled onto the soil.

EKOTEK LUBE (FORMER) (Continued) **S100833502**

Hazardous Waste Desc: Waste oil or solvents may contaminate soil and may contain benzene, toluene, phenol and lead.
Threat To Public Health & Env: Over 100,000 people live within a two mile radius of the site. A coastal wetland is located 4,000 feet away. Arrowhead Marsh is 1.4 miles away. The depth to ground water is from 5 to 28 feet. Approximately 18 irrigation and industrial wells are within 3 miles. The site is securely fenced and posted.
Site Activity Status: The RP has indicated an interest in rehabilitating the facility as a unit for treatment of oily waste water.

SLIC:
Region: STATE
Facility Status: Open - Remediation
Status Date: 2009-04-22 00:00:00
Global Id: SL18330750
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.7684026666665
Longitude: -122.221825666667
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01S0132
File Location: Regional Board
Potential Media Affected: Not reported
Potential Contaminants of Concern: Benzene, Other Solvent or Non-Petroleum Hydrocarbon, Vinyl chloride, Diesel, Gasoline, Other Petroleum, Waste Oil / Motor / Hydraulic / Lubricating
Site History: Not reported

SLIC:
Region: 2
Facility ID: 01S0132
Facility Status: Remedial action (cleanup) Underway
Date Closed: Not reported
Local Case #: Not reported
How Discovered: DVA
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

ENVIROSTOR:
Site Type: Historical
Site Type Detailed: * Historical
Acres: Not reported
NPL: NO
Regulatory Agencies: NONE SPECIFIED
Lead Agency: NONE SPECIFIED
Program Manager: Not reported
Supervisor: Referred - Not Assigned
Division Branch: Berkeley
Facility ID: 01290024

EKOTEK LUBE (FORMER) (Continued) **S100833502**

Site Code: Not reported
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Refer: RWQCB
Status Date: 1994-07-01 00:00:00
Restricted Use: NO
Funding: Not reported
Latitude: 37.7684084185107
Longitude: -122.221869822253
Alias Name: P23063
Alias Type: PCode
Alias Name: CAT000613422
Alias Type: EPA Identification Number
Alias Name: 01290024
Alias Type: Envirostor ID Number

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported
Completed Document Type: Not reported
Completed Date: Not reported

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: NONE SPECIFIED
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: NONE SPECIFIED

280
SE
1/2-1
0.642 mi.
3391 ft.

SHELL SELF SERVICE **Notify 65** **S100178911**
630 HIGH STREET **N/A**
OAKLAND, CA 92626

Relative:
Lower

Actual:
12 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported

SHELL SELF SERVICE (Continued) **S100178911**

Discharge Date: Not reported
Incident Description: 92626

281
ESE
1/2-1
0.654 mi.
3451 ft.

Relative:
Higher

Actual:
23 ft.

850 FORTY SECOND ST L L C
850 42ND AVE
OAKLAND, CA 94601

Database(s): RCRA-SQG, FINDS, Cortese, RESPONSE, SLIC, CERC-NFRAP, DEED, EMI, ENVIROSTOR, HIST Cal-Sites

EDR ID Number: 1000368367
EPA ID Number: CAD000629485

RCRA-SQG:
Date form received by agency: 05/24/2001
Facility name: 850 FORTY SECOND ST L L C
Facility address: 850 42ND AVE
OAKLAND, CA 946014035
EPA ID: CAD000629485
Mailing address: 101 LINDEN ST
OAKLAND, CA 94607
Contact: TODD BERRYHILL
Contact address: 101 LINDEN ST
OAKLAND, CA 94607
Contact country: US
Contact telephone: (510) 273-2000
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: 850 FORTY SECOND AVE L L C
Owner/operator address: 101 LINDEN ST
OAKLAND, CA 94601
Owner/operator country: Not reported
Owner/operator telephone: (510) 273-2000
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

850 FORTY SECOND ST L L C (Continued) **1000368367**

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 09/01/1996
Facility name: 850 FORTY SECOND ST L L C
Classification: Small Quantity Generator

Hazardous Waste Summary:
Waste code: D000
Waste name: Not Defined

Waste code: D009
Waste name: MERCURY

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 10/24/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002628176

Not reported

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Cortese:

850 FORTY SECOND ST L L C (Continued) **1000368367**

Region:	CORTESE
Envirostor Id:	1280083
Site/Facility Type:	STATE RESPONSE
Cleanup Status:	CERTIFIED / OPERATION & MAINTENANCE - LAND USE RESTRICTIONS
Status Date:	12/13/1995
Site Code:	200020
Latitude:	37.769915574411797
Longitude:	-122.219146074875

RESPONSE:

Facility ID:	01280083
Site Type:	State Response
Site Type Detail:	State Response or NPL
Acres:	2
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP, RWQCB 2 - San Francisco Bay
Lead Agency:	RWQCB 2 - San Francisco Bay
Lead Agency Description:	Not reported
Project Manager:	CLAUDE JEMISON
Supervisor:	Wei Wei Chui
Division Branch:	Berkeley
Site Code:	200020
Assembly:	16
Senate:	09
Special Program Status:	Not reported
Status:	Certified / Operation & Maintenance
Status Date:	1995-12-13 00:00:00
Restricted Use:	YES
Funding:	Responsible Party
Latitude:	37.7699155744118
Longitude:	-122.219146074875
Alias Name:	01280083
Alias Type:	Envirostor ID Number
Alias Name:	200020
Alias Type:	Project Code (Site Code)
Alias Name:	110002628176
Alias Type:	EPA (FRS #)
Alias Name:	P21013
Alias Type:	PCode
Alias Name:	CAD000629485
Alias Type:	EPA Identification Number
Alias Name:	033-2171-001-01
Alias Type:	APN

APN:	033-2171-001-01
APN Description:	Not reported
Comments:	Completed RIFS. Site investigations detected mercury in both the upper soils and shallow groundwater.Completed Design consisting of a groundwater extraction and treatment system.Recorded Deed Restriction limiting site to commercial/industrial uses. The site has a cap that will require annual inspections.Certified Site.Completed Five-Year Review. The site has been in operation and maintenance under the SF Regional Water Quality Control Board (RWQCB) oversight. In October 1995, Clorox requested a containment zone designation for the Site that would allow the cess2007 site inspection report completed and signed.ation of groundwater extraction and treatment. In its request to the RWQCB, Clorox proposed additional removal and treatment of

850 FORTY SECOND ST L L C (Continued) **1000368367**

contaminated soil and installation of monitoring wells. The RWQCB approved Clorox's proposal on December 13, 1995. Groundwater monitoring is ongoing at the Site.

Completed Info:

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Design/Implementation Workplan
Completed Date: 1987-06-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2006-09-14 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction
Completed Date: 1987-01-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 1988-06-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Unilateral Order (I/SE, RAO, CAO, EPA AO)
Completed Date: 1986-10-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2007-11-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2009-03-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: 5 Year Review Reports
Completed Date: 1996-01-05 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Completion Report
Completed Date: 1987-10-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation / Feasibility Study
Completed Date: 1985-10-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Plan

850 FORTY SECOND ST L L C (Continued) **1000368367**

Completed Date: 1987-01-29 00:00:00

Confirmed: 30357
Confirmed Description: Mercury and compounds
Future Area Name: PROJECT WIDE
Future Sub Area Name: Not reported
Future Document Type: 5 Year Review Reports
Future Due Date: 2010
Media Affected: 30357
Media Affected Desc: Not reported

Management:
Management Required: DAY, HOS, SCH, RES
Management Required Desc: Day care center prohibited
Management Required Desc: Hospital use prohibited
Management Required Desc: Public or private school for persons under 21 prohibited
Management Required Desc: Residence use prohibited
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MANUFACTURING - CHEMICALS

SLIC:
Region: STATE
Facility Status: Open - Remediation
Status Date: 1987-01-01 00:00:00
Global Id: SL20224842
Lead Agency: SAN FRANCISCO BAY RWQCB (REGION 2)
Lead Agency Case Number: Not reported
Latitude: 37.769747920574
Longitude: -122.218946814537
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01S0003
File Location: Regional Board
Potential Media Affected: Contaminated Surface / Structure, Other Groundwater (uses other than drinking water), Soil, Surface
Potential Contaminants of Concern: Not reported
Site History: Not reported

SLIC:
Region: 2
Facility ID: 21999208
Facility Status: Post remedial action monitoring
Date Closed: Not reported
Local Case #: Not reported
How Discovered: RPR
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported

850 FORTY SECOND ST L L C (Continued) **1000368367**

Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CERC-NFRAP:
Site ID: 0900939
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP

CERCLIS-NFRAP Site Contact Name(s):
Contact Name: Matt Mitguard
Contact Tel: (415) 972-3096
Contact Title: Site Assessment Manager (SAM)

Contact Name: Nuria Muniz
Contact Tel: (415) 972-3811
Contact Title: Site Assessment Manager (SAM)

CERCLIS-NFRAP Site Alias Name(s):
Alias Name: CLOROX CO THE
Alias Address: Not reported
CA
Site Description: Not reported

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 08/01/1980
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: Not reported
Date Completed: 06/01/1982
Priority Level: Low

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 09/01/1984
Priority Level: High

Action: SITE INSPECTION
Date Started: Not reported
Date Completed: 03/27/1990
Priority Level: NFRAP (No Futher Remedial Action Planned

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 03/27/1990
Priority Level: Not reported

DEED:
Area: PROJECT WIDE
Sub Area: Not reported

850 FORTY SECOND ST L L C (Continued) **1000368367**

Site Type: STATE RESPONSE
Status: CERTIFIED / OPERATION & MAINTENANCE
Deed Date(s): 1/13/1987

EMI:

Year:	1987
County Code:	1
Air Basin:	SF
Facility ID:	1801
Air District Name:	BA
SIC Code:	2842
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

ENVIROSTOR:

Site Type:	State Response
Site Type Detailed:	State Response or NPL
Acres:	2
NPL:	NO
Regulatory Agencies:	SMBRP, RWQCB 2 - San Francisco Bay
Lead Agency:	RWQCB 2 - San Francisco Bay
Program Manager:	CLAUDE JEMISON
Supervisor:	Wei Wei Chui
Division Branch:	Berkeley
Facility ID:	01280083
Site Code:	200020
Assembly:	16
Senate:	09
Special Program:	Not reported
Status:	Certified / Operation & Maintenance
Status Date:	1995-12-13 00:00:00
Restricted Use:	YES
Funding:	Responsible Party
Latitude:	37.7699155744118
Longitude:	-122.219146074875
Alias Name:	01280083
Alias Type:	Envirostor ID Number
Alias Name:	200020
Alias Type:	Project Code (Site Code)
Alias Name:	110002628176
Alias Type:	EPA (FRS #)
Alias Name:	P21013
Alias Type:	PCode
Alias Name:	CAD000629485
Alias Type:	EPA Identification Number
Alias Name:	033-2171-001-01
Alias Type:	APN

850 FORTY SECOND ST L L C (Continued) **1000368367**

APN: 033-2171-001-01
APN Description: Not reported
Comments: Completed RIFS. Site investigations detected mercury in both the upper soils and shallow groundwater.Completed Design consisting of a groundwater extraction and treatment system.Recorded Deed Restriction limiting site to commercial/industrial uses. The site has a cap that will require annual inspections.Certified Site.Completed Five-Year Review. The site has been in operation and maintenance under the SF Regional Water Quality Control Board (RWQCB) oversight. In October 1995, Clorox requested a containment zone designation for the Site that would allow the cess2007 site inspection report completed and signed.ation of groundwater extraction and treatment. In its request to the RWQCB, Clorox proposed additional removal and treatment of contaminated soil and installation of monitoring wells. The RWQCB approved Clorox's proposal on December 13, 1995. Groundwater monitoring is ongoing at the Site.

Completed Info:

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Design/Implementation Workplan
Completed Date: 1987-06-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2006-09-14 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction
Completed Date: 1987-01-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 1988-06-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Unilateral Order (I/SE, RAO, CAO, EPA AO)
Completed Date: 1986-10-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2007-11-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2009-03-26 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: 5 Year Review Reports
Completed Date: 1996-01-05 00:00:00

850 FORTY SECOND ST L L C (Continued) **1000368367**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Completion Report
Completed Date: 1987-10-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation / Feasibility Study
Completed Date: 1985-10-30 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Action Plan
Completed Date: 1987-01-29 00:00:00

Confirmed: 30357
Confirmed Description: Mercury and compounds
Future Area Name: PROJECT WIDE
Future Sub Area Name: Not reported
Future Document Type: 5 Year Review Reports
Future Due Date: 2010
Media Affected: 30357
Media Affected Desc: Not reported

Management:
Management Required: DAY, HOS, SCH, RES
Management Required Desc: Day care center prohibited
Management Required Desc: Hospital use prohibited
Management Required Desc: Public or private school for persons under 21 prohibited
Management Required Desc: Residence use prohibited
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: MANUFACTURING - CHEMICALS

HISTORICAL CAL-SITES:
Facility ID: 01280083
Region: 2
Region Name: BERKELEY
Branch: NC
Branch Name: NORTH COAST
File Name: Not reported
State Senate District: 12131995
Status: CERT - CERTIFIED AS HAVING BEEN REMEDIED SATISFACTORILY UNDER DTSC OVERSIGHT
Status Name: CERTIFIED
Lead Agency: RWQCB
Lead Agency: REGIONAL WATER QUALITY CONTROL BOARD
Facility Type: RP
Type Name: RESPONSIBLE PARTY
NPL: Not Listed
SIC Code: 28

850 FORTY SECOND ST L L C (Continued) **1000368367**

SIC Name: MANU - CHEMICALS & ALLIED PRODUCTS
Access: Not reported
Cortese: Not reported
Hazardous Ranking Score: Not reported
Date Site Hazard Ranked: Not reported
Groundwater Contamination: Confirmed
Staff Member Responsible for Site: HATIQEE
Supervisor Responsible for Site: Not reported
Region Water Control Board: SF
Region Water Control Board Name: SAN FRANCISCO BAY
Lat/Long Direction: Not reported
Lat/Long (dms): 0 0 0 / 0 0 0
Lat/long Method: Not reported
Lat/Long Description: Not reported
State Assembly District Code: 16
State Senate District Code: 09
Facility ID: 01280083
Activity: RIFS
Activity Name: REMEDIAL INVESTIGATION / FEASIBILITY STUDY
AWP Code: 1
Proposed Budget: 0
AWP Completion Date: Not reported
Revised Due Date: Not reported
Comments Date: 10301985
Est Person-Yrs to complete: 0
Estimated Size: Not reported
Request to Delete Activity: Not reported
Activity Status: CERT
Definition of Status: CERTIFIED
Liquids Removed (Gals): 0
Liquids Treated (Gals): 0
Action Included Capping: Not reported
Well Decommissioned: Not reported
Action Included Fencing: Not reported
Removal Action Certification: Not reported
Activity Comments: Not reported
For Commercial Reuse: 0
For Industrial Reuse: 0
For Residential Reuse: 0
Unknown Type: 0
Facility ID: 01280083
Activity: RAP
Activity Name: REMEDIAL ACTION PLAN / RECORD OF DECISION
AWP Code: 1
Proposed Budget: 0
AWP Completion Date: Not reported
Revised Due Date: Not reported
Comments Date: 03301986
Est Person-Yrs to complete: 0
Estimated Size: Not reported
Request to Delete Activity: Not reported
Activity Status: CERT
Definition of Status: CERTIFIED
Liquids Removed (Gals): 0
Liquids Treated (Gals): 0
Action Included Capping: Not reported
Well Decommissioned: Not reported

850 FORTY SECOND ST L L C (Continued) **1000368367**

Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01280083
Activity:	ORDER
Activity Name:	I/SE, IORSE, FFA, FFSRA, VCA, EA
AWP Code:	1
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	10301986
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	CERT
Definition of Status:	CERTIFIED
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01280083
Activity:	DES
Activity Name:	DESIGN
AWP Code:	1
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	06301987
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	CERT
Definition of Status:	CERTIFIED
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01280083
Activity:	FRA

850 FORTY SECOND ST L L C (Continued) **1000368367**

Activity Name:	FINAL REMEDIAL ACTION
AWP Code:	1
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	10301987
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	CERT
Definition of Status:	CERTIFIED
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01280083
Activity:	CERT
Activity Name:	CERTIFICATION
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	06301988
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	CERT
Definition of Status:	CERTIFIED
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01280083
Activity:	5YEAR
Activity Name:	FIVE-YEAR REVIEW REQUIRED BY CERCLA
AWP Code:	Not reported
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	01051996
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported

850 FORTY SECOND ST L L C (Continued) **1000368367**

Activity Status:	CERT
Definition of Status:	CERTIFIED
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Facility ID:	01280083
Activity:	DEED
Activity Name:	DEED RESTRICTIONS
AWP Code:	HWDLU
Proposed Budget:	0
AWP Completion Date:	Not reported
Revised Due Date:	Not reported
Comments Date:	01131987
Est Person-Yrs to complete:	0
Estimated Size:	Not reported
Request to Delete Activity:	Not reported
Activity Status:	CERT
Definition of Status:	CERTIFIED
Liquids Removed (Gals):	0
Liquids Treated (Gals):	0
Action Included Capping:	Not reported
Well Decommissioned:	Not reported
Action Included Fencing:	Not reported
Removal Action Certification:	Not reported
Activity Comments:	Not reported
For Commercial Reuse:	0
For Industrial Reuse:	0
For Residential Reuse:	0
Unknown Type:	0
Alternate Address:	850 42ND AVENUE
Alternate City,St,Zip:	OAKLAND, CA 94601
Background Info:	The Clorox Oakland plant produced liquid bleach from 1919 to 1981. Elemental mercury was used in the process until 1957.
Comments Date:	01051996
Comments:	Completed Five-Year Review. The site has been in operation and
Comments Date:	01051996
Comments:	maintenance under the SF Regional Water Quality Control Board
Comments Date:	01051996
Comments:	(RWQCB) oversight. Contaminant removal from the groundwater
Comments Date:	01051996
Comments:	reached an asymptotic state. Further investigation by Chlorox
Comments Date:	01051996
Comments:	identified a hot spot of mercury. In October 1995, Chlorox
Comments Date:	01051996
Comments:	requested a containment plan designation allowing the cessation
Comments Date:	01051996
Comments:	of the groundwater treatment system. After additional removal
Comments Date:	01051996
Comments:	of contaminated soil and installation of monitoring wells, the

850 FORTY SECOND ST L L C (Continued) **1000368367**

Comments Date:	01051996
Comments:	RWQCB approved containment designation on December 13, 1995.
Comments Date:	01051996
Comments:	The source areas were excavated and treated on-site using
Comments Date:	01051996
Comments:	low-temperature thermal treatment technology to reduce mercury
Comments Date:	01051996
Comments:	concentrations. Groundwater monitoring is still ongoing under
Comments Date:	01051996
Comments:	RWQCB oversight.
Comments Date:	01131987
Comments:	Recorded Deed Restriction limiting site to industrial uses.
Comments Date:	06301987
Comments:	Completed Design consisting of a groundwater extraction and
Comments Date:	06301987
Comments:	treatment system.
Comments Date:	06301988
Comments:	Certified Site.
Comments Date:	10301985
Comments:	Completed RIFS. Site investigations detected mercury in both
Comments Date:	10301985
Comments:	the upper soils and shallow groundwater.
ID Name:	CALSTARS CODE
ID Value:	200020
ID Name:	BEP DATABASE PCODE
ID Value:	P21013
ID Name:	EPA IDENTIFICATION NUMBER
ID Value:	CAD000629485
Alternate Name:	CLOROX COMPANY
Special Programs Code:	Not reported
Special Programs Name:	Not reported

282
NE
1/2-1
0.675 mi.
3565 ft.

Relative:
Higher

Actual:
86 ft.

PACIFIC BELL
2112 FRUITVALE AVENUE
OAKLAND, CA 94601

Notify 65 **1000250821**
RCRA-SQG **CAT080015464**
FINDS
UST
CA FID UST
HIST UST
SWEEPS UST

Notify 65:

Date Reported:	Not reported
Staff Initials:	Not reported
Board File Number:	Not reported
Facility Type:	Not reported
Discharge Date:	Not reported
Incident Description:	92626

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	PACIFIC BELL
Facility address:	2112 FRUITVALE AVENUE OAKLAND, CA 94601
EPA ID:	CAT080015464
Mailing address:	220 MONTGOMERY STREET RM 1051 SAN FRANCISCO, CA 94104
Contact:	Not reported

PACIFIC BELL (Continued) **1000250821**

Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: THE PACIFIC TEL & TEL COMPANY
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: Unknown
Mixed waste (haz. and radioactive): Unknown
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: Unknown
Furnace exemption: Unknown
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No
Off-site waste receiver: Commercial status unknown

Historical Generators:
Date form received by agency: 04/09/1990
Facility name: PACIFIC BELL
Classification: Large Quantity Generator

PACIFIC BELL (Continued) **1000250821**

Date form received by agency: 01/09/1981
Facility name: PACIFIC BELL
Classification: Large Quantity Generator

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site

Registry ID: 110002947152

California - Hazardous Waste Tracking System - Datamart

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

UST:
Global ID: 4738
Latitude: 37.7847
Longitude: -122.22233

CA FID UST:
Facility ID: 01002756
Regulated By: UTNKA
Regulated ID: 00057564
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 4159772167
Mail To: Not reported
Mailing Address: 1270 ARROYO WAY
Mailing Address 2: Not reported
Mailing City,St,Zip: OAKLAND 94601
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

HIST UST:
Region: STATE
Facility ID: 00000057564
Facility Type: Other
Other Type: SIC 4800
Total Tanks: 0001
Contact Name: E.J. KOEHLER

PACIFIC BELL (Continued) **1000250821**

Telephone: 4155426758
Owner Name: PACIFIC BELL
Owner Address: 370 THIRD STREET
Owner City,St,Zip: SAN FRANCISCO, CA 94107

Tank Num: 001
Container Num: 1
Year Installed: 1973
Tank Capacity: 00006000
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Tank Construction: Not reported
Leak Detection: None

SWEEPS UST:
Status: A
Comp Number: 57564
Number: 1
Board Of Equalization: 44-000556
Ref Date: 03-14-91
Act Date: 03-14-91
Created Date: 02-29-88
Tank Status: A
Owner Tank Id: 1
Swrcb Tank Id: 01-000-057564-000001
Actv Date: 03-14-91
Capacity: 6000
Tank Use: M.V. FUEL
Stg: P
Content: DIESEL
Number Of Tanks: 1

---

283 **BIG B LUMBERTERIA** **ENVIROSTOR** **S102008155**
SSE **301/411 HIGH STREET** **N/A**
1/2-1 **OAKLAND, CA 94601**
0.677 mi.
3572 ft.

Relative:
Lower

Actual:
2 ft.

ENVIROSTOR:
Site Type: Historical
Site Type Detailed: * Historical
Acres: Not reported
NPL: NO
Regulatory Agencies: NONE SPECIFIED
Lead Agency: NONE SPECIFIED
Program Manager: Not reported
Supervisor: Referred - Not Assigned
Division Branch: Berkeley
Facility ID: 01240034
Site Code: Not reported
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Refer: RWQCB
Status Date: 1994-06-08 00:00:00
Restricted Use: NO
Funding: Not reported

BIG B LUMBERTERIA (Continued) **S102008155**

Latitude: 37.7647222222222
Longitude: -122.224444444444
Alias Name: 01240034
Alias Type: Envirostor ID Number

APN: NONE SPECIFIED
APN Description: Not reported
Comments: SF RWQCB has issued a CAO #90-133 for properties at 301, 411 & 401 High Street, Oakland. The 411 High Street site was formerly an ARCO Products Company bulk transfer facility for petroleum products. The 301 High Street site was formerly used by ARON CORTESE LIST SAMPLE RESULTS PRELIMINARY SOIL & GROUNDWATER SAMPLES RESULTS INDICATE SOIL & GROUNDWATER CONTAMINATION WITH TOLUENE (24 PPM SOIL, 1.7 PPM WATER), BENZENE (0.7 PPM WATER), XYLENE (3.7 PPM WATER), 1,1 DICHLOROETH- ANE (0.1 PPM WATER) & NEPHTALENE (29 PPM SOIL). NEIGHBORING PROPERTIES: UNOCAL CHEM AT 401 HIGH STREET AND THE LEARNER CHEM AT 3675 ALAMEDA STREET ALSO HAVE SOIL AND GROUND WATER CONTAMINATION. SITE SCREENING DONE PENDING: SF BAY RWQCB WILL ISSUE CLEAN- UP & ABATECO for equipment maintenance & storage. The property at 301 & 411 is currently owned by Koch Trust and is currently occupied by Big B Lumberteria. The property at 401 High St is currently owned and operated by Unocal Chemical Division as a bulk cheMENT ORDERS TO ALL 3 SITESmical transfer facility. In June 1983, approx 23,000 gallons of toluene was spilled during rail car off loading on a rail spur located along the northern part of Unocal facility.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Screening
Completed Date: 1991-05-06 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Screening
Completed Date: 1990-04-05 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 10002, 10009
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported

BIG B LUMBERTERIA (Continued) **S102008155**

PastUse: NONE SPECIFIED

284
ESE
1/2-1
0.682 mi.
3602 ft.

ROY HATTON PROJECT
752 HIGH ST
OAKLAND, CA 94601

Notify 65 **S100226799**
LUST **N/A**
Alameda County CS
HIST CORTESE

Relative:
Lower

Actual:
21 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

LUST:
Region: STATE
Global Id: T0600100500
Latitude: 37.768708
Longitude: -122.218187
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1997-12-05 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0547
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Waste Oil / Motor / Hydraulic / Lubricating
Site History: LUFT Con. LC 3 Jo12/05/199706/17/1993

LUST:
Region: 2
Facility Id: 01-0547
Facility Status: Case Closed
Case Number: 4440
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Case Closed
Record Id: RO0000956
PE: 5602

ROY HATTON PROJECT (Continued) **S100226799**

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0547

285
WSW
1/2-1
0.693 mi.
3661 ft.

KEN MIL COMPANY
1829 CLEMENT AVE
ALAMEDA, CA

SLIC **S102008205**
Alameda County CS **N/A**
ENVIROSTOR

Relative:
Lower

Actual:
13 ft.

SLIC:
Region: STATE
Facility Status: Open - Verification Monitoring
Status Date: 2007-05-01 00:00:00
Global Id: SLT2O00414
Lead Agency: ALAMEDA COUNTY LOP
Lead Agency Case Number: RO0002624
Latitude: 37.7601126823019
Longitude: -122.255990851793
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: ALAMEDA COUNTY LOP
RB Case Number: Not reported
File Location: Local Agency
Potential Media Affected: Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern: Cyanide, Arsenic, Chromium, Copper
Site History: Not reported

SLIC:
Region: 2
Facility ID: 01S0142
Facility Status: Leak being confirmed
Date Closed: Not reported
Local Case #: Not reported
How Discovered: Not reported
Leak Cause: Not reported
Leak Source: Not reported
Date Confirmed: Not reported
Date Prelim Site Assmnt Workplan Submitted: Not reported
Date Preliminary Site Assessment Began: Not reported
Date Pollution Characterization Began: Not reported
Date Remediation Plan Submitted: Not reported
Date Remedial Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CS:
Status: Leak being confirmed
Record Id: RO0002624
PE: 5502

Status: Preliminary site assessment underway
Record Id: RO0002624
PE: 5502

KEN MIL COMPANY (Continued) **S102008205**

Status: Post remedial action monitoring
Record Id: RO0002624
PE: 5502

ENVIROSTOR:
Site Type: Historical
Site Type Detailed: * Historical
Acres: 0.1
NPL: NO
Regulatory Agencies: RWQCB 2 - San Francisco Bay
Lead Agency: RWQCB 2 - San Francisco Bay
Program Manager: Not reported
Supervisor: Referred - Not Assigned
Division Branch: Berkeley
Facility ID: 01350100
Site Code: Not reported
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Refer: Other Agency
Status Date: 2004-07-09 00:00:00
Restricted Use: NO
Funding: Not reported
Latitude: 37.775
Longitude: -122.251111111111
Alias Name: 01350100
Alias Type: Envirostor ID Number
Alias Name: GRAPHIC SERVICES (KEM MIL DIVISION)
Alias Type: Alternate Name

APN: NONE SPECIFIED
APN Description: Not reported
Comments: County has oversight.Records Search: Alameda County made a routine inspection & noted plating wastewater had been illegally disposed-of on-site. Contaminants include high levels of cyanide & metals. The site is very close to the bay. Site Screening Done: Alameda County issued a letter to the Responsible Party to assess extent of contamination. DHS recommends Preliminary Endangerment Assessment (med).

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 1991-07-01 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Screening
Completed Date: 1990-05-02 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported

KEN MIL COMPANY (Continued) **S102008205**

Media Affected: 10093, 30153, 30160, 30407
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: NONE SPECIFIED

286
ESE
1/2-1
0.709 mi.
3743 ft.

THE CLOROX COMPANY **CA BOND EXP. PLAN** **S100833553**
850 42ND AVENUE **N/A**
OAKLAND, CA 94608

Relative:
Higher

Actual:
26 ft.

CA BOND EXP. PLAN:
Reponsible Party: COST RECOVERY/OPERATION AND MAINTENANCE SITE
Project Revenue Source Company: Not reported
Project Revenue Source Addr: Not reported
Project Revenue Source City,St,Zip: Not reported
Project Revenue Source Desc: The responsible party funded the characterization and remedial action at the site. State Bond funds were used for oversight of the RPs activities. DHS will seek cost recovery for its direct costs including staff costs and overhead related to the RI/FS and implementation of the RAP. DHS has budgeted $5,000 per year for oversight of operation and maintenance of the ground water extraction and treatment system during a forecasted 15 year period.
Site Description: The Clorox Company manufactures bleach and other products at this site. The ground water contains mercury.
Hazardous Waste Desc: Mercury (Hg) has been found in the ground water at a concentration of up to 9,600 parts per billion (ppb).
Threat To Public Health & Env: Contaminated ground water eventually discharges to the Alameda Estuary, which leads to the San Francisco Bay. Potential receptors to exposure of contaminants in ground water include aquatic life in San Francisco Bay.
Site Activity Status: The responsible parties completed their investigation at the site to determine the extent of contamination in October, 1985. The RAP was received by the Department in March, 1986. DHS issued a RAO in October, 1986 and the RPs completed the design ofthe treatment plant in June, 1987. Clorox began construction of the ground water treatment plant in October, 1987 and DHS granted the RPs a variance in December, 1987 to operate the plant starting in January, 1988. Clorox was issued waste discharge requirements from the Oakland RWQCB and met their discharge requirements in May, 1988. The site was certified in late June, 1988.

287
WSW
1/2-1
0.771 mi.
4070 ft.

OAKLAND GAS LIGHT AND HEAT CO
CLEMENT AVE AND UNION STREET
ALAMEDA, CA 94501

Manufactured Gas Plants **1008407652**
N/A

Relative:
Lower

Actual:
11 ft.

288
West
1/2-1
0.800 mi.
4222 ft.

2015 GRAND STREET
ALAMEDA, CA 94501

CHMIRS **S102008176**
ENVIROSTOR **N/A**

Relative:
Lower

Actual:
10 ft.

CHMIRS:

OES Incident Number:	00-3890	
OES notification:	8/29/200009:31:23 AM	
OES Date:	Not reported	
OES Time:	Not reported	
Incident Date:	Not reported	
Date Completed:	**Not reported**	
Property Use:	Not reported	
Agency Id Number:	Not reported	
Agency Incident Number:	Not reported	
Time Notified:	Not reported	
Time Completed:	Not reported	
Surrounding Area:	Not reported	
Estimated Temperature:	Not reported	
Property Management:	Not reported	
Special Studies 1:	Not reported	
Special Studies 2:	Not reported	
Special Studies 3:	Not reported	
Special Studies 4:	Not reported	
Special Studies 5:	Not reported	
Special Studies 6:	Not reported	
More Than Two Substances Involved?:		Not reported
Resp Agncy Personel # Of Decontaminated:		Not reported
Responding Agency Personel # Of Injuries:		Not reported
Responding Agency Personel # Of Fatalities:		Not reported
Others Number Of Decontaminated:		Not reported
Others Number Of Injuries:		Not reported
Others Number Of Fatalities:		Not reported
Vehicle Make/year:	Not reported	
Vehicle License Number:	Not reported	
Vehicle State:	Not reported	
Vehicle Id Number:	Not reported	
CA/DOT/PUC/ICC Number:	Not reported	
Company Name:	Not reported	
Reporting Officer Name/ID:	Not reported	
Report Date:	Not reported	
Comments:	Not reported	
Facility Telephone:	Not reported	
Waterway Involved:	No	
Waterway:	Not reported	
Spill Site:	Not reported	
Cleanup By:	Contractor	
Containment:	Not reported	
What Happened:	Not reported	
Type:	Not reported	

(Continued) **S102008176**

Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	2000
Agency:	Pennzoil
Incident Date:	8/28/200012:00:00 AM
Admin Agency:	Alameda County Environmental Health
Amount:	Not reported
Contained:	Yes
Site Type:	Other
E Date:	Not reported
Substance:	penz suppress
Quantity Released:	Not reported
BBLS:	0
Cups:	0
CUFT:	0
Gallons:	99
Grams:	0
Pounds:	0
Liters:	0
Ounces:	0
Pints:	0
Quarts:	0
Sheen:	0
Tons:	0
Unknown:	0
Description:	Not reported
Evacuations:	0
Number of Injuries:	0
Number of Fatalities:	0
Description:	It is a road dust suppresser. Storage tank developed a small leak. The release was contained to the containment field at the tank farm.
OES Incident Number:	97-3459
OES notification:	9/4/199711:06:49 AM
OES Date:	Not reported
OES Time:	Not reported
Incident Date:	Not reported
Date Completed:	**Not reported**
Property Use:	Not reported
Agency Id Number:	Not reported
Agency Incident Number:	Not reported
Time Notified:	Not reported
Time Completed:	Not reported
Surrounding Area:	Not reported
Estimated Temperature:	Not reported
Property Management:	Not reported
Special Studies 1:	Not reported
Special Studies 2:	Not reported
Special Studies 3:	Not reported
Special Studies 4:	Not reported
Special Studies 5:	Not reported
Special Studies 6:	Not reported
More Than Two Substances Involved?:	Not reported
Resp Agncy Personel # Of Decontaminated:	Not reported
Responding Agency Personel # Of Injuries:	Not reported
Responding Agency Personel # Of Fatalities:	Not reported

(Continued) **S102008176**

Others Number Of Decontaminated:	Not reported
Others Number Of Injuries:	Not reported
Others Number Of Fatalities:	Not reported
Vehicle Make/year:	Not reported
Vehicle License Number:	Not reported
Vehicle State:	Not reported
Vehicle Id Number:	Not reported
CA/DOT/PUC/ICC Number:	Not reported
Company Name:	Not reported
Reporting Officer Name/ID:	Not reported
Report Date:	Not reported
Comments:	Not reported
Facility Telephone:	Not reported
Waterway Involved:	No
Waterway:	Not reported
Spill Site:	Not reported
Cleanup By:	Reporting Party
Containment:	Not reported
What Happened:	Not reported
Type:	Not reported
Measure:	Not reported
Other:	Not reported
Date/Time:	Not reported
Year:	1997
Agency:	Pensoil Products Co.
Incident Date:	9/4/199712:00:00 AM
Admin Agency:	Not reported
Amount:	Not reported
Contained:	Yes
Site Type:	Other
E Date:	Not reported
Substance:	road dust oil
Quantity Released:	Not reported
BBLS:	0
Cups:	0
CUFT:	0
Gallons:	800
Grams:	0
Pounds:	0
Liters:	0
Ounces:	0
Pints:	0
Quarts:	0
Sheen:	0
Tons:	0
Unknown:	0
Description:	Not reported
Evacuations:	0
Number of Injuries:	0
Number of Fatalities:	0
Description:	A leak in a storage tank began yesterday & noticed this morning. The leak has been stopped. Release to asphalt only.

ENVIROSTOR:

Site Type:	Historical
Site Type Detailed:	* Historical
Acres:	Not reported

(Continued) **S102008176**

NPL: NO
Regulatory Agencies: NONE SPECIFIED
Lead Agency: NONE SPECIFIED
Program Manager: Not reported
Supervisor: Referred - Not Assigned
Division Branch: Berkeley
Facility ID: 01290012
Site Code: Not reported
Assembly: 16
Senate: 09
Special Program: * Site Char & Assess Grant (CERCLA 104)
Status: Refer: RWQCB
Status Date: 1994-06-08 00:00:00
Restricted Use: NO
Funding: Not reported
Latitude: 37.7766037352489
Longitude: -122.253315205809
Alias Name: 01290012
Alias Type: Envirostor ID Number
Alias Name: PENNZOIL PRODUCTS COMPANY
Alias Type: Alternate Name
Alias Name: CAD981688021
Alias Type: HWIS Identification Code

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported
Completed Document Type: Not reported
Completed Date: Not reported

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 10060, 10179, 10185, 10199, 20017, 30018
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported

(Continued) **S102008176**

PastUse: NONE SPECIFIED

289
ESE
1/2-1
0.812 mi.
4289 ft.

1033 44TH AVENUE
OAKLAND, CA 92626

Notify 65 **S100226650**
N/A

Relative:
Higher

Actual:
26 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

290
SE
1/2-1
0.866 mi.
4572 ft.

PACIFIC GALVANIZING INC.
715 46TH AVE
OAKLAND, CA 94601

TRIS **1006816272**
VCP **94601PCFCG71**
EMI
ENVIROSTOR

Relative:
Lower

Actual:
13 ft.

VCP:
Facility ID: 60001018
Site Type: Voluntary Cleanup
Site Type Detail: Voluntary Cleanup
Acres: 2
National Priorities List: NO
Cleanup Oversight Agencies: SMBRP, RWQCB 2 - San Francisco Bay, ALAMEDA COUNTY
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager: HOMAYUNE ATIQEE
Supervisor: Karen Toth
Division Branch: Berkeley
Site Code: 201831
Assembly: 16
Senate: 09
Special Programs Code: Not reported
Status: Active
Status Date: 2008-11-20 00:00:00
Restricted Use: NO
Funding: Responsible Party
Lat/Long: 37.7664984 / -122.217215
Alias Name: 60001018
Alias Type: Envirostor ID Number
Alias Name: 201831
Alias Type: Project Code (Site Code)
Alias Name: 34-2291-4-3
Alias Type: APN

APN: 34-2291-4-3
APN Description: Not reported
Comments: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported

PACIFIC GALVANIZING INC. (Continued) **1006816272**

Completed Document Type: Not reported
Completed Date: Not reported

Confirmed: 30594,30013
Confirmed Description: Zinc
Confirmed Description: Lead
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30013, 30594
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: METAL PLATING - OTHER

EMI:
Year: 1987
County Code: 1
Air Basin: SF
Facility ID: 456
Air District Name: BA
SIC Code: 3479
Air District Name: BAY AREA AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 0
Reactive Organic Gases Tons/Yr: 0
Carbon Monoxide Emissions Tons/Yr: 0
NOX - Oxides of Nitrogen Tons/Yr: 1
SOX - Oxides of Sulphur Tons/Yr: 0
Particulate Matter Tons/Yr: 1
Part. Matter 10 Micrometers & Smllr Tons/Yr: 0

Year: 1990
County Code: 1
Air Basin: SF
Facility ID: 456
Air District Name: BA
SIC Code: 3479
Air District Name: BAY AREA AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 0
Reactive Organic Gases Tons/Yr: 0
Carbon Monoxide Emissions Tons/Yr: 0

PACIFIC GALVANIZING INC. (Continued) **1006816272**

NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1995
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1996
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1997
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	1
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0
Year:	1998

PACIFIC GALVANIZING INC. (Continued) **1006816272**

County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	1
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	1999
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2000
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2001
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD

PACIFIC GALVANIZING INC. (Continued) **1006816272**

Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	1
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2002
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2003
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	3
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	1
NOX - Oxides of Nitrogen Tons/Yr:	2
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2004
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1.659
Reactive Organic Gases Tons/Yr:	0.170819
Carbon Monoxide Emissions Tons/Yr:	0.583
NOX - Oxides of Nitrogen Tons/Yr:	1.615

PACIFIC GALVANIZING INC. (Continued) **1006816272**

SOX - Oxides of Sulphur Tons/Yr:	0.009
Particulate Matter Tons/Yr:	0.057
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0.056772
Year:	2005
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1.113
Reactive Organic Gases Tons/Yr:	.1215762
Carbon Monoxide Emissions Tons/Yr:	.426
NOX - Oxides of Nitrogen Tons/Yr:	1.669
SOX - Oxides of Sulphur Tons/Yr:	.008
Particulate Matter Tons/Yr:	.044
Part. Matter 10 Micrometers & Smllr Tons/Yr:	.04385
Year:	2006
County Code:	1
Air Basin:	SF
Facility ID:	456
Air District Name:	BA
SIC Code:	3479
Air District Name:	BAY AREA AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1.193
Reactive Organic Gases Tons/Yr:	.1282266
Carbon Monoxide Emissions Tons/Yr:	.415
NOX - Oxides of Nitrogen Tons/Yr:	1.619
SOX - Oxides of Sulphur Tons/Yr:	.009
Particulate Matter Tons/Yr:	.046
Part. Matter 10 Micrometers & Smllr Tons/Yr:	.045838

ENVIROSTOR:

Site Type:	Voluntary Cleanup
Site Type Detailed:	Voluntary Cleanup
Acres:	2
NPL:	NO
Regulatory Agencies:	SMBRP, RWQCB 2 - San Francisco Bay, ALAMEDA COUNTY
Lead Agency:	SMBRP
Program Manager:	HOMAYUNE ATIQEE
Supervisor:	Karen Toth
Division Branch:	Berkeley
Facility ID:	60001018
Site Code:	201831
Assembly:	16
Senate:	09
Special Program:	Not reported
Status:	Active
Status Date:	2008-11-20 00:00:00
Restricted Use:	NO
Funding:	Responsible Party

PACIFIC GALVANIZING INC. (Continued) **1006816272**

Latitude: 37.7664984
Longitude: -122.217215
Alias Name: 60001018
Alias Type: Envirostor ID Number
Alias Name: 201831
Alias Type: Project Code (Site Code)
Alias Name: 34-2291-4-3
Alias Type: APN

APN: 34-2291-4-3
APN Description: Not reported
Comments: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported
Completed Document Type: Not reported
Completed Date: Not reported

Confirmed: 30594,30013
Confirmed Description: Zinc
Confirmed Description: Lead
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 30013, 30594
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: OTH, SOIL
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: METAL PLATING - OTHER

291
NNW
1/2-1
0.870 mi.
4592 ft.

DAVLIN PAINT COMPANY **Notify 65** **S100179369**
1401 14TH ST E **LUST** **N/A**
OAKLAND, CA 94606 **HIST CORTESE**

Relative:
Higher

Actual:
38 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

LUST:

DAVLIN PAINT COMPANY (Continued) **S100179369**

Region: STATE
Global Id: T0600100429
Latitude: 37.81123
Longitude: -122.29119
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1994-09-16 00:00:00
Lead Agency: ALAMEDA COUNTY LOP
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 01-0473
LOC Case Number: Not reported
File Location: Local Agency
Potential Media Affect: Other Groundwater (uses other than drinking water)
Potential Contaminats of Concern: Gasoline
Site History: LUFT Con. LC 3HSCAWG Ba09/16/1994

LUST:
Region: 2
Facility Id: 01-0473
Facility Status: Case Closed
Case Number: 1123
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 6/20/1991
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-0473

BU292 **CROWLEY MARITIME CORP.** **Notify 65** **S100179677**
NW **PAC. DRY DOCK REPAIR YARD** **N/A**
1/2-1 **OAKLAND, CA 92626**
0.883 mi.
4663 ft. **Site 1 of 2 in cluster BU**

Relative:
Lower

Actual:
0 ft.

Notify 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Incident Description: 92626

BU293
NW
1/2-1
0.906 mi.
4786 ft.

CROWLEY MARITIME CORPORATION
PAC. DRY DOCKS, YARDS 1 / 2
OAKLAND, CA 92626

Site 2 of 2 in cluster BU

Notify 65 **S100179669**
N/A

Relative:
Lower

Actual:
0 ft.

Notify 65:

Date Reported:	Not reported
Staff Initials:	Not reported
Board File Number:	Not reported
Facility Type:	Not reported
Discharge Date:	Not reported
Incident Description:	92626

294
NNW
1/2-1
0.924 mi.
4877 ft.

EAST BAY BLUE PRINT & SUPPLY CO
1745 14TH AVE
OAKLAND, CA 94606

HAZNET **S102816716**
SCH **N/A**
ENVIROSTOR

Relative:
Higher

Actual:
41 ft.

HAZNET:

Gepaid:	CAL000091259
Contact:	SUSAN VQ SMITH
Telephone:	5102612990
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1745 14TH AVE
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Not reported
Disposal Method:	Transfer Station
Tons:	0.12
Facility County:	Not reported

Gepaid:	CAL000091259
Contact:	SUSAN VQ SMITH
Telephone:	5102612990
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1745 14TH AVE
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	Alameda
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Photochemicals/photoprocessing waste
Disposal Method:	Transfer Station
Tons:	0.12
Facility County:	Not reported

Gepaid:	CAL000091259
Contact:	STEVEN VON QUERNER
Telephone:	5102612990
Facility Addr2:	Not reported
Mailing Name:	Not reported
Mailing Address:	1745 14TH AVE
Mailing City,St,Zip:	OAKLAND, CA 946060000
Gen County:	1
TSD EPA ID:	CA0000084517

EAST BAY BLUE PRINT & SUPPLY CO (Continued) **S102816716**

TSD County: Sacramento
Waste Category: Photochemicals/photoprocessing waste
Disposal Method: Transfer Station
Tons: .7506
Facility County: 1

Gepaid: CAL000091259
Contact: STEVEN VON QUERNER
Telephone: 5102612990
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1745 14TH AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CA0000084517
TSD County: Sacramento
Waste Category: Not reported
Disposal Method: Transfer Station
Tons: 0.1251
Facility County: 1

Gepaid: CAL000091259
Contact: STEVEN VON QUERNER
Telephone: 5102612990
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1745 14TH AVE
Mailing City,St,Zip: OAKLAND, CA 946060000
Gen County: 1
TSD EPA ID: CA0000084517
TSD County: Sacramento
Waste Category: Photochemicals/photoprocessing waste
Disposal Method: Transfer Station
Tons: 0.3753
Facility County: 1

Click this hyperlink while viewing on your computer to access
13 additional CA_HAZNET: record(s) in the EDR Site Report.

SCH:

Facility ID: 01270026
Site Type: School Investigation
Site Type Detail: School
Acres: 3
National Priorities List: NO
Cleanup Oversight Agencies: SMBRP
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager: Not reported
Supervisor: Javier Hinojosa
Division Branch: Chatsworth
Site Code: 204067-11
Assembly: 16
Senate: 09
Special Program Status: Not reported
Status: Inactive - Needs Evaluation

EAST BAY BLUE PRINT & SUPPLY CO (Continued) **S102816716**

Status Date: 2003-09-08 00:00:00
Restricted Use: NO
Funding: School District
Latitude: 37.7915336802908
Longitude: -122.243761427181
Alias Name: EAST BAY BLUE SCHOOL
Alias Type: Alternate Name
Alias Name: 01270026
Alias Type: Envirostor ID Number
Alias Name: OAKLAND UNIFIED SCHOOL DISTRICT
Alias Type: Alternate Name
Alias Name: 204067-11
Alias Type: Project Code (Site Code)
Alias Name: EAST BAY BLUE SCHOOL EXPANSION SITE
Alias Type: Alternate Name

APN: NONE SPECIFIED
APN Description: Not reported
Comments: The school site was dropped.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2003-09-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Environmental Oversight Agreement
Completed Date: 2001-05-01 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2002-07-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Workplan
Completed Date: 2002-06-27 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: NONE SPECIFIED
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported

EAST BAY BLUE PRINT & SUPPLY CO (Continued) **S102816716**

Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: * MANU - PRINTING & PUBLISHING

ENVIROSTOR:
Site Type: School Investigation
Site Type Detailed: School
Acres: 3
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: Not reported
Supervisor: Javier Hinojosa
Division Branch: Chatsworth
Facility ID: 01270026
Site Code: 204067-11
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Inactive - Needs Evaluation
Status Date: 2003-09-08 00:00:00
Restricted Use: NO
Funding: School District
Latitude: 37.7915336802908
Longitude: -122.243761427181
Alias Name: EAST BAY BLUE SCHOOL
Alias Type: Alternate Name
Alias Name: 01270026
Alias Type: Envirostor ID Number
Alias Name: OAKLAND UNIFIED SCHOOL DISTRICT
Alias Type: Alternate Name
Alias Name: 204067-11
Alias Type: Project Code (Site Code)
Alias Name: EAST BAY BLUE SCHOOL EXPANSION SITE
Alias Type: Alternate Name

APN: NONE SPECIFIED
APN Description: Not reported
Comments: The school site was dropped.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2003-09-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Environmental Oversight Agreement
Completed Date: 2001-05-01 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Inspections/Visit (Non LUR)
Completed Date: 2002-07-19 00:00:00

Completed Area Name: PROJECT WIDE

EAST BAY BLUE PRINT & SUPPLY CO (Continued) **S102816716**

Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Workplan
Completed Date: 2002-06-27 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: NONE SPECIFIED
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: * MANU - PRINTING & PUBLISHING

295
East
1/2-1
0.938 mi.
4955 ft.

Relative:
Higher

Actual:
35 ft.

WEST COAST FLOOR COVERING
1468 44TH AVE
OAKLAND, CA 94601

HAZNET **1000154988**
LUST **N/A**
SLIC
ENVIROSTOR
CA WDS
HIST CORTESE

HAZNET:
Gepaid: CAL000206928
Contact: JOHN BELTRAN
Telephone: 8054830512
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1441 MOUNTAIN VIEW
Mailing City,St,Zip: OXNARD, CA 930300000
Gen County: Ventura
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Empty containers less than 30 gallons
Disposal Method: Not reported
Tons: 0
Facility County: Not reported

Gepaid: CAL000206928
Contact: JOHN BELTRAN
Telephone: 8054830512
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1441 MOUNTAIN VIEW
Mailing City,St,Zip: OXNARD, CA 930300000
Gen County: Ventura
TSD EPA ID: Not reported
TSD County: Los Angeles

WEST COAST FLOOR COVERING (Continued) **1000154988**

Waste Category: Other organic solids
Disposal Method: Disposal, Land Fill
Tons: 0.27
Facility County: Not reported

Gepaid: CAL000206928
Contact: JOHN BELTRAN
Telephone: 8054830512
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1441 MOUNTAIN VIEW
Mailing City,St,Zip: OXNARD, CA 930300000
Gen County: Ventura
TSD EPA ID: Not reported
TSD County: Los Angeles
Waste Category: Unspecified oil-containing waste
Disposal Method: Recycler
Tons: 0.2
Facility County: Not reported

Gepaid: CAL000206928
Contact: JOHN BELTRAN
Telephone: 8054830512
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1441 MOUNTAIN VIEW
Mailing City,St,Zip: OXNARD, CA 930300000
Gen County: Ventura
TSD EPA ID: CAD099452708
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: H039
Tons: 0.95
Facility County: Ventura

Gepaid: CAL000206928
Contact: RALP BELTRAN
Telephone: 0000000000
Facility Addr2: Not reported
Mailing Name: Not reported
Mailing Address: 1441 MOUNTAIN VIEW
Mailing City,St,Zip: OXNARD, CA 930300000
Gen County: Ventura
TSD EPA ID: CAD982444481
TSD County: San Bernardino
Waste Category: Other organic solids
Disposal Method: Recycler
Tons: 0.1
Facility County: Ventura

Click this hyperlink while viewing on your computer to access
4 additional CA_HAZNET: record(s) in the EDR Site Report.

LUST:
Region: 2
Facility Id: 01-1658
Facility Status: Case Closed

WEST COAST FLOOR COVERING (Continued) **1000154988**

Case Number: 837
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

SLIC:
Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 2000-12-21 00:00:00
Global Id: SLT43663661
Lead Agency: LOS ANGELES RWQCB (REGION 4)
Lead Agency Case Number: Not reported
Latitude: 34.193338
Longitude: -119.163764
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: 1003
File Location: Not reported
Potential Media Affected: Not reported
Potential Contaminants of Concern: * Metals, * Solvents, Heating Oil / Fuel Oil
Site History: Not reported

Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 2007-02-03 00:00:00
Global Id: T0611158758
Lead Agency: VENTURA COUNTY LOP
Lead Agency Case Number: SR0002867
Latitude: 34.193962
Longitude: -119.163147
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: VENTURA COUNTY LOP
RB Case Number: Not reported
File Location: Local Agency Warehouse
Potential Media Affected: Under Investigation
Potential Contaminants of Concern: * Metals, * Solvents, Heating Oil / Fuel Oil
Site History: Not reported

ENVIROSTOR:
Site Type: Historical
Site Type Detailed: * Historical
Acres: 0
NPL: NO
Regulatory Agencies: NONE SPECIFIED
Lead Agency: NONE SPECIFIED
Program Manager: Not reported

WEST COAST FLOOR COVERING (Continued) **1000154988**

Supervisor: * MMONROY
Division Branch: Chatsworth
Facility ID: 56500003
Site Code: Not reported
Assembly: 35
Senate: 23
Special Program: * Site Char & Assess Grant (CERCLA 104)
Status: No Further Action
Status Date: 1987-12-09 00:00:00
Restricted Use: NO
Funding: Not reported
Latitude: 34.1939617874138
Longitude: -119.163147343988
Alias Name: WEST COAST AUTO RECYCLERS
Alias Type: Alternate Name
Alias Name: 56500003
Alias Type: Envirostor ID Number
Alias Name: CAD053859393
Alias Type: EPA Identification Number

APN: NONE SPECIFIED
APN Description: Not reported
Comments: CalSites Validation Program confirms NFA for DTSC.Facility identified from DHS DMI file listing 1982.Preliminary Assessment Done: EPA Federal Investigation Team reports no hazardous material use of hazardous waste generated; EPA recommendation is no further action.Site Screening done to check EPA's actions since the DHS Preliminary Assessment.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: * Discovery
Completed Date: 1982-06-21 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Screening
Completed Date: 1994-10-25 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Site Screening
Completed Date: 1987-12-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Assessment Report
Completed Date: 1987-08-18 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: 10008, 10064, 10076, 10097, 10197, 10199
Media Affected Desc: Not reported

WEST COAST FLOOR COVERING (Continued) **1000154988**

Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL, SV
Potenital Description: Not reported
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: BATTERY RECLAMATION, METAL RECLAMATION

CA WDS:
Facility ID: 4 56I009899
Facility Type: Other - Does not fall into the category of Municipal/Domestic, Industrial, Agricultural or Solid Waste (Class I, II or III)
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number: CAS000001 The 1st 2 characters designate the state. The remaining 7 are assigned by the Regional Board
Subregion: 4
Facility Telephone: Not reported
Facility Contact: John Beltran
Agency Name: OXNARD METAL COMPANY
Agency Address: Not reported
Agency City,St,Zip: 0
Agency Contact: Not reported
Agency Telephone: Not reported
Agency Type: Private
SIC Code: 0
SIC Code 2: Not reported
Primary Waste: Not reported
Primary Waste Type: Not reported
Secondary Waste: Not reported
Secondary Waste Type: Not reported
Design Flow: 0
Baseline Flow: 0
Reclamation: Not reported
POTW: Not reported
Treat To Water: Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Complexity: Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as

WEST COAST FLOOR COVERING (Continued) **1000154988**

dairy waste ponds.

CORTESE:

Region:	CORTESE
Facility County Code:	56
Reg By:	CALSI
Reg Id:	56500003

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-1658

296
ESE
1/2-1
0.966 mi.
5099 ft.

DUTCH BOY PAINT **VCP** **S104549014**
4701 SAN LEANDRO STREET **ENVIROSTOR** **N/A**
OAKLAND, CA 94601

Relative:
Lower

Actual:
21 ft.

VCP:

Facility ID:	01390003
Site Type:	Voluntary Cleanup
Site Type Detail:	Voluntary Cleanup
Acres:	3.4
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	CLAUDE JEMISON
Supervisor:	Wei Wei Chui
Division Branch:	Berkeley
Site Code:	201272
Assembly:	16
Senate:	09
Special Programs Code:	Voluntary Cleanup Program
Status:	Certified / Operation & Maintenance
Status Date:	2007-10-24 00:00:00
Restricted Use:	YES
Funding:	Responsible Party
Lat/Long:	37.7673338376698 / -122.214449621529
Alias Name:	01390003
Alias Type:	Envirostor ID Number
Alias Name:	34-2269-2
Alias Type:	APN
Alias Name:	DUTCH BOY PAINT
Alias Type:	Alternate Name
Alias Name:	201272
Alias Type:	Project Code (Site Code)
Alias Name:	110002955366
Alias Type:	EPA (FRS #)

APN:	34-2269-2
APN Description:	Not reported
Comments:	The Remedial Investigation Report confirms that lead above screening levels exists in surface soils and that underground storage tanks exist at the site. Groundwater does not appear to be impacted.Removal Action Workplan (RAW) approved which requires that

DUTCH BOY PAINT (Continued) **S104549014**

all soil containing lead above residential levels and arsenic above background, be excavated and disposed offsite.Health and Safety Plan for site cleanup activitiesFact Sheet for Draft RAWClosure Plan for City of Oakland approval.NOE approved for Removal Action WorkplanVoluntary Cleanup Agreement with the National Lead Company and Francis and Catharine Collins for additional investigation and remediation at the site.Operations and Maintenance Plan for annual inspections and maintenance of the capped property approved.Deed restrictions signed for portions of the site where lead contamination remainImplementation Report approved which documents excavation and offsite disposal of contaminated soil and backfilling of unpaved areas.Operation and Maintenance Plan for annual inspections and maintenance of capped site approved.Implementation Plan describes steps to be taken to remove lead contaminated soils required by the RAW.Workplan for investigation of lead contaminated soilsWorkplan approved. The objective for this remedial investigation is to complete site characterization, including the further evaluation of' vertical distribution and extent of total lead and arsenic concentrations in shallow soil and dissolved in shwell installation workplan approvedCommunity Profile approvedSoil Management plan address disturbance of approximately 120 cubic feet of contaminated soil during the installation of new sidewalks.allow groundwater.

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Remedial Investigation Report
Completed Date:	2002-04-08 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Well Installation Workplan
Completed Date:	2001-11-15 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Health & Safety Plan
Completed Date:	2004-05-28 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Fact Sheets
Completed Date:	2003-03-21 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Technical Workplan
Completed Date:	2003-04-18 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	CEQA - Notice of Exemption
Completed Date:	2003-03-18 00:00:00

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Certification
Completed Date:	2007-10-24 00:00:00

DUTCH BOY PAINT (Continued) **S104549014**

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2000-06-23 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operation & Maintenance Order/Agreement
Completed Date: 2007-10-11 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction
Completed Date: 2007-09-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2008-12-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2006-03-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operations and Maintenance Plan
Completed Date: 2006-05-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Design/Implementation Workplan
Completed Date: 2004-06-02 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2001-02-27 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2003-01-31 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Community Profile
Completed Date: 2001-09-12 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Soils Management Plan
Completed Date: 2008-04-02 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported

DUTCH BOY PAINT (Continued) **S104549014**

Completed Document Type: Removal Action Completion Report
Completed Date: 2008-08-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Workplan
Completed Date: 2003-05-02 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: PROJECT WIDE
Future Sub Area Name: Not reported
Future Document Type: 5 Year Review Reports
Future Due Date: 2011
Media Affected: 30001, 30013
Media Affected Desc: Not reported
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: SOIL
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: PAINT MANUFACTURING

ENVIROSTOR:
Site Type: Voluntary Cleanup
Site Type Detailed: Voluntary Cleanup
Acres: 3.4
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: CLAUDE JEMISON
Supervisor: Wei Wei Chui
Division Branch: Berkeley
Facility ID: 01390003
Site Code: 201272
Assembly: 16
Senate: 09
Special Program: Voluntary Cleanup Program
Status: Certified / Operation & Maintenance
Status Date: 2007-10-24 00:00:00
Restricted Use: YES
Funding: Responsible Party
Latitude: 37.7673338376698
Longitude: -122.214449621529
Alias Name: 01390003
Alias Type: Envirostor ID Number
Alias Name: 34-2269-2
Alias Type: APN
Alias Name: DUTCH BOY PAINT
Alias Type: Alternate Name

DUTCH BOY PAINT (Continued) **S104549014**

Alias Name: 201272
Alias Type: Project Code (Site Code)
Alias Name: 110002955366
Alias Type: EPA (FRS #)

APN: 34-2269-2
APN Description: Not reported
Comments: The Remedial Investigation Report confirms that lead above screening levels exists in surface soils and that underground storage tanks exist at the site. Groundwater does not appear to be impacted.Removal Action Workplan (RAW) approved which requires that all soil containing lead above residential levels and arsenic above background, be excavated and disposed offsite.Health and Safety Plan for site cleanup activitiesFact Sheet for Draft RAWClosure Plan for City of Oakland approval.NOE approved for Removal Action WorkplanVoluntary Cleanup Agreement with the National Lead Company and Francis and Catharine Collins for additional investigation and remediation at the site.Operations and Maintenance Plan for annual inspections and maintenance of the capped property approved.Deed restrictions signed for portions of the site where lead contamination remainImplementation Report approved which documents excavation and offsite disposal of contaminated soil and backfilling of unpaved areas.Operation and Maintenance Plan for annual inspections and maintenance of capped site approved.Implementation Plan describes steps to be taken to remove lead contaminated soils required by the RAW.Workplan for investigation of lead contaminated soilsWorkplan approved. The objective for this remedial investigation is to complete site characterization, including the further evaluation of' vertical distribution and extent of total lead and arsenic concentrations in shallow soil and dissolved in shwell installation workplan approvedCommunity Profile approvedSoil Management plan address disturbance of approximately 120 cubic feet of contaminated soil during the installation of new sidewalks.allow groundwater.

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Report
Completed Date: 2002-04-08 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Well Installation Workplan
Completed Date: 2001-11-15 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Health & Safety Plan
Completed Date: 2004-05-28 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Fact Sheets
Completed Date: 2003-03-21 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Technical Workplan

DUTCH BOY PAINT (Continued) **S104549014**

Completed Date: 2003-04-18 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: CEQA - Notice of Exemption
Completed Date: 2003-03-18 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Certification
Completed Date: 2007-10-24 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Voluntary Cleanup Agreement
Completed Date: 2000-06-23 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operation & Maintenance Order/Agreement
Completed Date: 2007-10-11 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Land Use Restriction
Completed Date: 2007-09-07 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: LUR Site Inspection/Visit
Completed Date: 2008-12-16 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Removal Action Completion Report
Completed Date: 2006-03-13 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Operations and Maintenance Plan
Completed Date: 2006-05-19 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Design/Implementation Workplan
Completed Date: 2004-06-02 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2001-02-27 00:00:00

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Remedial Investigation Workplan
Completed Date: 2003-01-31 00:00:00

DUTCH BOY PAINT (Continued) **S104549014**

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Community Profile
Completed Date:	2001-09-12 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Soils Management Plan
Completed Date:	2008-04-02 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Removal Action Completion Report
Completed Date:	2008-08-28 00:00:00
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Removal Action Workplan
Completed Date:	2003-05-02 00:00:00
Confirmed:	NONE SPECIFIED
Confirmed Description:	Not reported
Future Area Name:	PROJECT WIDE
Future Sub Area Name:	Not reported
Future Document Type:	5 Year Review Reports
Future Due Date:	2011
Media Affected:	30001, 30013
Media Affected Desc:	Not reported
Media Affected Desc:	Not reported

Management:

Management Required:	NONE SPECIFIED
Management Required Desc:	Not reported
Potential:	SOIL
Potenital Description:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported
PastUse:	PAINT MANUFACTURING

297
ESE
1/2-1
0.987 mi.
5212 ft.

Relative:
Higher

Actual:
28 ft.

FREMONT HIGH SCHOOL NO. 2 **SCH** **S107027237**
1201 46TH AVENUE **ENVIROSTOR** **N/A**
OAKLAND, CA 94601

SCH:

Facility ID:	10880004
Site Type:	School Investigation
Site Type Detail:	School
Acres:	37
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program

FREMONT HIGH SCHOOL NO. 2 (Continued) **S107027237**

Project Manager:	Not reported
Supervisor:	Javier Hinojosa
Division Branch:	Chatsworth
Site Code:	204100-11
Assembly:	16
Senate:	09
Special Program Status:	Not reported
Status:	Inactive - Needs Evaluation
Status Date:	2005-06-17 00:00:00
Restricted Use:	NO
Funding:	School District
Latitude:	37.7705745664114
Longitude:	-122.213308198704
Alias Name:	204100-11
Alias Type:	Project Code (Site Code)
Alias Name:	10880004
Alias Type:	Envirostor ID Number
Alias Name:	OAKLAND USD-FREMONT HIGH SCHOOL NO. 2
Alias Type:	Alternate Name
APN:	NONE SPECIFIED
APN Description:	Not reported
Comments:	Not reported

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	2005-06-17 00:00:00
Confirmed:	NONE SPECIFIED
Confirmed Description:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Media Affected:	NONE SPECIFIED
Media Affected Desc:	Not reported

Management:

Management Required:	NONE SPECIFIED
Management Required Desc:	Not reported
Potential:	NONE SPECIFIED
Potenital Description:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported
PastUse:	RESIDENTIAL AREA

ENVIROSTOR:

Site Type:	School Investigation
Site Type Detailed:	School
Acres:	37
NPL:	NO
Regulatory Agencies:	SMBRP
Lead Agency:	SMBRP

FREMONT HIGH SCHOOL NO. 2 (Continued) **S107027237**

Program Manager: Not reported
Supervisor: Javier Hinojosa
Division Branch: Chatsworth
Facility ID: 10880004
Site Code: 204100-11
Assembly: 16
Senate: 09
Special Program: Not reported
Status: Inactive - Needs Evaluation
Status Date: 2005-06-17 00:00:00
Restricted Use: NO
Funding: School District
Latitude: 37.7705745664114
Longitude: -122.213308198704
Alias Name: 204100-11
Alias Type: Project Code (Site Code)
Alias Name: 10880004
Alias Type: Envirostor ID Number
Alias Name: OAKLAND USD-FREMONT HIGH SCHOOL NO. 2
Alias Type: Alternate Name

APN: NONE SPECIFIED
APN Description: Not reported
Comments: Not reported

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 2005-06-17 00:00:00

Confirmed: NONE SPECIFIED
Confirmed Description: Not reported
Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Media Affected: NONE SPECIFIED
Media Affected Desc: Not reported

Management:
Management Required: NONE SPECIFIED
Management Required Desc: Not reported
Potential: NONE SPECIFIED
Potenital Description: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported
PastUse: RESIDENTIAL AREA

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
ALAMEDA	S104569482	INTERNATIONAL TECHNOLOGY/TRAILER	ALAMEDA NAVAL AIR STATION	94501	HAZNET, CHMIRS, HIST CORTESE
ALAMEDA	S109284032	RUSSI COMMERCIAL PROPERTY	1347 PARK	94501	LUST
ALAMEDA	S109284002	NORMANDY PROJECT TRACT 4495	UNKNOWN MCCARTNEY RD	94501	LUST
ALAMEDA	S103890483	NORMANDY PROJECT TRACT 44	UNKNOWN MECARTNEY RD	94501	HIST CORTESE
ALBANY	S106162029	WILANCO INC	1081 5 EASTSHORE HWY	94501	LUST
OAKLAND	S105954485	URBAN PROMISE ACADEMY SITE	2200-2288 EAST 12TH STREET/23R	94606	SCH, ENVIROSTOR
OAKLAND	90186466	29TH ST & GLASSCOCK AT (7-11 STORE	29TH ST & GLASSCOCK AT (7-11 S	94601	ERNS
OAKLAND	1003878529	NATIONAL LEAD CO	47TH AVE & E 10TH ST	94601	CERC-NFRAP
OAKLAND	S106234893	OAKLAND TERMINAL RAILWAY PROPERTY	HWY 80/HWY 580 INTERCHANGE S O		SLIC
OAKLAND	2009040117	I-880 @ 16TH AVE	I-880 @ 16TH AVE		HMIRS
OAKLAND	90150868	I-880 AND 5TH AVE	I-880 AND 5TH AVE		ERNS
OAKLAND	S106928481	LAKE MERRITT PUMP STATION	7TH ST AT E 8TH ST	94606	SWEEPS UST
OAKLAND	S106661084	SOUTHERN PACIFIC TRANSPORTATION CO	0 5TH AVE / 7TH ST	94606	Alameda County CS
OAKLAND	S105194665	UNION PACIFIC	5TH AVE / 7TH ST		LUST, CHMIRS
OAKLAND	98434862	5TH AVENUE MARINA 499 EMBARKEDERO	5TH AVENUE MARINA 499 EMBARKED		ERNS
OAKLAND	S109443847	FORMER ORP BLDG 1 REMEDIATION PROJ	BATAAN AVE AT MARITIME ST		NPDES
OAKLAND	S103881512	UPTOWN THEATER DISTRICT	BORDERED BY 20TH ST SAN PABLO		SLIC
OAKLAND	S102008237	CHINATOWN REDEVELOPMENT - OAKLAND	BOUNDED BY 11TH, 10TH,WEBSTER	94601	ENVIROSTOR
OAKLAND	S105025327	ESPOSITO PLATING COPORAT	29042908 CHAPMAN STREET	94601	HIST CORTESE
OAKLAND	96497885	CORNER OF 101 ST. AVENUE AND E ST.	CORNER OF 101 ST. AVENUE AND E		ERNS
OAKLAND	S106234797	303 & 315 DERBY AVENUE	DERBY AVENUE		SLIC
OAKLAND	1003878570	PORT OF OAKLAND	EMBARCADERO CV MARINA SITE	94606	CERC-NFRAP
OAKLAND	S109284006	VUKASIM PROPERTY	54 EMBARCADERO ST	94606	LUST
OAKLAND	1003879399	54 EMBARCADERO	FALLON ST & EMBARCADERO DR	94606	CERC-NFRAP
OAKLAND	90189398	E/B I-80 WEST OF GRAND AVENUE	E/B I-80 WEST OF GRAND AVENUE		ERNS
OAKLAND	8874691	NB I-880 AT HIGH ST OFF RAMP	NB I-880 AT HIGH ST OFF RAMP		ERNS
OAKLAND	91241949	SB I-880 AT 23ND ST. OFF RAMP	SB I-880 AT 23ND ST. OFF RAMP		ERNS
OAKLAND	90186048	N/B I-880 AT HEGENBERGER	N/B I-880 AT HEGENBERGER		ERNS
OAKLAND	91217729	SB I-880 AT 16TH ST. OVERCROSSING	SB I-880 AT 16TH ST. OVERCROSS		ERNS
OAKLAND	91240438	INT I-880 & HIGH ST	INT I-880 & HIGH ST		ERNS
OAKLAND	S107736940	OAK STREET TO 9TH AVENUE	OAK STREET TO 9TH AVENUE	94606	VCP, ENVIROSTOR
OAKLAND	2003703587	OAKLAND BAY BRIDGE CONSTRUCTION PR	OAKLAND BAY BRIDGE CONSTRUCTIO		ERNS
OAKLAND	90186234	PORT OF OAKLAND 9TH AVENUE TERMIN	PORT OF OAKLAND 9TH AVENUE TE		ERNS
OAKLAND	S105870950	SOUTHERN PACIFIC TRANSPORT COMPANY	1912 7TH ST	94606	LUST, Alameda County CS
OAKLAND	1003880072	BATAVIA PROPERTY	1832 9TH STREET		CERC-NFRAP
OAKLAND	91232281	AT THE END OF 6TH AVENUE	AT THE END OF 6TH AVENUE		ERNS
OAKLAND	S106485399	PORT OF OAKLAND NINTH AVENUE TERMI	UNKNOWN 8TH 9TH AVE		SLIC
OAKLAND	S106162033	OAKLAND REDEVELOPMENT AGENCY	UNKNOWN 11TH ST / WEBSTER S	94606	SLIC
OAKLAND	S106162028	SOUTHERN PACIFIC	UNKNOWN 12TH ST E / 23RD AVE	94606	LUST
OAKLAND	S106162375	SOUTHERN PACIFIC TRANS COMPANY	UNKNOWN 5TH AVE / 7TH ST	94606	LUST
OAKLAND	S109283917	EBMUD	UNKNOWN 7TH ST / 29TH AVE	94606	LUST
OAKLAND	S109283889	BRAMALEA PACIFIC	UNKNOWN 12TH / CLAY	94601	LUST

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 02/02/2009
Date Data Arrived at EDR: 02/12/2009
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 46

Source: EPA
Telephone: N/A
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 04/23/2009
Date Data Arrived at EDR: 04/28/2009
Date Made Active in Reports: 05/19/2009
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 02/02/2009
Date Data Arrived at EDR: 02/12/2009
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 46

Source: EPA
Telephone: N/A
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/09/2009
Date Data Arrived at EDR: 01/30/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 101

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 07/14/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 12/03/2007
Date Data Arrived at EDR: 12/06/2007
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 76

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/25/2009
Date Data Arrived at EDR: 04/02/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 39

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Transporters, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/23/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/23/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/23/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/23/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/31/2009
Date Data Arrived at EDR: 04/22/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/31/2009
Date Data Arrived at EDR: 04/22/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 01/30/2009
Date Made Active in Reports: 05/19/2009
Number of Days to Update: 109

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 07/21/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Annually

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 05/27/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 19

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/27/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 05/27/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 19

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/27/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 03/09/2009
Date Data Arrived at EDR: 03/10/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 29

Source: Integrated Waste Management Board
Telephone: 916-341-6320
Last EDR Contact: 03/10/2009
Next Scheduled EDR Contact: 06/08/2009
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST REG 9: Leaking Underground Storage Tank Report
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 05/04/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Varies

LUST REG 6L: Leaking Underground Storage Tank Case Listing
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 05/18/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: No Update Planned

LUST: Geotracker's Leaking Underground Fuel Tank Report
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 07/07/2009
Date Data Arrived at EDR: 07/09/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 14

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 05/18/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 07/06/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 05/11/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 06/22/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Quarterly

SLIC: Statewide SLIC Cases

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 07/07/2009
Date Data Arrived at EDR: 07/09/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 14

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 05/18/2009
Next Scheduled EDR Contact: 08/17/2008
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 07/06/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 05/11/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 06/28/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 06/28/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36

Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11

Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 06/28/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 05/26/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Annually

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 12/15/2008
Date Data Arrived at EDR: 12/16/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 90

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Quarterly

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/20/2009
Date Data Arrived at EDR: 05/20/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 9

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 06/04/2009
Date Data Arrived at EDR: 06/05/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 12
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 03/24/2009
Date Data Arrived at EDR: 05/20/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 28
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/20/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 06/01/2009
Date Data Arrived at EDR: 06/03/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 14
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 25
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/24/2009
Date Data Arrived at EDR: 03/03/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 63
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Semi-Annually

State and tribal registered storage tank lists

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 07/07/2009
Date Data Arrived at EDR: 07/09/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 15
Source: SWRCB
Telephone: 916-480-1028
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
Registered Aboveground Storage Tanks.

Date of Government Version: 02/01/2009
Date Data Arrived at EDR: 06/10/2009
Date Made Active in Reports: 07/20/2009
Number of Days to Update: 40
Source: State Water Resources Control Board
Telephone: 916-341-5712
Last EDR Contact: 05/29/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 25

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/24/2009
Date Data Arrived at EDR: 03/03/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 09/08/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 10/16/2008
Number of Days to Update: 27

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/20/2009
Date Data Arrived at EDR: 05/20/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 9

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2008
Date Data Arrived at EDR: 12/30/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 76

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/22/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 06/01/2009
Date Data Arrived at EDR: 06/03/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 14

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 06/04/2009
Date Data Arrived at EDR: 06/05/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 12

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 12/15/2008
Date Data Arrived at EDR: 12/16/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 90

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 04/02/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 05/27/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 19

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/27/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 10/01/2008
Date Data Arrived at EDR: 11/14/2008
Date Made Active in Reports: 12/23/2008
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 07/14/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 03/25/2008
Date Data Arrived at EDR: 04/17/2008
Date Made Active in Reports: 05/15/2008
Number of Days to Update: 28

Source: EPA, Region 9
Telephone: 415-972-3336
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

WMUDS/SWAT: Waste Management Unit Database

Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

SWRCY: Recycler Database

A listing of recycling facilities in California.

Date of Government Version: 04/07/2009
Date Data Arrived at EDR: 04/08/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 33

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 05/28/2009
Date Data Arrived at EDR: 05/29/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 17

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 06/08/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 05/26/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 10/31/2008
Date Made Active in Reports: 12/23/2008
Number of Days to Update: 53

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/26/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: Quarterly

HIST CAL-SITES: Calsites Database
The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program
This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 05/27/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 19

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/27/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Quarterly

TOXIC PITS: Toxic Pits Cleanup Act Sites
Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 09/30/2008
Date Data Arrived at EDR: 10/06/2008
Date Made Active in Reports: 10/13/2008
Number of Days to Update: 7

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

Local Lists of Registered Storage Tanks

CA FID UST: Facility Inventory Database

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 06/22/2009
Date Data Arrived at EDR: 06/22/2009
Date Made Active in Reports: 07/20/2009
Number of Days to Update: 28

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 06/21/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Varies

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 05/29/2009
Date Data Arrived at EDR: 06/03/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/18/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 06/08/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Varies

LIENS: Environmental Liens Listing

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 05/15/2009
Date Data Arrived at EDR: 05/19/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 27

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/04/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Varies

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 06/29/2009
Date Data Arrived at EDR: 07/01/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 22

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 12/30/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/31/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 43

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/16/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Annually

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 05/09/2008
Date Made Active in Reports: 06/20/2008
Number of Days to Update: 42

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 05/18/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 07/07/2009
Date Data Arrived at EDR: 07/09/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 14

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 07/07/2009
Date Data Arrived at EDR: 07/09/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 14

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/23/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 05/14/2008
Date Data Arrived at EDR: 05/28/2008
Date Made Active in Reports: 08/08/2008
Number of Days to Update: 72

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/27/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 05/08/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 09/05/2008
Date Made Active in Reports: 09/23/2008
Number of Days to Update: 18

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 07/01/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 01/27/2009
Date Data Arrived at EDR: 04/23/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 18

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 04/23/2009
Date Data Arrived at EDR: 04/28/2009
Date Made Active in Reports: 05/19/2009
Number of Days to Update: 21

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 01/05/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 05/08/2009
Number of Days to Update: 1

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 03/24/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 42

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/23/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 04/09/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 69

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 06/16/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2002
Date Data Arrived at EDR: 04/14/2006
Date Made Active in Reports: 05/30/2006
Number of Days to Update: 46

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 07/14/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 03/14/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 35
Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/14/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 03/20/2009
Date Data Arrived at EDR: 03/20/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 46
Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 02/26/2009
Date Data Arrived at EDR: 05/20/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 9
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 05/04/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/02/2009
Date Data Arrived at EDR: 04/24/2009
Date Made Active in Reports: 05/19/2009
Number of Days to Update: 25
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/28/2009
Date Data Arrived at EDR: 04/29/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 12
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/29/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/28/2009
Date Data Arrived at EDR: 05/01/2009
Date Made Active in Reports: 05/19/2009
Number of Days to Update: 18

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 05/22/2009
Number of Days to Update: 92

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/08/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Biennially

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

NPDES: NPDES Permits Listing

A listing of NPDES permits, including stormwater.

Date of Government Version: 03/09/2009
Date Data Arrived at EDR: 03/13/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 26

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 06/11/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Quarterly

CA WDS: Waste Discharge System

Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Quarterly

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites). This listing is no longer updated by the state agency.

Date of Government Version: 04/20/2009
Date Data Arrived at EDR: 04/22/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 19

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 07/21/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES].

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

NOTIFY 65: Proposition 65 Records

Proposition 65 Notification Records. NOTIFY 65 contains facility notifications about any release which could impact drinking water and thereby expose the public to a potential health risk.

Date of Government Version: 10/21/1993
Date Data Arrived at EDR: 11/01/1993
Date Made Active in Reports: 11/19/1993
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: No Update Planned

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 05/06/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 4

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Annually

WIP: Well Investigation Program Case List

Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 03/31/2009
Date Data Arrived at EDR: 04/24/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 17

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 07/21/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 02/17/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 50

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 05/08/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Annually

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 07/14/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 9

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 07/14/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 05/08/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 04/13/2009
Date Data Arrived at EDR: 04/14/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 06/22/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 05/08/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Historical Auto Stations: EDR Proprietary Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Historical Cleaners: EDR Proprietary Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 04/24/2009
Date Data Arrived at EDR: 04/28/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 13

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 04/24/2009
Date Data Arrived at EDR: 04/28/2009
Date Made Active in Reports: 05/14/2009
Number of Days to Update: 16

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Site List

List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 05/28/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 18

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 05/26/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Semi-Annually

FRESNO COUNTY:

CUPA Resources List

Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 04/17/2009
Date Data Arrived at EDR: 04/17/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 24

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 05/04/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Semi-Annually

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing

Kern County Sites and Tanks Listing.

Date of Government Version: 06/15/2009
Date Data Arrived at EDR: 06/15/2009
Date Made Active in Reports: 07/20/2009
Number of Days to Update: 35

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern

San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 07/07/1999
Date Made Active in Reports: N/A
Number of Days to Update: 0

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: No Update Planned

HMS: Street Number List

Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 11/26/2008
Date Data Arrived at EDR: 01/27/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 71

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 07/10/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities

Solid Waste Facilities in Los Angeles County.

Date of Government Version: 05/12/2009
Date Data Arrived at EDR: 05/14/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 32

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 05/12/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 03/05/2009
Date Data Arrived at EDR: 03/10/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 29

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 06/08/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 02/11/2009
Date Data Arrived at EDR: 04/23/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 18

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 05/11/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 05/11/2009
Date Data Arrived at EDR: 05/19/2009
Date Made Active in Reports: 06/12/2009
Number of Days to Update: 24

Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 05/11/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/28/2003
Date Data Arrived at EDR: 10/23/2003
Date Made Active in Reports: 11/26/2003
Number of Days to Update: 34

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 06/03/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 02/23/2009
Date Data Arrived at EDR: 02/24/2009
Date Made Active in Reports: 04/09/2009
Number of Days to Update: 44

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 06/12/2009
Next Scheduled EDR Contact: 08/10/2009
Data Release Frequency: Semi-Annually

MARIN COUNTY:

Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 05/18/2009
Date Data Arrived at EDR: 06/15/2009
Date Made Active in Reports: 07/20/2009
Number of Days to Update: 35

Source: Public Works Department Waste Management
Telephone: 415-499-6647
Last EDR Contact: 04/27/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Semi-Annually

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 07/09/2008
Date Data Arrived at EDR: 07/09/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 22

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 06/21/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Semi-Annually

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/16/2008
Date Made Active in Reports: 02/08/2008
Number of Days to Update: 23

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 06/22/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Annually

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 05/06/2009
Date Data Arrived at EDR: 06/09/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 6

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 06/03/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 03/02/2009
Date Data Arrived at EDR: 03/27/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 12

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 06/03/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 05/06/2009
Date Data Arrived at EDR: 06/09/2009
Date Made Active in Reports: 06/12/2009
Number of Days to Update: 3

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 07/15/2009
Date Data Arrived at EDR: 07/16/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 7

Source: Placer County Health and Human Services
Telephone: 530-889-7312
Last EDR Contact: 06/28/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Semi-Annually

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 04/14/2009
Date Data Arrived at EDR: 04/15/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 26
Source: Department of Public Health
Telephone: 951-358-5055
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 05/06/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 05/14/2009
Number of Days to Update: 7
Source: Health Services Agency
Telephone: 951-358-5055
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Contaminated Sites
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 02/04/2009
Date Data Arrived at EDR: 04/29/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 12
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 04/29/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

ML - Regulatory Compliance Master List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/04/2009
Date Data Arrived at EDR: 04/29/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 12
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 04/29/2009
Next Scheduled EDR Contact: 07/27/2009
Data Release Frequency: Quarterly

SAN BERNARDINO COUNTY:

Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 06/29/2009
Date Data Arrived at EDR: 07/01/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 22
Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database
The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 07/16/2008
Date Data Arrived at EDR: 10/29/2008
Date Made Active in Reports: 11/26/2008
Number of Days to Update: 28

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 07/02/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Quarterly

Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 11/01/2008
Date Data Arrived at EDR: 12/23/2008
Date Made Active in Reports: 01/27/2009
Number of Days to Update: 35

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 05/18/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Varies

Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 06/16/2009
Date Data Arrived at EDR: 07/01/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 22

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 07/01/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Varies

SAN FRANCISCO COUNTY:

Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 10/01/2008
Number of Days to Update: 12

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST

A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 04/22/2009
Date Data Arrived at EDR: 05/12/2009
Date Made Active in Reports: 06/12/2009
Number of Days to Update: 31

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Semi-Annually

SAN MATEO COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 04/29/2009
Date Data Arrived at EDR: 05/01/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 10

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 07/06/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 04/07/2009
Date Data Arrived at EDR: 04/07/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 34

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 07/06/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Semi-Annually

SANTA CLARA COUNTY:

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 05/29/2009
Date Data Arrived at EDR: 06/01/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 14

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 06/22/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Varies

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 06/01/2009
Date Data Arrived at EDR: 06/01/2009
Date Made Active in Reports: 06/15/2009
Number of Days to Update: 14

Source: City of San Jose Fire Department
Telephone: 408-277-4659
Last EDR Contact: 06/01/2009
Next Scheduled EDR Contact: 08/31/2009
Data Release Frequency: Annually

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 07/01/2009
Date Data Arrived at EDR: 07/07/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 16

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/22/2009
Next Scheduled EDR Contact: 09/21/2009
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 07/01/2009
Date Data Arrived at EDR: 07/10/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 14

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/22/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: Quarterly

SONOMA COUNTY:

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/20/2009
Date Data Arrived at EDR: 04/21/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 20

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 07/20/2009
Next Scheduled EDR Contact: 10/19/2009
Data Release Frequency: Quarterly

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 04/01/2009
Date Data Arrived at EDR: 04/02/2009
Date Made Active in Reports: 04/09/2009
Number of Days to Update: 7

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 06/29/2009
Next Scheduled EDR Contact: 09/28/2009
Data Release Frequency: Semi-Annually

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 06/02/2009
Date Data Arrived at EDR: 06/15/2009
Date Made Active in Reports: 07/23/2009
Number of Days to Update: 38

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/12/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 08/01/2008
Date Data Arrived at EDR: 09/04/2008
Date Made Active in Reports: 09/18/2008
Number of Days to Update: 14

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 05/17/2009
Next Scheduled EDR Contact: 08/17/2009
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/09/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Quarterly

Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 06/26/2009
Date Data Arrived at EDR: 07/09/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 15
Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 07/09/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 04/21/2009
Date Data Arrived at EDR: 05/06/2009
Date Made Active in Reports: 05/14/2009
Number of Days to Update: 8
Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 07/13/2009
Next Scheduled EDR Contact: 10/12/2009
Data Release Frequency: Annually

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 12/11/2008
Date Made Active in Reports: 03/19/2009
Number of Days to Update: 98
Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 07/21/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 05/05/2009
Date Made Active in Reports: 05/22/2009
Number of Days to Update: 17
Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 05/05/2009
Next Scheduled EDR Contact: 08/03/2009
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 05/22/2009
Date Data Arrived at EDR: 05/27/2009
Date Made Active in Reports: 07/01/2009
Number of Days to Update: 35
Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/27/2009
Next Scheduled EDR Contact: 08/24/2009
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 09/11/2008
Date Made Active in Reports: 10/02/2008
Number of Days to Update: 21

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/08/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 06/01/2009
Date Data Arrived at EDR: 06/12/2009
Date Made Active in Reports: 06/29/2009
Number of Days to Update: 17

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 06/15/2009
Next Scheduled EDR Contact: 09/14/2009
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/22/2008
Date Made Active in Reports: 09/08/2008
Number of Days to Update: 17

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 07/06/2009
Next Scheduled EDR Contact: 10/05/2009
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

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APPENDIX D

AGENCY DOCUMENTATION

CALIFORNIA REGIONAL WATER 01-1078
MAY 13 1996 KG
QUALITY CONTROL BOARD

CASE CLOSURE SUMMARY
Leaking Underground Fuel Storage Tank Program

I. AGENCY INFORMATION **Date: April 24, 1996**

Agency name: **Alameda County-HazMat** Address: **1131 Harbor Bay Pkwy**
City/State/Zip: **Alameda, CA 94502** Phone: **(510) 567-6700**
Responsible staff person: **Eva Chu** Title: **Hazardous Materials Spec.**

II. CASE INFORMATION

Site facility name: **Former Exchange Linen Service**
Site facility address: **527 23rd Ave, Oakland, CA 94606**
RB LUSTIS Case No: **N/A** Local Case No./LOP Case No.: **215**
URF filing date: **1/19/93** SWEEPS No: **N/A**

Responsible Parties:	Addresses:	Phone Numbers:
1. John Protopappas Madison Park	1155 5th Street, Suite 101 Oakland, CA 94607	
2. Andy Gottelli ELS Properties	5 Thomas Mellon Circle, Suite 109 San Francisco, CA 94134	

Tank No:	Size in gal.:	Contents:	Closed in-place or removed?:	Date:
1	2,000	Bunker Fuel	Closed in-place	April 1990
2	1,000	Gasoline	Removed	12/9/92
3	550	Gasoline	Removed	12/9/92

III. RELEASE AND SITE CHARACTERIZATION INFORMATION

Cause and type of release: **Leaking UST**
Site characterization complete? **YES**
Date approved by oversight agency: **1/17/96**
Monitoring Wells installed? **Yes** Number: **3**
Proper screened interval? **Yes**
Highest GW depth below ground surface: **6.22'** Lowest depth: **8.02' in MW-2**
Flow direction: **Predominately to NE and NW**
Most sensitive current use: **Commercial**
Are drinking water wells affected? **No** Aquifer name: **Unknown**
Is surface water affected? **No** Nearest affected SW name: **NA**
Off-site beneficial use impacts (addresses/locations): **None**

Report(s) on file? **YES** Where is report(s) filed? **Alameda County**
1131 Harbor Bay Pkwy
Alameda, CA 94502

96 APR 29 PM 3:03
ENVIRONMENTAL HEALTH

Treatment and Disposal of Affected Material:

Material	Amount (include units)	Action (Treatment or Disposal w/destination)	Date
Tank	2 USTs	Disposed by Schnitzer Steel, Oakland	12/9/92
	1 UST	Closed in place	Apr 1990
Rinseate	425 gal	Refinery Services in Patterson	12/9/92

Maximum Documented Contaminant Concentrations - - Before and After Cleanup

Contaminant	Soil (ppm) Before[1]	Soil (ppm) After[2]	Water (ppb) Before	Water (ppb) After	
TPH (Gas)	4.5	230	760,000[4]	1,600	1,000
TPH (Diesel)	<1[3]		<700[4]		<100
TPH-MO	<10		<350[4]		
Benzene	<0.0025	0.25	230[4]	22	3.0
Toluene	"	1.1	320[4]	44	<0.5
Ethylbenzene	"	0.48	<150[4]	13	5.5
Xylenes	"	3.1	260[4]	54	7.7
Lead	16				

NOTE:
1. soil sample from gasoline tank excavation
2. soil sample from hand-augered boring just west of gasoline tank excavation at 10.5' bgs
3. soil sample from bunker fuel tank area at 10' bgs
4. "Grab" groundwater sample from boring west of gasoline excavation

Comments (Depth of Remediation, etc.):

See Section VII, Additional Comments, etc...

IV. CLOSURE

Does completed corrective action protect existing beneficial uses per the Regional Board Basin Plan? **Undetermined**
Does completed corrective action protect potential beneficial uses per the Regional Board Basin Plan? **Undetermined**
Does corrective action protect public health for current land use? **YES**
Site management requirements: **None**

Should corrective action be reviewed if land use changes? **YES**
Monitoring wells Decommissioned: **None, pending site closure**
Number Decommissioned: 0 Number Retained: 3
List enforcement actions taken: **None**

List enforcement actions rescinded: **NA**

V. LOCAL AGENCY REPRESENTATIVE DATA

Name: **Eva Chu** Title: **Haz Mat Specialist**

Signature: Eva Chu Date: 5/9/96

Reviewed by

Name: **Dale Klettke** Title: **Haz Mat Specialist**

Signature: Dale Klettke Date: 4/24/96

Name: **Thomas Peacock** Title: **Supervisor**

Signature: Thomas Peacock Date: 5/9/96

VI. RWQCB NOTIFICATION

Date Submitted to RB: 5/10/96 RB Response: Approved

RWQCB Staff Name: **Kevin Graves** Title: **AWRCE**

Signature: Kevin Graves Date: 5/23/96

VII. ADDITIONAL COMMENTS, DATA, ETC.

A 2,000 gallon UST which previously stored bunker fuel, located under the sidewalk and adjacent to the ELS building, was closed in-place with cement slurry in April 1990. Two soil samples were collected at 10' bgs from each end of the UST using a hand auger. Laboratory analytical results did not identify BTEX or TPH as diesel, motor oil, and bunker C in the soil samples. (See Fig 1.)

In December 9, 1992 two additional USTs (1-1,000, 1-500 gallon) which were believed to have stored gasoline were removed. The smaller UST had apparent through-holes on the bottom. A strong hydrocarbon odor was present and soil discoloration was evident in the excavation. Soil samples collected from native clay soil beneath the USTs, however, did not contain remarkable levels of TPH-G, TPH-D, or BTEX. The pit was backfilled using previously excavated material. (See Fig 2.)

Additional subsurface investigations were conducted on December 18, 1992 using hand-augered borings. Soil samples were collected from beneath the former fuel dispenser, from native soil at the west edge of the former excavation, and from the fill material within the former excavation pit. A "grab" groundwater sample was also collected from the boring along the west edge of the excavation. Low levels of TPH-G and BTEX were identified in all soil samples. The "grab" groundwater sample exhibited up to 760,000 ppb TPH-G, and 230, 320, ND, and 260 ppb BTEX, respectively. (See Fig 3, Table 1 and 2.)

Three groundwater monitoring wells, MW-1 through MW-3, were installed in July 1993. (See boring logs.) Soil from boring MW-2 (through the former tank pit) at 10.5' bgs contained low levels of TPH-G and BTEX. By February 1995 groundwater had been sampled for 6 consecutive quarters where well MW-2 continued to exhibit up to 950 ppb TPH-G and 4.8 ppb benzene. (See Fig 4, Tables 4 and 5.) Groundwater flow direction was determined to be predominately toward the NW and NE.

In September 1995 six Geoprobe borings were advanced to delineate the extent of groundwater contamination. "Grab" groundwater samples were collected from each boring. Borings GP-1 through GP-4 did not identify TPH-G or BTEX. However, groundwater from borings GP-5 and GP-6 exhibited up to 210 ppb TPH-G and 24 ppb benzene. It appeared groundwater contamination detected in GP-5 and GP-6 may not be the result of the fuel release at this site; rather, it may be from the former UST removed from 534 23rd Ave. (See Fig 4, Table 3.)

Subsurface investigations have demonstrated the fuel release from this site is limited to an area near the tank excavation. Petroleum hydrocarbons in groundwater should naturally bioattenuate. Shallow groundwater in this area is not a source of drinking water. Residual hydrocarbons in soil and groundwater should pose no significant risk to human health or the environment. Continued groundwater sampling is not warranted.

ELS.1

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

Alameda County CC4580
Environmental Health Services
1131 Harbor Bay Pkwy., #250
Alameda CA 94502-6577
(510)567-6700 FAX(510)337-9335

StID 215

May 29, 1996

Mr. John Protopappas
115 5th St, Suite 101
Oakland, CA 94607

Mr. Andy Gotelli
ELS Properties
5 Thomas Mellon Circle, Suite 109
San Francisco, CA 94134

RE: Well Decommission at 527 23rd Ave, Oakland, CA

Dear Messrs. Protopappas and Gotelli:

This office and the San Francisco RWQCB have reviewed the case closure summary for the above referenced site and concur that no further action related to the underground tank release is required at this time. Before a remedial action completion letter is sent, the onsite monitoring wells (MW-1 through MW-3) should be decommissioned, if they will no longer be monitored. Please notify this office upon completion of well destruction so a closure letter can be issued.

Well destruction permits may be obtained from Alameda County Flood Control and Water Conservation, Zone 7. They can be reached at (510) 484-2600.

If you have any questions, I can be reached at (510) 567-6762.

Sincerely,

eva chu
Hazardous Materials Specialist

cc: files

ELS.2

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 1

To	From
Co.	Co.
Dept.	Phone #
Fax #	Fax #

CAMBRIA

November 24, 2004

Keith Matthews
Hazardous Materials Inspector
Office of Emergency Services Oakland Fire Department
1605 Martin Luther King Jr. Way
Oakland, CA 94612

Re: **Dispenser Upgrade Sampling Report**
Shell-branded Service Station
820 Portwood Street (01)
Oakland, California
SAP # 135696
Cambria Project #206-0944-002

Dear Mr. Matthews:

On behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), Cambria Environmental Technology, Inc. (Cambria) is submitting this *Dispenser Upgrade Sampling Report* that presents the results of sampling conducted during station upgrade activities at the referenced site. Presented below are a summary of site conditions, sampling activities and analytical results.

SITE CONDITIONS

Site Location: This Shell-branded service station is located at the southeast corner of the East 8th Street and Portwood Avenue intersection in Oakland, California (Figure 1). Currently the site consists of a station kiosk, three gasoline underground storage tanks (USTs), three dispenser islands, and a car wash (Figure 2). The surrounding properties consist of residential and commercial buildings. Immediately south of East 8th Street is the Interstate 880 freeway.

Upgrade Activities: In September of 2004, Paradiso Mechanical, Inc. (Paradiso) of San Leandro, California upgraded the station's fuel system, including the UST sumps and fuel dispensers. As described below, Cambria collected soil samples beneath the replaced dispensers.

SAMPLING ACTIVITIES AND SAMPLE ANALYSIS

Personnel Present: Ron Barone, Staff Geologist, Cambria
Keith Matthews, Hazardous Materials Inspector, Oakland Fire Department

Cambria
Environmental
Technology, Inc.

5900 Hollis Street
Suite A
Emeryville, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

Sample Date: September 10, 2004.

Sampling Requirements: As directed by Keith Matthews during September 10, 2004 field activities, one soil sample was collected beneath each of the three dispensers within 1 to 2 feet of native soil (Figure 2). As piping was not replaced or exposed, no other samples were collected.

Dispenser Sampling: Cambria collected three soil samples at depths of 4.0 feet below ground. Field indications of hydrocarbons, including staining and odor, were observed in the vicinity of the sampled areas. Attachment A presents Cambria's standard procedures for dispenser and piping sampling.

Sample Analyses: State-certified laboratory Severn Trent Laboratories Inc. of Pleasanton, California analyzed the three samples for total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tert-butyl ether (MTBE) and ethanol by EPA Method 8260B, for total lead by EPA Method 6010B, and for total petroleum hydrocarbons as diesel (TPHd) by EPA Method 8015M. Table 1 summarizes laboratory analytical results. Attachment B presents laboratory analytical reports and chain of custody records.

Soil Stockpile Disposal: The upgrade activities generated approximately 8.3 tons of soil. To characterize stockpiled soil for disposal, one four-point composite sample was collected and analyzed for TPHg, BTEX and MTBE by EPA Method 8260B, for TPHd by EPA Method 8015M, and for total lead by EPA Method 6010B. The stockpile was hauled to Forward Landfill in Manteca, California for disposal on September 24, 2004. The soil disposal confirmation is included as Attachment C.

ANALYTICAL RESULTS

Analytes were detected in all soil samples, with the highest concentrations detected in sample D-3-4.0. TPHg was detected in sample D-2-4.0 at a concentration of 57 parts per million (ppm) and in sample D-3-4.0 at a concentration of 1,000 ppm. TPHd was detected in sample D-2-4.0 at a concentration of 9.7 ppm and in sample D-3-4.0 at a concentration of 120 ppm. Ethylbenzene, xylenes, and MTBE were detected at highest concentrations of 17 ppm, 65 ppm, and 9.1 ppm, respectively, in sample D-3-4.0. Benzene and toluene were not detected in any samples. Table 1 summarizes laboratory analytical results, and Attachment B presents laboratory analytical reports and chain of custody records.

CONCLUSIONS

As a result of the petroleum hydrocarbon detections, Shell filed a September 27, 2004 Unauthorized Release Report (Attachment D).

In February 2004, at Shell's request, Cambria researched Department of Water Resources water well records for water producing wells located within one-half mile of the site. No public water supply wells were located. Two industrial wells were identified approximately one-half mile to the southwest on Alameda Island. As a result, Cambria believes groundwater in the area is not used as a drinking water source. The detected soil concentrations for TPHg, ethylbenzene, xylenes, and MTBE in soil sample D-3-4.0 are above the San Francisco Regional Water Quality Control Board's environmental screening levels for commercial/ industrial sites where groundwater is not a potential source of drinking water.

Table 1. Soil Analytical Results, Shell-branded Service Station, 820 Portwood, Oakland, CA. SAP # 135696

Sample	Depth (fbg)	Date Sampled	TPHg	TPHd	Benzene	Toluene	Ethyl benzene	Xylenes	MTBE	
			← (ppm) →							
D-1-4.0	4.0	9/13/2004	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	**0.0086**	**6.3**
D-2-4.0	4.0	9/13/2004	**57**	**9.7**	<0.0050	<0.0050	**0.6**	**2**	<0.0050	**6.1**
D-3-4.0	4.0	9/13/2004	**1,000**	**120**	<0.0050	<0.0050	**17**	**65**	**9.1**	**6.6**

Abbreviations and Notes:

fbg = feet below grade

parts per million = ppm

<x = Not detected at detection limit x

TPHg = Total petroleum hydrocarbons as gasoline analyzed by EPA Method 8260b

TPHd= Total petroleum hydrocarbons as diesel analyzed by EPA Method 8015M

Benzene, toluene, ethylbenzene, and xylenes analyzed by EPA Method 8260B

MTBE = methyl tertiary butyl ether analyzed by EPA Method 8260B

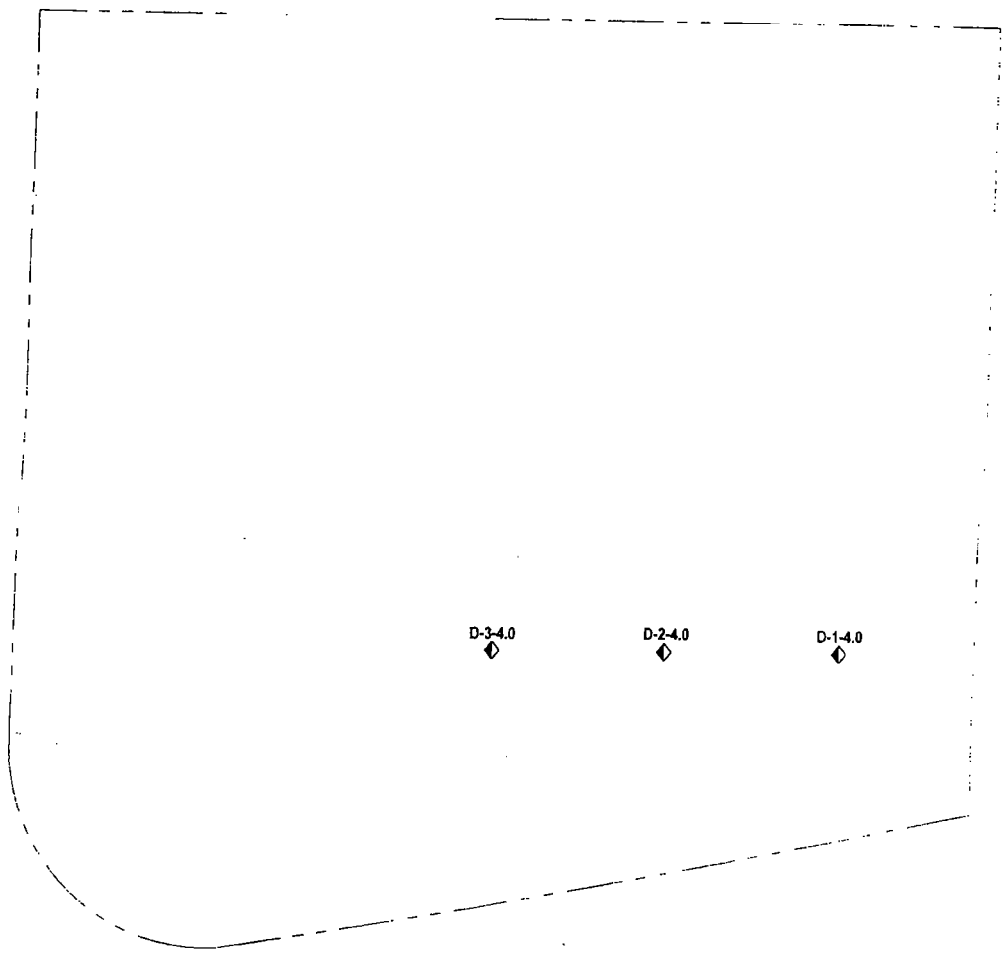
Lead by EPA Method 6010B

G:\Oakland 820 Portwood\2004 Upgrades\[2004 Upgrades Soils.xls]Sheet1

10/15/04

EXPLANATION

D-1-4.0 Soil sample location (9/10/04)



0 15 30

Scale (ft)

FIGURE

2

G:\OAKLAND\820 PORTWOOD\FIGURES\SITE PLAN 9-04.DWG

Shell-branded Service Station

820 (834) Portwood Avenue

Oakland, California

CAMBRIA

Site Plan

GEOCON
CONSULTANTS, INC.
ENVIRONMENTAL ■ GEOTECHNICAL ■ MATERIALS

June 15, 2006

Mr. Amir Gholami
Alameda County Environmental Health
1131 Harbor Parkway
Alameda, CA 94502

Subject: Low-Risk Case Closure Report

Site: Caltrans South Oakland Maintenance Station, 1112 29th Avenue
Oakland, California

Dear Mr. Gholami:

Please find enclosed one copy of the above referenced report. The report was prepared on behalf of Caltrans for the purpose of acquiring case closure from the Alameda County Environmental Health Department.

If you have any questions concerning the contents of the report please give me a call at (925) 371-5900.

Sincerely,
GEOCON CONSULTANTS, INC.

John Love, PG
Sr. Project Geologist

2356 Research Drive ■ Livermore, CA 94550-3848 ■ Telephone (925) 371-5900 ■ Fax (925) 371-5915

GEOCON

CONSULTANTS, INC

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

LOW RISK CASE CLOSURE SUMMARY REPORT

SOUTH OAKLAND MAINTENANCE STATION
1112 29TH AVENUE
OAKLAND, CALIFORNIA

PREPARED FOR:
CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING
111 GRAND AVENUE
OAKLAND, CALIFORNIA

PREPARED BY:
GEOCON CONSULTANTS, INC.
2356 RESEARCH DRIVE
LIVERMORE, CALIFORNIA

CALTRANS CONTRACT NO. 04A1862
TASK ORDER NO. 32

GEOCON PROJECT NO. E8220-06-32

June 2006

GEOCON
CONSULTANTS, INC.
ENVIRONMENTAL ■ GEOTECHNICAL ■ MATERIALS

Project No. E8220-06-32
June 14, 2006

Mr. Bahram Sazegar
California Department of Transportation - District 4
111 Grand Avenue, 14th Floor
Post Office Box 23660
Oakland, California 94623-0660

Subject: LOW RISK CASE CLOSURE SUMMARY REPORT
SOUTH OAKLAND MAINTENANCE STATION – 1112 29TH AVENUE
OAKLAND, CALIFORNIA
CONTRACT NO. 04A1862, TASK ORDER NO. 32

Dear Mr. Sazegar:

In accordance with California Department of Transportation (Caltrans) Contract No. 04A1862 and Task Order No. 32, Geocon has performed environmental engineering services associated with the Caltrans South Oakland Maintenance Station located at 1112 29th Avenue in Oakland, California.

The scope of services contained in this report consisted of compiling data presented in reports prepared by Geocon and other consultants for the purpose assessing subsurface soil and groundwater quality conditions with current regulatory guidelines required for case closure as a low risk soil and groundwater site.

The contents of this report were prepared using data produced by others. To that extent, Geocon is not responsible for the accuracy of the data presented in reports prepared by others. The contents of this report do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

If there are any questions concerning the contents of this report, or if Geocon may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

John Love, PG
Sr. Project Geologist

PROFESSIONAL GEOLOGIST
JOHN W. LOVE
No. 6315
Expires 11-30-06
STATE OF CALIFORNIA

Richard W. Day, CEG, CHG
Regional Manager

JL:RWD:rjk

(3) Addressee
(1) Amir Gholami, Alameda County Department of Environmental Health

2356 Research Drive ■ Livermore, CA 94550-3848 ■ Telephone (925) 371-5900 ■ Fax (925) 371-5915

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LOW RISK CASE CLOSURE SUMMARY REPORT

1.0 INTRODUCTION

This Low Risk Case Closure Summary Report for the California Department of Transportation (Caltrans) South Oakland Maintenance Station was prepared under Caltrans Contract No. 4A1862 and Task Order (TO) No. 32. The report was prepared to summarize soil and groundwater sample results obtained during previous source removal and characterization studies for the purpose of obtaining case closure from the Alameda County Department of Environmental Health (DEH) and Regional Water Quality Control Board – San Francisco Bay Region (RWQCB).

1.1 Site Description

The subject site is located at 1112 29th Avenue in Oakland, California. The site is used by Caltrans to store and service maintenance vehicles and equipment. The approximate location of the site is depicted on the Vicinity Map, Figure 1. The approximate site boundaries and existing structures are depicted on the Site Plan, Figure 2.

1.2 Background

One 4,000-gallon underground storage tank (UST) and one 2,000-gallon gasoline UST were removed from the site on March 11, 1997. The tank pit was over-excavated and approximately 52 tons of petroleum-impacted soil was transported on March 14, 1997 to TPS Technologies in Richmond, California for thermal treatment. Confirmation soil samples collected from the UST excavation indicated that total petroleum hydrocarbon compounds as gasoline (TPHg) and as diesel (TPHd) were reported as high as 380 and 21 milligrams per kilogram (mg/kg), respectively. Benzene, toluene, ethylbenzene, total xylenes (BTEX compounds) were reported as high as 48 mg/kg and methyl tertiary butyl ether (MTBE) was reported as high as 9.15 mg/kg. Excavation sample results are presented in Table 1.

On April 6 and 7, 1999, soil and groundwater samples were collected from six soil borings (B-1 through B-6) installed at the site. Soil sample results indicated that TPHg and MTBE were detected in one sample location (B-6 at 10 feet) at concentrations of 13 mg/kg and 0.16 mg/kg, respectively. No other contaminants were detected above the laboratory reporting limits in soil samples collected from the other soil borings. Groundwater sample results indicated that TPHg was present at concentrations of 520 micrograms per liter (ug/l) in two boring locations (B-3 and B-4), and it was reported as non-detect in the other four soil boring locations. Benzene was detected at 6.3 ug/l at one location (B-3), above its maximum contaminant level (MCL) of 1 ug/l. MTBE was detected above its MCL of 13 ug/l at two locations (B-5 and B-6), with reported concentrations of 6,600 ug/l and 24 ug/l.

On August 13, 1999, three additional soil borings (SB-7 through SB-9) were drilled at the site along the property boundary. Results indicated that MTBE was present in groundwater in two sample locations (B-7 and B-8) at concentrations of 5,600 and 9.0 ug/l. Soil sample results are presented in Table 1, and grab groundwater sample results are presented in Tables 2 and 2A.

In June and July 2000, Professional Service Industries (PSI) completed a supplemental investigation that included the installation of four monitoring wells (MW-1 through MW-4). Analytical laboratory results of groundwater samples collected from MW-1 through MW-4 indicated that TPHg and BTEX compounds were present at low concentrations in monitoring wells MW-1 and MW-3, and MTBE was present in groundwater samples collected from all four monitoring wells at concentrations ranging from 18 ug/l to 5,000 ug/l.

In August 2001, PSI drilled three offsite soil borings (B-10 to B-12). The borings were positioned in the downgradient groundwater flow direction at the All-Aboard Mini-Storage property. Analytical laboratory results of groundwater samples collected from the three temporary boring locations indicated that MTBE was not present in groundwater at concentrations that exceeded the MCL. Based on these results, PSI recommended no further investigation downgradient of the South Oakland Maintenance Station.

Quarterly groundwater sampling of monitoring wells MW-1 through MW-4 was conducted at the site from June 2000 through September 2002. The monitoring wells were also sampled in May 2004 and May 2005. Groundwater sample results from MW-1 through MW-4 are presented in Table 3.

2.0 SITE LITHOLOGY AND HYDROGEOLOGIC CONDITIONS

Subsurface soil and groundwater conditions were obtained from boring logs included in several site investigation reports prepared by PSI in 1999, 2000, and 2001.

2.1 Site Lithology

The site is underlain by sand and gravel fill below the asphalt-paved ground surface to depths ranging from three to five feet below ground surface (bgs). Underlying the fill material are fine grain soils consisting primarily of inter-bedded clayey sands and silts, and clays to a depth of approximately 25 feet bgs. Some sand and gravel was logged in the MW-1 borehole from approximately 18 to 25 feet bgs; however, this unit does not appear to be continuous beneath the area.

Copies of soil boring logs and well construction details are provided in Appendix A, and geologic cross sections of the study area are provided on Figures 3 and 4.

2.2 Hydrogeologic Conditions

Groundwater was encountered under confined conditions at most sample locations beneath the study area. Groundwater was generally encountered during drilling operations at depths ranging from 10 to 32 feet bgs, and it was reported to have stabilized between 5 and 14.5 feet bgs in all borehole locations (see boring logs in Appendix A).

In June 2000, monitoring wells MW-1 through MW-4 were constructed. Since that time, depth to groundwater in all four monitoring wells has been reported at depths ranging from 7.65 feet to 10.76 feet below top of well casing (see Table 3).

Based on depth to groundwater measurements collected from MW-1 through MW-4 during quarterly monitoring events, the groundwater flow direction and magnitude has ranged from west in June 2000 at a magnitude of 0.005 feet per foot (ft/ft) to south in May 2005 at a magnitude of 0.01 ft/ft.

3.0 SOIL AND GROUNDWATER QUALITY CONDITIONS

Soil and groundwater sample results were compiled from previous investigations conducted by A.E. Schmidt Environmental (1997), PSI (1999, 2000, and 2001), and Geocon (2005).

3.1 Excavation Soil Sample Results

In March 1997, A.E. Schmidt Environmental over-excavated approximately 8½ tons of petroleum hydrocarbon-impacted soil from the UST excavation shown on Figure 2. The depth of the excavation and subsequent soil sample depths were not presented in the 1997 UST Closure Report; however, based on the size of the USTs and the volume of soil removed from the excavation, the depth of the excavation and confirmation soil samples was approximately 10 feet bgs.

Two soil samples were collected beneath each end of the unleaded and diesel fuel USTs. The samples collected beneath the 2,000-gallon unleaded gasoline UST designated as CAL-OAK-UNL-N and CAL-OAK-UNL-S, and the samples collected beneath the 4,000-gallon diesel fuel UST were designated as CAL-OAK-DIS-N and CAL-OAK-DIS-S. The samples collected beneath the unleaded gasoline UST were analyzed for TPHg, BTEX, MTBE, and total lead; the samples collected beneath the diesel fuel UST were analyzed for TPHd, BTEX, and total lead.

Soil sample CAL-OAK-UNL-N collected beneath the west end of the gasoline UST was reported to contain benzene, toluene, ethylbenzene, xylenes, and MTBE at concentrations of 1,650 ug/kg, 11,860 ug/kg, 8,040 ug/kg, 48,860 ug/kg, and 9,150 ug/kg, respectively; however, other soil samples collected within close proximity (within the same excavation) to CAL-OAK-UNL-N were only reported to contain benzene, ethylbenzene, and MTBE at concentrations ranging from non-detect to 380 ug/kg, indicating that the CAL-OAK-UNL-N soil sample was likely collected from an isolated "hot spot" within the former UST excavation.

All excavation confirmation and stockpile soil sample results are tabulated in Table 1.

3.2 Temporary Boring and Monitoring Well Borehole Soil Sample Results

Between April 1999 and August 2001, twelve temporary borings (B-1 through B-12) were advanced at the site and offsite area to the south-southwest to characterize the vertical and lateral extent of petroleum hydrocarbon impacts to soil and groundwater associated with the former USTs. The boring locations are shown on Figure 2.

Soil samples were collected for laboratory analysis from borings B-1 through B-12 at 5-foot sample intervals beginning at 5 feet bgs and extending to depths ranging from 10 to 25 feet bgs. Soil samples were analyzed for TPHg, BTEX, MTBE, and in some instances other fuel oxygenate compounds (FOCs) and volatile organic compounds (VOCs). Soil sample results are presented in Table 1, and graphically shown on the cross-sections, Figures 3 and 4.

BTEX compounds were reported as non-detect in soil samples, and TPHg was only reported in two soil samples (B-6 at 10 feet and B-9 at 15 feet) at concentrations of 0.54 mg/kg and 13 mg/kg. MTBE was reported in three soil samples from borings B-5, B-7, and B-8 at concentrations ranging 11 ug/kg to 160 ug/kg.

Soil sample results obtained from borings B-1 through B-12 indicate that soil contamination beneath most of the study area was the result of contaminant migration through groundwater zones located within clayey soils situated west and south of the former USTs (see Figure 3 and 4).

3.3 Temporary Boring Grab Groundwater Sample Results

Grab groundwater samples were collected from first encountered groundwater in borings B-1 through B-12. All groundwater samples were analyzed for TPHg, BTEX, MTBE, and in some instances FOCs and VOCs. Results of grab groundwater samples collected from borings B-1 through B-12 are presented in Tables 2 and 2A, and grab groundwater sample results for MTBE are plotted on the cross-sections, Figures 3, 4, and on Figure 5.

All target analytes were reported as non-detect in borings B-1 and B-2. TPHg, BTEX, and several VOCs were reported at low concentrations in borings B-3 through B-12. MTBE was reported in several boring locations situated south and down gradient of the former USTs. MTBE was detected at concentrations exceeding the maximum contaminant level (MCL) in three boring locations (B-5 through B-7). MTBE was reported at concentrations of 6,600 ug/l in B-5, 24 ug/l in B-6, and 5,600 ug/l in B-7.

An isoconcentration map of MTBE concentrations reported in grab groundwater samples collected from borings B-1 through B-12 is presented as Figure 5. The map indicates the highest MTBE concentrations are located immediately south of the former UST excavation, centered in the vicinity of MW-3. These sample results coincide with groundwater sample results obtained from monitoring wells MW-1 through MW-4, which are discussed in the following Section.

3.4 Monitoring Well Groundwater Sample Results

Groundwater samples have been collected 12 times from monitoring wells MW-1 through MW-4 since June 2000. All groundwater samples were analyzed for TPHg, BTEX, and FOCs. Groundwater sample results from the four wells are presented in Table 3, and sample results for MTBE are plotted on the cross-sections, Figures 3, 4, and on Figures 6 and 7.

The highest MTBE concentrations in groundwater are from samples collected from MW-1 located within several feet of the former UST excavation in the upgradient groundwater flow direction; and MW-3 situated approximately 25 feet south of the former UST excavation in the down gradient groundwater flow direction.

Isoconcentration maps of initial MTBE concentrations (June 2000), and the most recent MTBE concentrations (May 2005) are presented as Figures 6 and 7, respectively. The isoconcentration contours shown on Figures 6 and 7 indicate the highest MTBE concentrations are located immediately south of the former USTs near MW-3, and that the lateral extent of the MTBE plume is decreasing with time.

MTBE concentrations in MW-3 have fluctuated since June 2000; however, as the MTBE concentration charts for MW-1 through MW-4 provided in Appendix B indicates, the MTBE concentration trend in MW-3 shows a stabilized to slightly decreasing trend and the MTBE concentration trends in MW-1, MW-2, and MW-3 display decreasing trends over the same time period.

4.0 SENSITIVE RECEPTORS

A sensitive receptor survey was completed by PSI in 1999. The findings of the survey were included in a report entitled *Hazardous Waste Preliminary Site Investigation Report*, dated December 1, 1999.

Findings of the survey indicated that there were no utility trenches within the vicinity of the former UST excavation; however, there were two industrial wells located south of the Caltrans Maintenance facility and Southern Pacific Railroad right-of-way on the All Aboard Mini-Storage site. The All Aboard Mini-Storage site used to be owned by the Del Monte Corporation and the wells were reported to be 873 feet and 875 feet deep. The 875-foot well was reportedly abandoned, however, there was no information found pertaining to the disposition of the other well.

The 873-foot industrial well was likely abandoned before the Del Monte site was redeveloped as a mini-storage facility; however, even if it were still in existence, it is unlikely this well would provide a conduit for the vertical migration of petroleum hydrocarbons from the Caltrans site because groundwater samples collected from borings B-10, B-11, and B-12 drilled on the All Aboard Mini-Storage site indicates the hydrocarbon plume terminates somewhere northeast of this property beneath the Pacific Railroad right-of-way.

The nearest surface waters within proximity of the Caltrans site are Sausal Creek located approximately 650 feet to the northeast and a San Francisco Bay tidal canal located approximately ½ mile southwest of the site (see Figure 1). Neither water body is threatened by the petroleum hydrocarbon plume beneath the Caltrans site.

5.0 COMPARISON OF CONTAMINANT CONCENTRATIONS AND CITY OF OAKLAND ENVIRONMENTAL RISK-BASED SCREENING LEVELS

Tier 1 Risk-Based Screening Levels (RBSLs) developed by the City of Oakland Public Works Agency, Environmental Services Division (PWA), and Tier 3 Site Specific Target Levels (SSTLs) developed using PWA software, were compared with contaminant concentrations in soil and groundwater beneath the Caltrans site. The applied RBSLs and SSTLs were based on viable exposure pathways associated with present and potential future property uses of the Caltrans site. Tier 1 RBSLs and Tier 3 SSTLs are presented in Appendix C, along with the input parameters used to develop each.

Since shallow-depth groundwater beneath the site is not used for drinking water purposes, the only exposure pathways applicable for the site are vapor intrusion from groundwater and soil to indoor and outdoor air, and direct exposure to soil (workers contacting excavated soil). Additionally, although RBSL and SSTL comparisons were made for both residential and commercial sites, the appropriate classification of the Caltrans site is that of a commercial property underlain by low permeable soils (clays and silts).

Geocon completed the City of Oakland Risk-Based Corrective Action (RBCA) Eligibility Checklist (provided in Appendix C) to determine if the site was eligible for comparison with the Tier 1 or Tier 2 RBSLs, or whether comparison with Tier 3 SSTLs was necessary. Results of the checklist indicate that establishment of Tier 3 SSTLs was necessary for the Caltrans South Oakland site because groundwater is less than 10 feet below ground surface (bgs), and inhalation of volatilized contaminants of concern (COCs) from groundwater to indoor air or outdoor air is a pathway of concern but groundwater ingestion is not.

Tier 3 SSTLS were calculated for the site using the City of Oakland software available on the PWA website. Based on the site lithology, Geocon used the clayey silts input default parameters, and site specific depth to groundwater and depth to subsurface soil data to calculate Tier 3 SSTLs.

Since the Tier 3 SSTLs are typically less stringent than the Tier 1 RBSLs, comparison of COC concentrations in soil and groundwater beneath the site with both the Tier 1 RBSLs and Tier 3 SSTLs are presented to further justify the site's qualification for low risk closure.

5.1 Volatilization of Contaminants in Groundwater to Indoor and Outdoor Air

A comparison of COC concentrations in groundwater beneath the site with the Tier 1 RBSLs established by the City of Oakland for BTEX and MTBE volatilization from groundwater to indoor and outdoor air are shown in Tables 4 and 4A, and Tier 3 SSTL comparisons are provided in Tables 5 and 5A. For comparison purposes, the maximum reported concentrations at the site were used, as were the most recent concentrations (May 2005) reported in monitoring well MW-3 (the monitoring well with the highest contaminant concentrations). The contaminant concentrations were compared with the RBSLs and SSTLs established for both residential and commercial sites.

The maximum reported contaminant concentrations at the site do not exceed the Tier 3 SSTLs.

The only exceedance noted in the comparison of groundwater concentrations with the Tier 1RBSLs was benzene. The highest benzene concentration of 220 ug/l exceeded the Tier 1 residential carcinogenic RBSL of 110 ug/l (see Table 4). No other Tier 1RBSLs were exceeded.

5.1.1 Calculated MTBE Half-Life Concentrations in Groundwater

The lateral extent of the petroleum hydrocarbon plume has changed through time, as shown in Figures 5 through 7. Currently, MTBE concentrations have stabilized near MW-3 and are decreasing around the margins of the plume. This conclusion is supported by MTBE concentration trends plotted on charts for monitoring wells MW-1 through MW-4 provided in Appendix B.

Both natural and logarithmic graphs were plotted for MTBE concentrations reported in MW-1 through MW-4 from June 2000 to May 2005. With the exception of MW-3, wells MW-1, MW-2, and MW-4 show clear decreasing MTBE concentration trends, while MW-3 shows a stable to slightly decreasing concentration trend.

Based on the contaminant trend slopes of each well, the ½-life for MTBE concentrations in MW-1 through MW-4 can be calculated using the following formula:

$$t_{0.5} = \ln(0.5) / \text{slope}.$$

Where:

$t_{0.5}$ = half-life of MTBE [days]
$\ln(0.5)$ = natural log of 0.5 (equals -0.693)
slope = first order degradation constant [day $^{-1}$]

The degradation constants (trendline slope) for wells MW-1, MW-2, and MW-4 range from -0.0008 to -0.0012. This equates to a MTBE half-life ranging from 866 days (2.37 years) to 578 days (1.58 years). The degradation constant for well MW-3 is -0.00006, which equates to a MTBE ½-life of 11,552 days (31.6 years).

This graphical method used to determine site-specific degradation rate and ½-life is consistent with the approach presented in "*Regression Techniques and Analytical Solutions to Demonstrate Intrinsic Bioremediation. In: Intrinsic Bioremediation*" (Buscheck and Alcantar, 1995).

5.2 Volatilization of Contaminants in Soil to Indoor and Outdoor Air

A worse case scenario of volatilization of contaminants in soil to indoor and outdoor air was used to compare with the Tier 1 RBSLs and Tier 3 SSTLs. In evaluating a worse case scenario, only post-remediation excavation soil samples (collected from a depth of 10 feet bgs or less), and soil samples from boreholes located within, adjacent, and down gradient from the former USTs were used in calculating the 95% upper confidence limit (UCL) concentration for comparison with the RBSLs and SSTLs. Soil samples from post-remediation excavation sample CAL-OAK-UNL-S and CAL-OAK-UNL-N, temporary borings B-2, B-3, B-4, B-5, and monitoring wells MW-1, MW-2, and MW-3 were used to calculate the 95% UCL concentrations for comparisons with the RBSL and SSTLs.

ProUCL software published by the EPA (EPA/600/R04/079, April 2004) was used to evaluate the data distribution and calculate 95% UCL concentrations in soil. The 95% UCL of the true mean is defined as that value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95% of the time. The UCLs of the true mean concentration are used as the mean concentrations because it is not possible to know the true mean due to the essentially infinite number of soil samples that could be collected from the site. The UCLs therefore account for uncertainties due to limited sampling data. As data become less limited at a site, uncertainties decrease and the UCLs move closer to the true mean.

Based on the distribution of contaminant concentrations in soil samples collected from the sample locations mentioned above, the ProUCL software computed the data set for each COC is non-parametric, and the Chebychev statistical method should be utilized to calculate an appropriate UCL concentration for each analyte. Copies of the ProUCL software calculations for each analyte are provided in Appendix D, and the resultant values are presented in Tables 6, 6A, 7, and 7A for comparison with the Tier 1 RBSLs and Tier 3 SSTLs.

The 95% UCL concentrations at the site do not exceed the Tier3 SSTLs.

The only exceedances noted in the comparison of soil concentrations with Tier 1 RBSLs was benzene. The 95% UCL benzene concentration of 809 ug/kg exceeded the Tier 1 residential carcinogenic RBSL of 62 ug/kg for volatilization from soil to indoor air, as well as the Tier 1 residential and commercial carcinogenic RBSLs of 190 ug/kg and 730 ug/kg, respectively, for volatilization from soil to outdoor air. No other RBSLs were exceeded.

It should also be pointed out that the 95% UCL used to calculate the contaminant concentrations in soils beneath the site were heavily skewed as a result of one soil sample collected (CAL-OAK-UNL-N) from the former UST excavation. As Tables 6, 6A, 7, and 7A show, if this potentially

anomalous result is omitted from the calculation, no Tier 1 RBSL for either residential or commercial use scenario is exceeded.

5.3 Direct Exposure to Contaminants in Soil

Should soil excavation take place at some point in the future as the result of redevelopment or modification to the Caltrans site, workers could potentially come into direct contact with petroleum-impacted soils. Contaminant concentrations in soil used to compare with the Tier 1 RBSLs and Tier 3 SSTLs for direct exposure are the same as those calculated for the volatilization to indoor and outdoor air scenarios described in Section 5.2. The RBSLs and SSTLs used to simulate the direct exposure pathway are those values listed under the surficial soil exposure route in the City of Oakland RBSL and SSTL tables provided in Appendix C.

Tables 8 and 9 present the 95% UCL contaminant concentrations in soil comparisons with the Tier 1 RBSLs and Tier 3 SSTLs for direct exposure with surficial soils. As the tables indicate, all COCs are below the residential and commercial RBSLs and SSTLs for the direct contact with soils exposure pathway.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of previous investigations and quarterly groundwater monitoring the following is concluded:

- Source removal was conducted in 1997 when the USTs and contaminated soil surrounding the USTs were removed from the site.

- After several investigations, and quarterly groundwater monitoring events, the lateral and vertical extent of soil and groundwater contamination was adequately characterized. Impacts to soil are primarily restricted to the immediate vicinity of the excavation and area immediately south near MW-3. Other impacts to soils, as those reported in soil samples collected from the MW-3 borehole, appear to be the result of saturated soil samples collected within the boundaries of the petroleum hydrocarbon plume.

  The lateral extent of the petroleum hydrocarbon plume has changed through time, as shown in Figures 6 and 7. Currently, MTBE concentrations appear to have stabilized near MW-3 and are decreasing around the margins of the plume.

- The groundwater flow direction beneath the site has ranged from west to southwest since June 2000.

- A comparison of soil and groundwater contaminant concentrations with City of Oakland SSTLs indicates that no Tier 3 SSTL (which the site is classified under according to City of Oakland RBCA criteria) was exceeded under the residential or commercial land use scenarios. To further support case closure contaminant concentrations were also compared to Tier 1 RBSLs. The only compound which exceeds the Tier 1 RBSLs was benzene.

- A sensitive receptor survey was completed by PSI in 2001. Results of the survey indicated that there is potentially one 873-foot deep industrial well located on the All-Aboard Mini Storage site located southwest of the Caltrans site; however, grab groundwater samples collected from borings B-7 through B-12 indicate the MTBE plume likely terminates somewhere beneath the Southern Pacific Railroad right-of-way situated between the Caltrans and All-Aboard Mini Storage sites.

Based on the information presented in this report, the lateral extent of the plume is decreasing with time, and current MTBE concentrations do not pose an undue risk to the environment or human health. Therefore, Geocon recommends the DEH consider this site for case closure as a low risk groundwater site.

7.0 LIMITATIONS

This report has been prepared exclusively for Caltrans. The information contained herein is only valid as of the date of the report, and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

8.0 REFERENCES

A.E. Schmidt Environmental, April 1997, UST Closure Report, State of California Department of Transportation, Oakland Maintenance Yard

City of Oakland Public Works Agency, January 2000, Oakland Urban Land Redevelopment Program: Guidance Document

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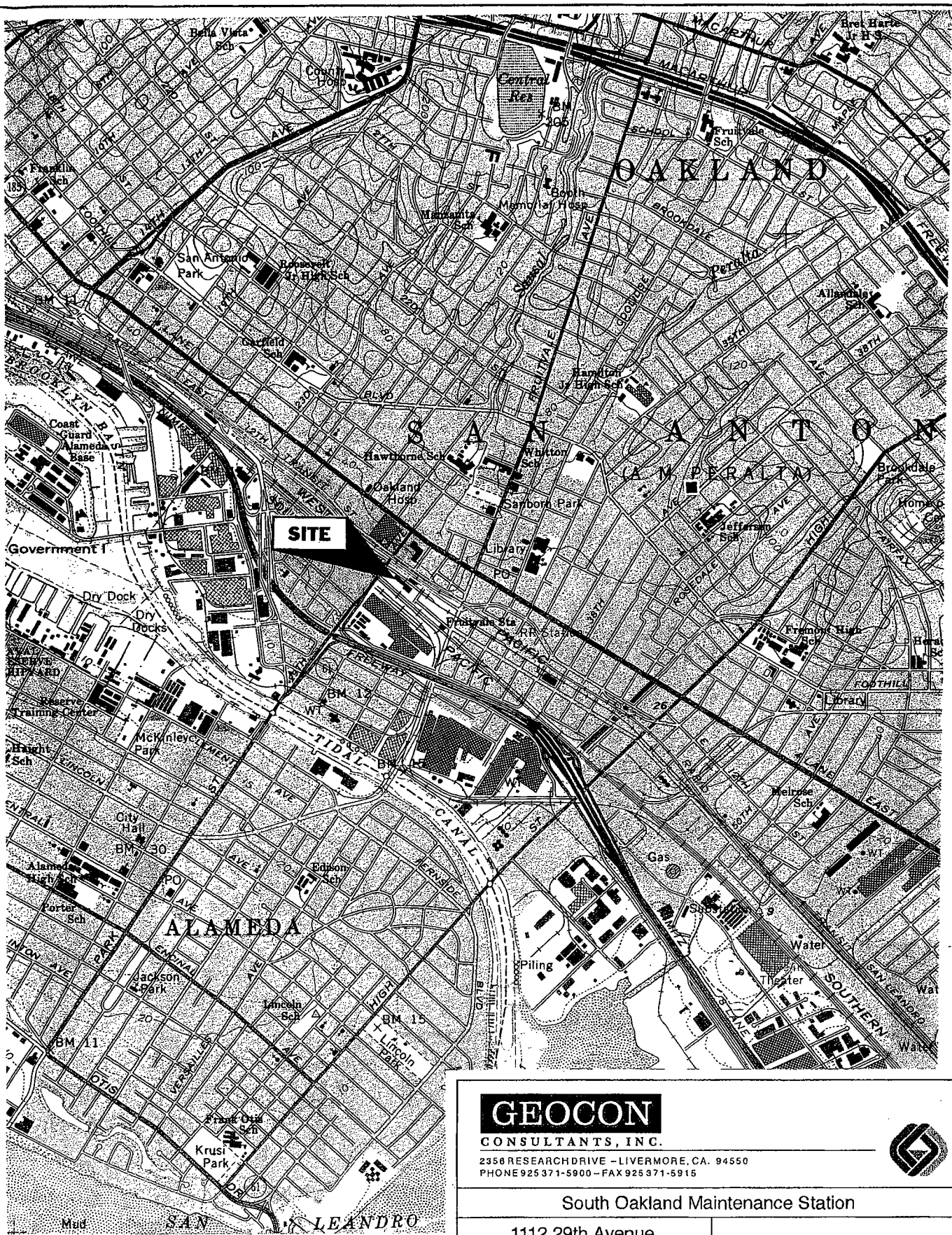
Professional Service Industries, Inc., September 2001, Hazardous Waste Preliminary Site Investigation Report, South Oakland Maintenance Station



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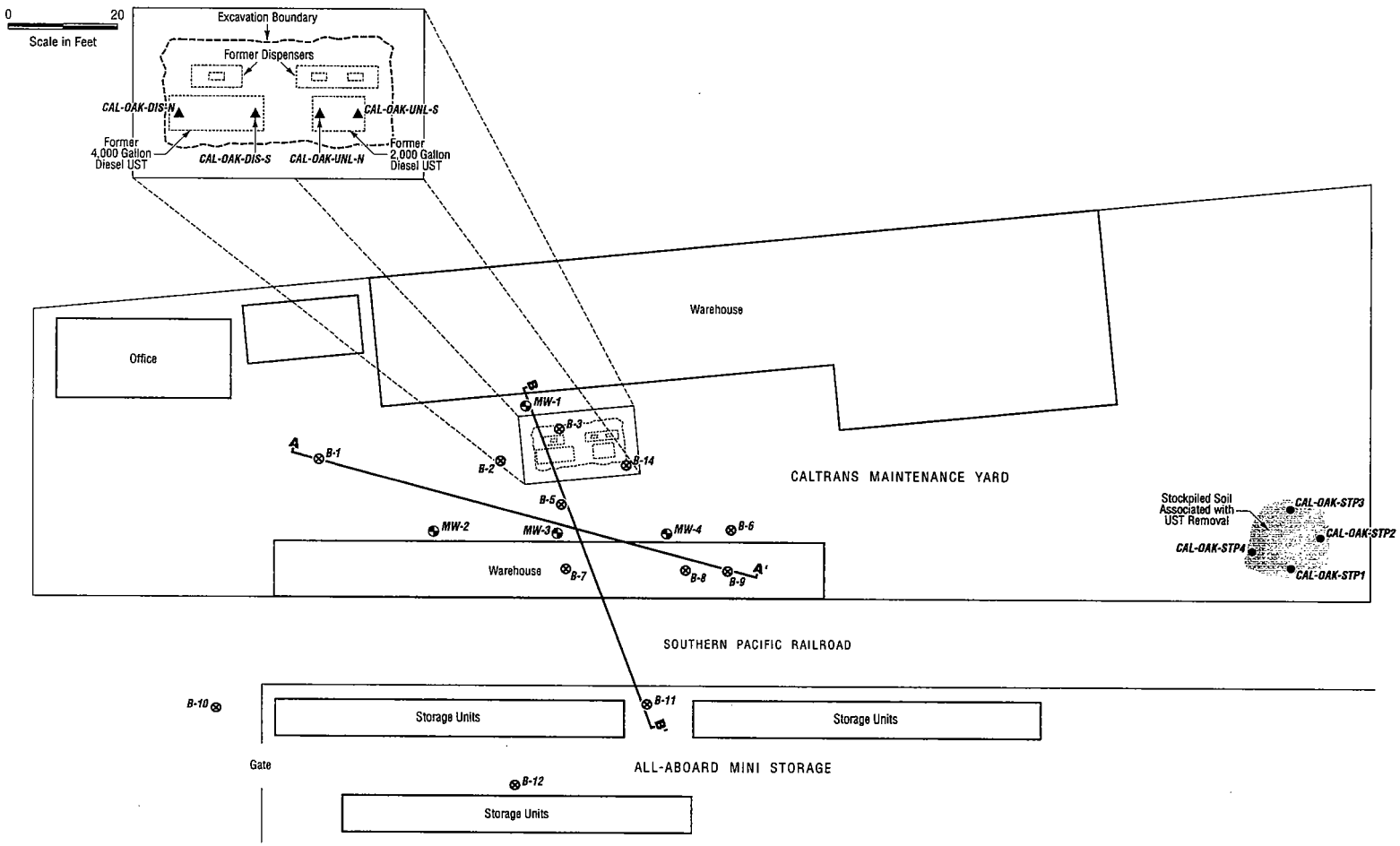
South Oakland Maintenance Station		
1112 29th Avenue Oakland, California	**VICINITY MAP**	
GEOCON Proj. No. E8220-06-32		
Task Order No. 32	June 2006	Figure 1



LEGEND:

- MW-1 ⊗ Approximate Monitoring Well Location
- B-1 ⊗ Approximate Temporary Boring Location
- CAL-OAK-DIS-N ▲ Approximate Excavation Sample Location
- CAL-OAK-STP1 ● Approximate Stockpile Sample Location
- A — A' Cross-Section Location (See Figures 3 and 4)

0 50
Scale in Feet

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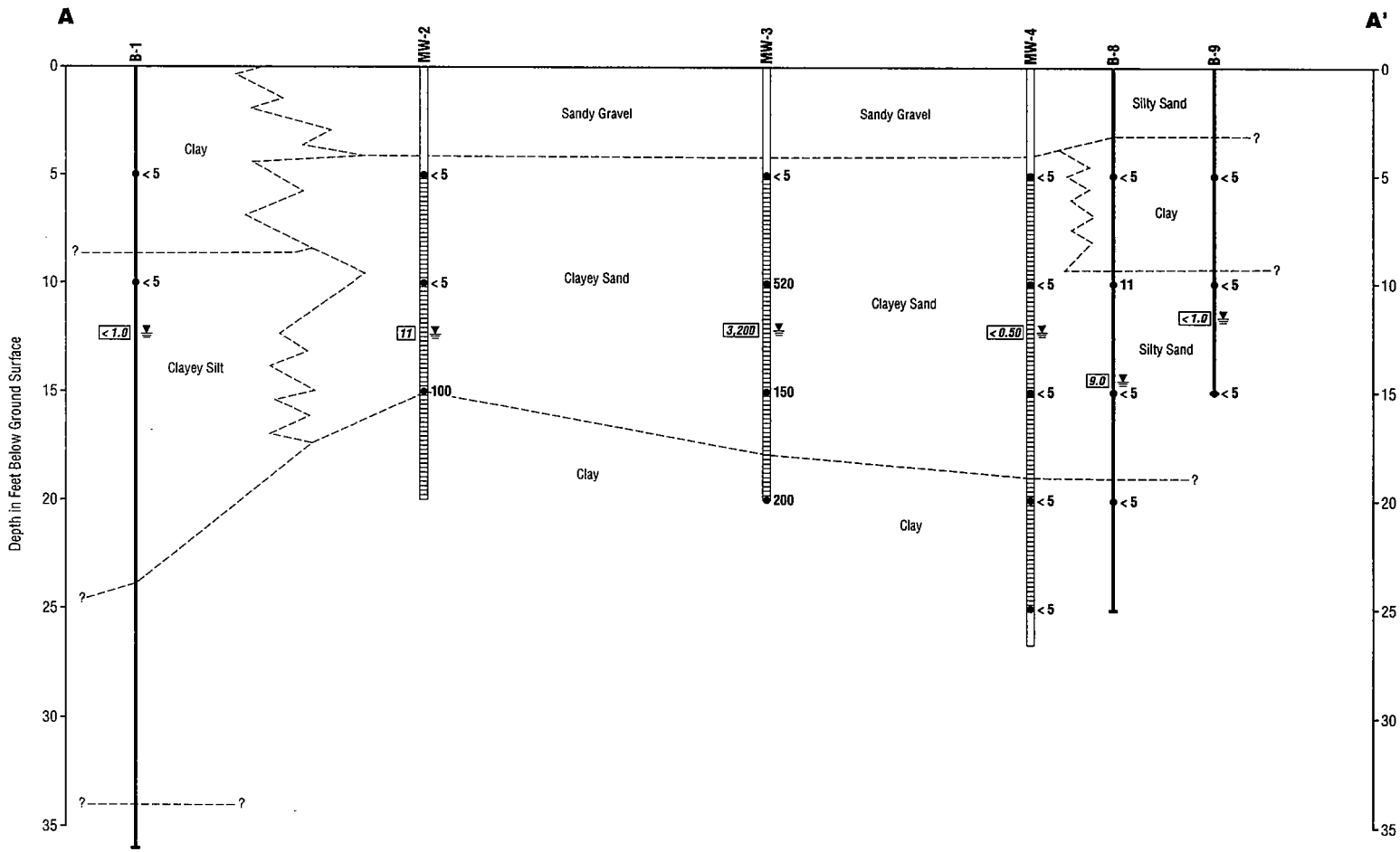
SITE PLAN

GEOCON Proj. No. E8220-06-32

Task Order No. 32 | June 2006 | Figure 2



LEGEND:

MW-2 — Monitoring Well Location

Screened Interval

< 5 MTBE Concentration in Soil (ug/kg)

11 MTBE Concentration in Groundwater (ug/l)

First Encountered Groundwater

B-1 — Temporary Boring Location

HORIZONTAL SCALE: 1" = 20'

VERTICAL SCALE: 1" = 5'

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CROSS-SECTION A – A'

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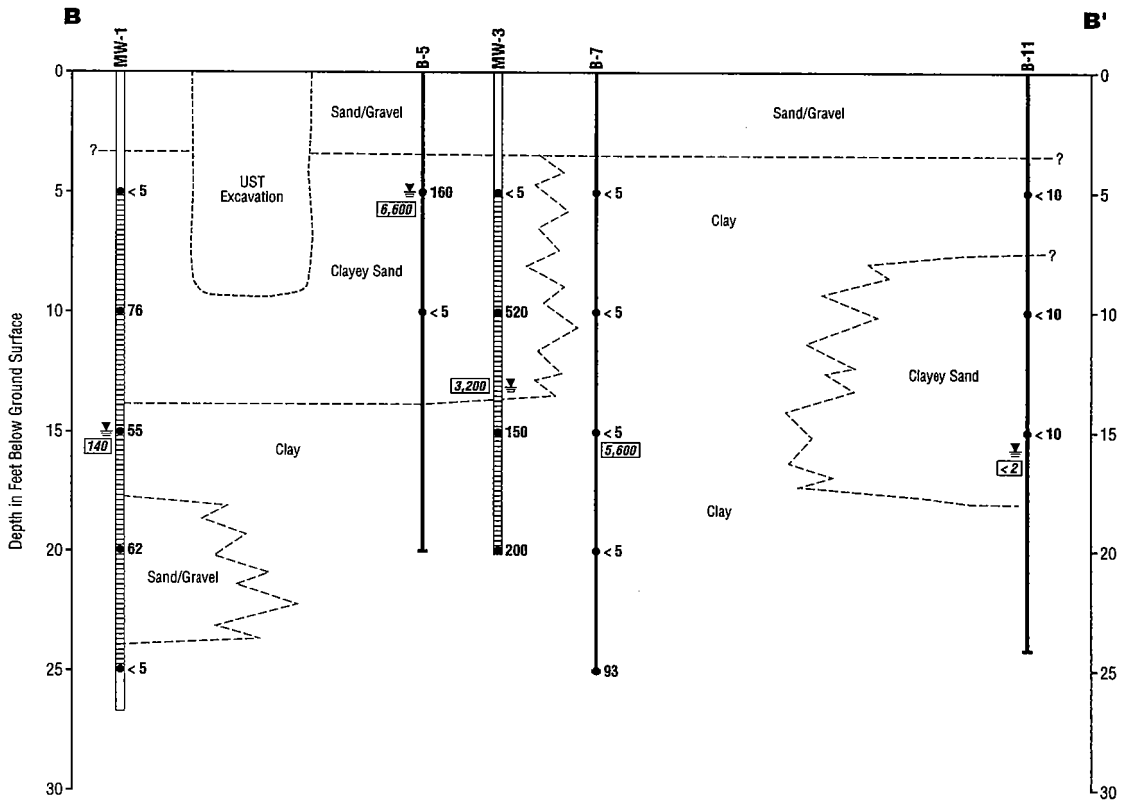
Task Order No. 32

June 2006

Figure 3



LEGEND:

MW-1 Monitoring Well Location

Screened Interval

< 5 MTBE Concentration in Soil (ug/kg)

140 MTBE Concentration in Groundwater (ug/l)

First Encountered Groundwater

B-5 Temporary Boring Location

HORIZONTAL SCALE: 1" = 20'

VERTICAL SCALE: 1" = 5'

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CROSS-SECTION B – B'

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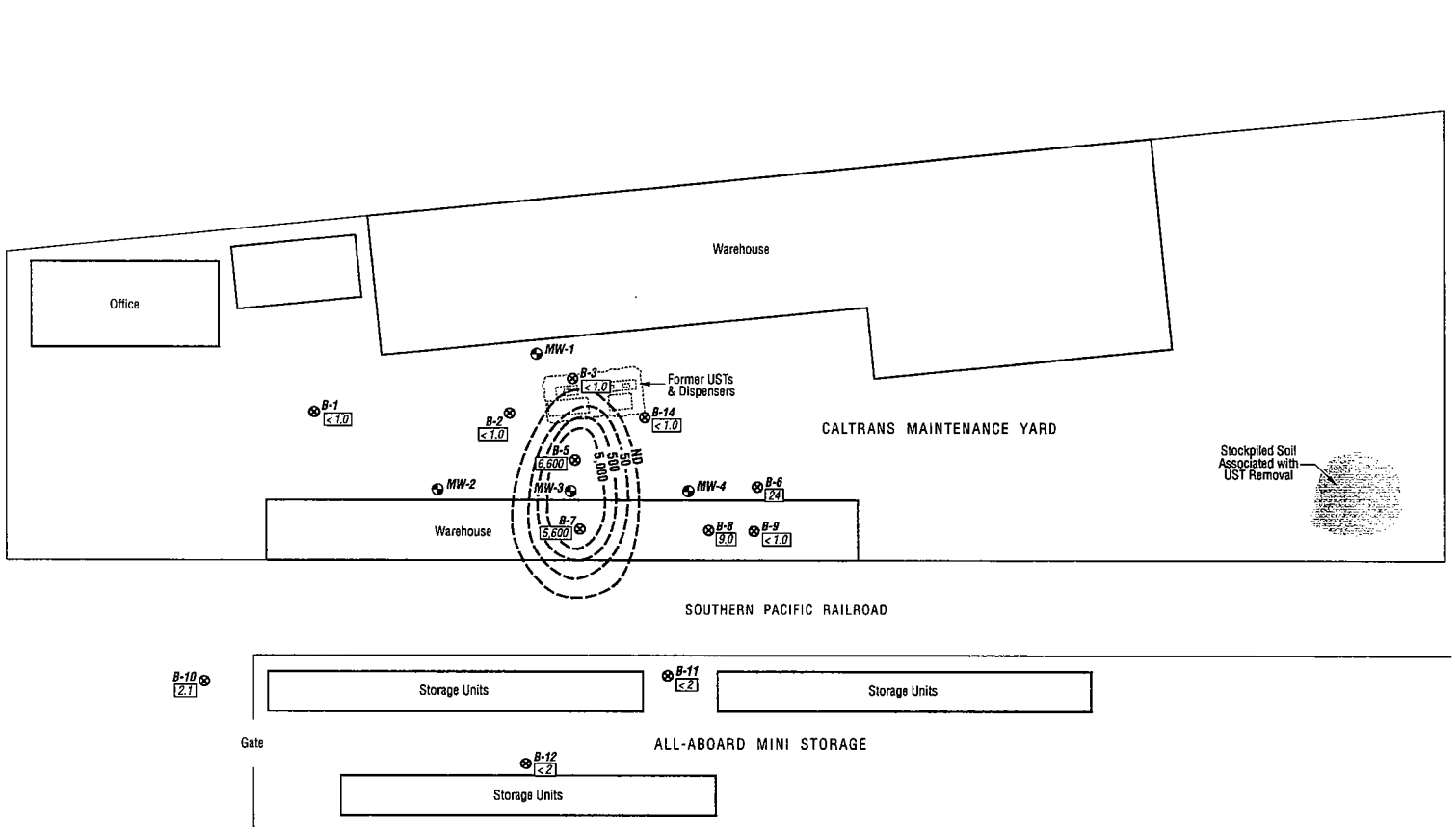
Task Order No. 32

June 2006

Figure 4



LEGEND:

MW-1 ⊕ Approximate Monitoring Well Location

B-1 ⊗ Approximate Temporary Boring Location

6,600 MTBE Concentration (ug/l)

5,000 ——— MTBE Isoconcentration Contour (ug/l)

0 50

Scale in Feet

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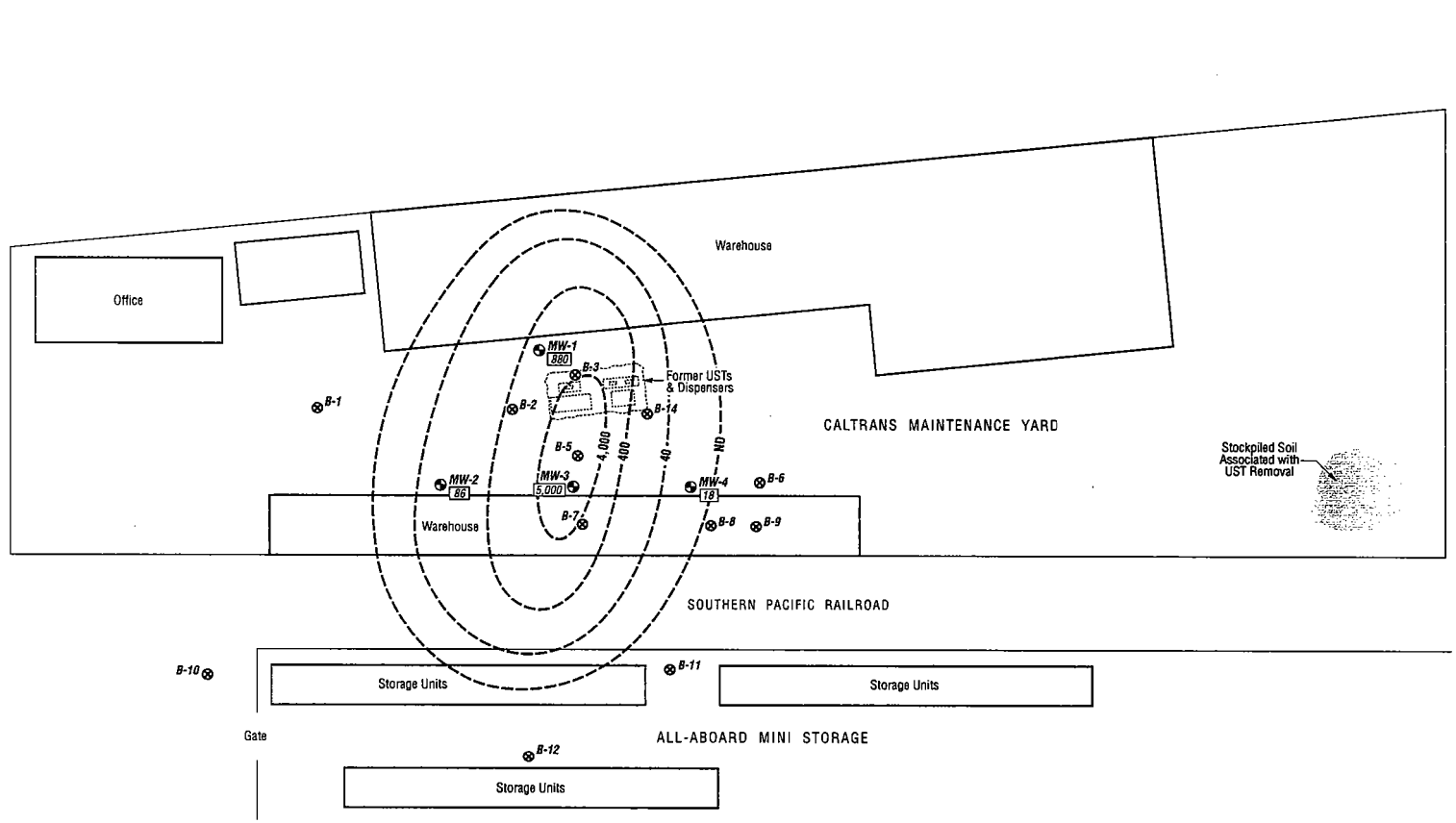
Isoconcentration Map – MTBE Concentrations In Grab Groundwater Samples

GEOCON Proj. No. E8220-06-32

Task Order No. 32 | June 2006 | Figure 5



LEGEND:

MW-1 ⊗ Approximate Monitoring Well Location

B-1 ⊗ Approximate Temporary Boring Location

5,000 MTBE Concentration (ug/l)

4,000 ——— MTBE Isoconcentration Contour (ug/l)

0 50

Scale in Feet

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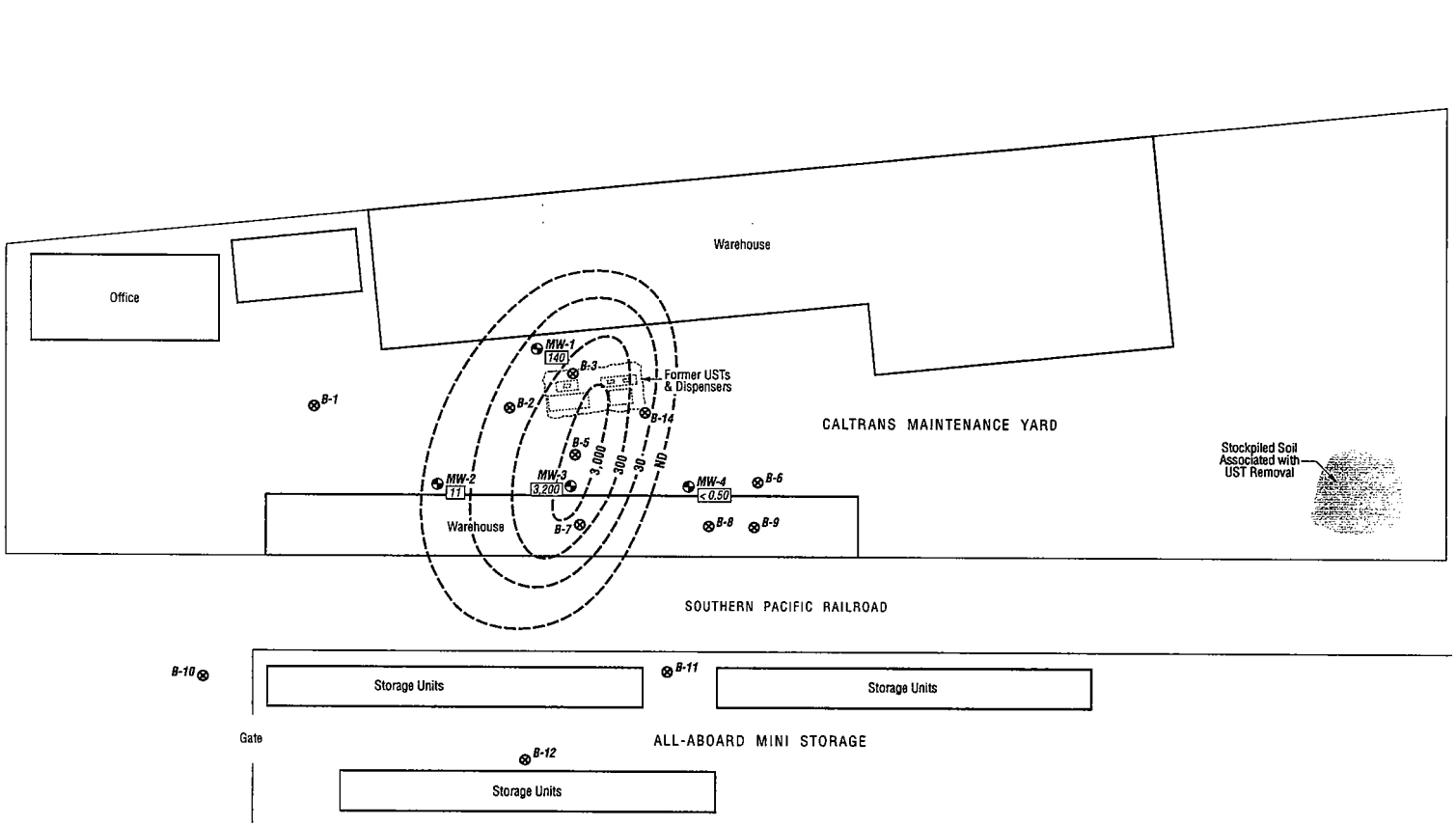
Isoconcentration Map – MTBE Concentrations in Groundwater (June 2000)

GEOCON Proj. No. E8220-06-32

Task Order No. 32 | June 2006 | Figure 6



LEGEND:

MW-1 ⊗ Approximate Monitoring Well Location

B-1 ⊗ Approximate Temporary Boring Location

3,200 MTBE Concentration (ug/l)

3,000 ---- MTBE Isoconcentration Contour (ug/l)

0 50

Scale in Feet

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South Oakland Maintenance Station

1112 29th Avenue Oakland, California	**Isoconcentration Map – MTBE Concentrations in Groundwater (May 2005)**
GEOCON Proj. No. E8220-06-32	
Task Order No. 32	June 2006 — Figure 7

HYDRO ANALYSIS, INC.
Environmental & Water Resources Engineering
Groundwater Consultants

JUL 18 2002

July 16, 2002

191 / RO 395

Barney Chan
Alameda County Environmental Health
1131 Harbor Bay Parkway
2nd Floor
Alameda, CA 94502

Re: Golden Gate Petroleum
421-23rd Ave, Oakland, CA

Dear Mr. Chan:

On behalf of Golden Gate Petroleum, please find enclosed a copy of the "*Quarterly Groundwater Monitoring Report*" by Hydro Analysis, Inc., dated July 9, 2002.

If you have any questions, please contact me at (510)620-0891.

Gary Aguiar
Principal Engineer

11100 SAN PABLO AVE., SUITE 200-A, EL CERRITO, CALIFORNIA 94530 • TEL 510-620-0891 • FAX 510-620-0894
www.HydroAnalysis.com

TABLE 1.

Shallow Water Table Elevations
June 4, 2002

Well	Top of Casing Elevation (feet)	Depth to Water (feet)	Product Thickness (inch)	Elevation Adjustment (feet)	Water Table Elevation (feet)
MW-1	9.47	7.79	0	0.00	1.68
MW-2	8.72	7.29	0	0.00	1.43
MW-3	9.00	7.62	0	0.00	1.38
MW-4	9.30	7.84	0	0.00	1.46
MW-5	10.19	9.09	0	0.00	1.10
MW-6	9.86	8.72	0	0.00	1.14
MW-7	8.60	7.27	0	0.00	1.33

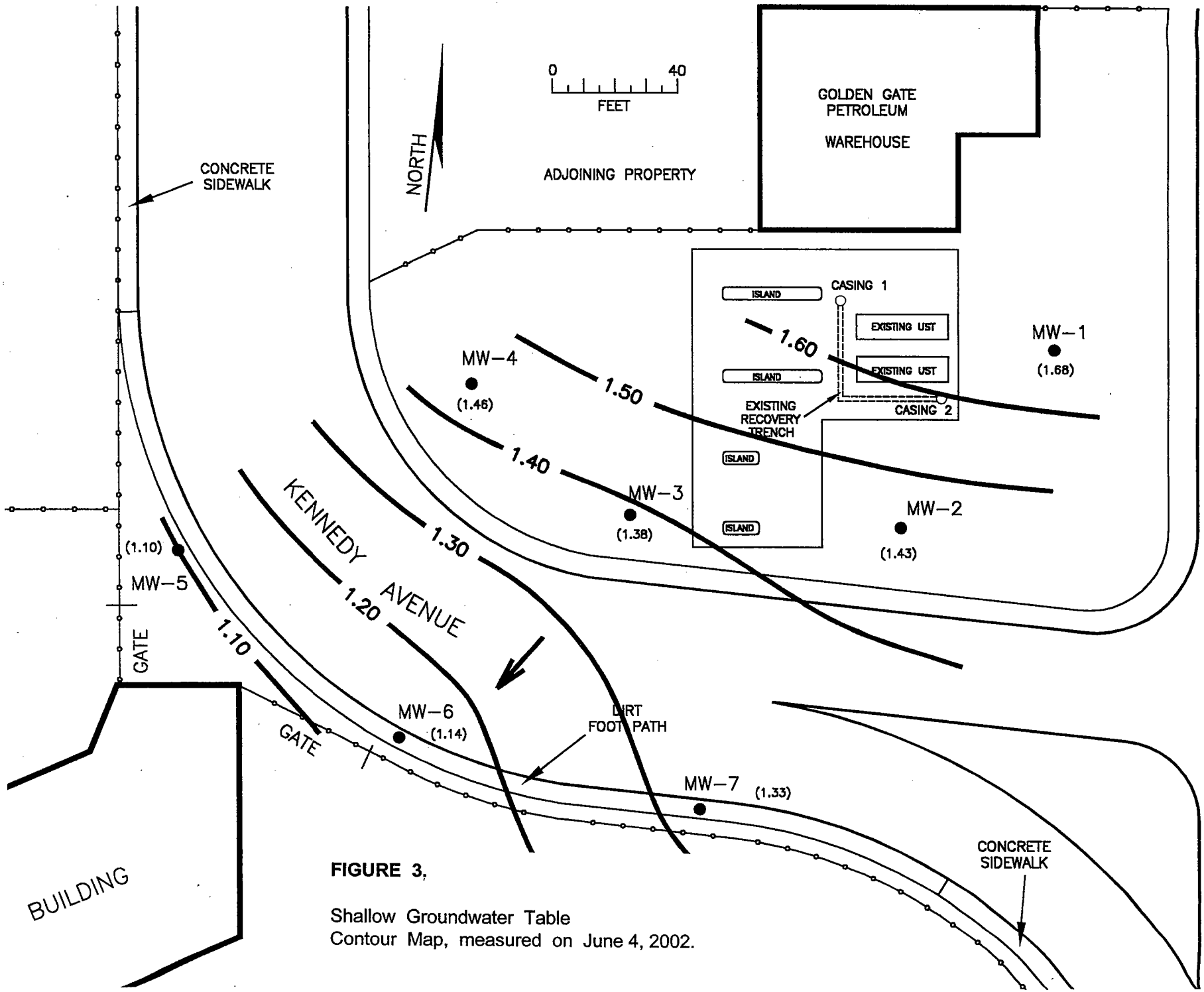

FIGURE 3,

Shallow Groundwater Table
Contour Map, measured on June 4, 2002.

TABLE 3.

Shallow Groundwater Sampling Results

Well	Date	TPH as Diesel (µg/L)	TPH as Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE Methyl-t-butyl ether (µg/L)
MW-1	11-Nov-99	ND	ND	ND	ND	ND	ND	ND < 5
	28-Mar-00	ND	ND	ND	ND	ND	ND	ND < 5
	07-Aug-00	ND	ND	ND	ND	ND	ND	ND < 5
	18-Oct-00	ND	ND	ND	ND	ND	ND	ND < 5
	29-Jan-01	ND	ND	ND	ND	ND	ND	ND < 5
	04-Jun-02	ND	**51**	ND	ND	ND	ND < 1	**1.6**
MW-2	11-Nov-99	**220**	**6,800**	ND < 50	ND < 50	ND < 50	ND < 50	**13,000**
	28-Mar-00	**1,800**	**2,500**	ND < 25	ND < 25	ND < 25	ND < 25	**1,800**
	07-Aug-00	**620**	**4,500**	ND < 25	ND < 25	ND < 25	ND < 25	**6,300**
	18-Oct-00	**510**	**2,300**	ND < 5	ND < 5	ND < 5	ND < 5	**8,300**
	29-Jan-01	**750**	**1,100**	**11**	ND	ND	ND	**4,300**
	04-Jun-02	ND	**59**	ND	ND	ND	ND < 1	**582**
MW-3	11-Nov-99	ND	**1,600**	ND < 25	ND < 25	ND < 25	ND < 25	**2,500**
	28-Mar-00	ND	**280**	ND < 2.5	ND < 2.5	ND < 2.5	ND < 2.5	**610**
	07-Aug-00	ND	**1,100**	ND < 5	ND < 5	ND < 5	ND < 5	**1,500**
	18-Oct-00	**58**	**900**	ND < 5	ND < 5	ND < 5	ND < 5	**2,000**
	29-Jan-01	ND	**700**	**2**	ND	ND	ND	**920**
	04-Jun-02	ND	**56**	ND	**0.5**	**0.8**	**3.2**	**2,710**
MW-4	11-Nov-99	ND	**650**	ND < 10	ND < 10	ND < 10	ND < 10	**540**
	28-Mar-00	ND	**430**	ND < 2.5	ND < 2.5	ND < 2.5	ND < 2.5	**800**
	07-Aug-00	ND	**600**	ND < 5	ND < 5	ND < 5	ND < 5	**500**
	18-Oct-00	ND	**260**	ND < 2.5	ND < 2.5	ND < 2.5	ND < 2.5	**410**
	29-Jan-01	ND < 56	**160**	**1.7**	ND	ND	ND	**230**
	04-Jun-02	ND	**89**	ND	ND	**1.1**	**6.3**	**35**
Detection Limit		50	50	0.5	0.5	0.5	0.5	0.5

ND= not detected

TABLE 3. (continued)

Shallow Groundwater Sampling Results

Well	Date	TPH as Diesel (µg/L)	TPH as Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE Methyl-t-butyl ether (µg/L)
MW-5	07-Aug-00	ND	**110**	ND	ND	ND	ND	**470**
	18-Oct-00	**83**	**150**	ND	ND	ND	ND	**420**
	29-Jan-01	**86**	**190**	**1.9**	ND	ND	ND	**290**
	04-Jun-02	ND	ND	ND	ND	ND	ND < 1	**108**
MW-6	07-Aug-00	ND	**460**	ND	ND	ND	ND	**1,900**
	18-Oct-00	**62**	**890**	**5.6**	ND < 2.5	ND < 2.5	**3.1**	**2,400**
	29-Jan-01	ND < 69	**780**	**4.2**	ND	ND	ND	**1,200**
	04-Jun-02	ND	ND	ND	ND	ND	**1.7**	**725**
MW-7	07-Aug-00	ND	ND	ND	ND	ND	ND	ND < 5
	18-Oct-00	ND	ND	ND	ND	ND	ND	ND < 5
	29-Jan-01	ND < 63	ND	ND	ND	ND	ND	ND < 5
	04-Jun-02	ND	ND	ND	ND	ND	**1.9**	**1.1**
CASING-1	11-Nov-99	ND	ND < 250	ND < 2.5	ND < 2.5	ND < 2.5	ND < 2.5	**350**
	29-Jan-01	**69**	ND < 500	ND < 5	ND < 5	ND < 5	ND < 5	**760**
	07-Aug-00	**140**	**54**	ND	ND	ND	ND	**30**
CASING-2	11-Nov-99	ND	**150**	ND < 1	ND < 1	ND < 1	ND < 1	**320**
	28-Mar-00	ND	**270**	ND < 2.5	ND < 2.5	ND < 2.5	ND < 2.5	**150**
	07-Aug-00	**110**	**82**	ND	ND	ND	ND	**190**
Detection Limit		50	50	0.5	0.5	0.5	0.5	0.5

ND= not detected

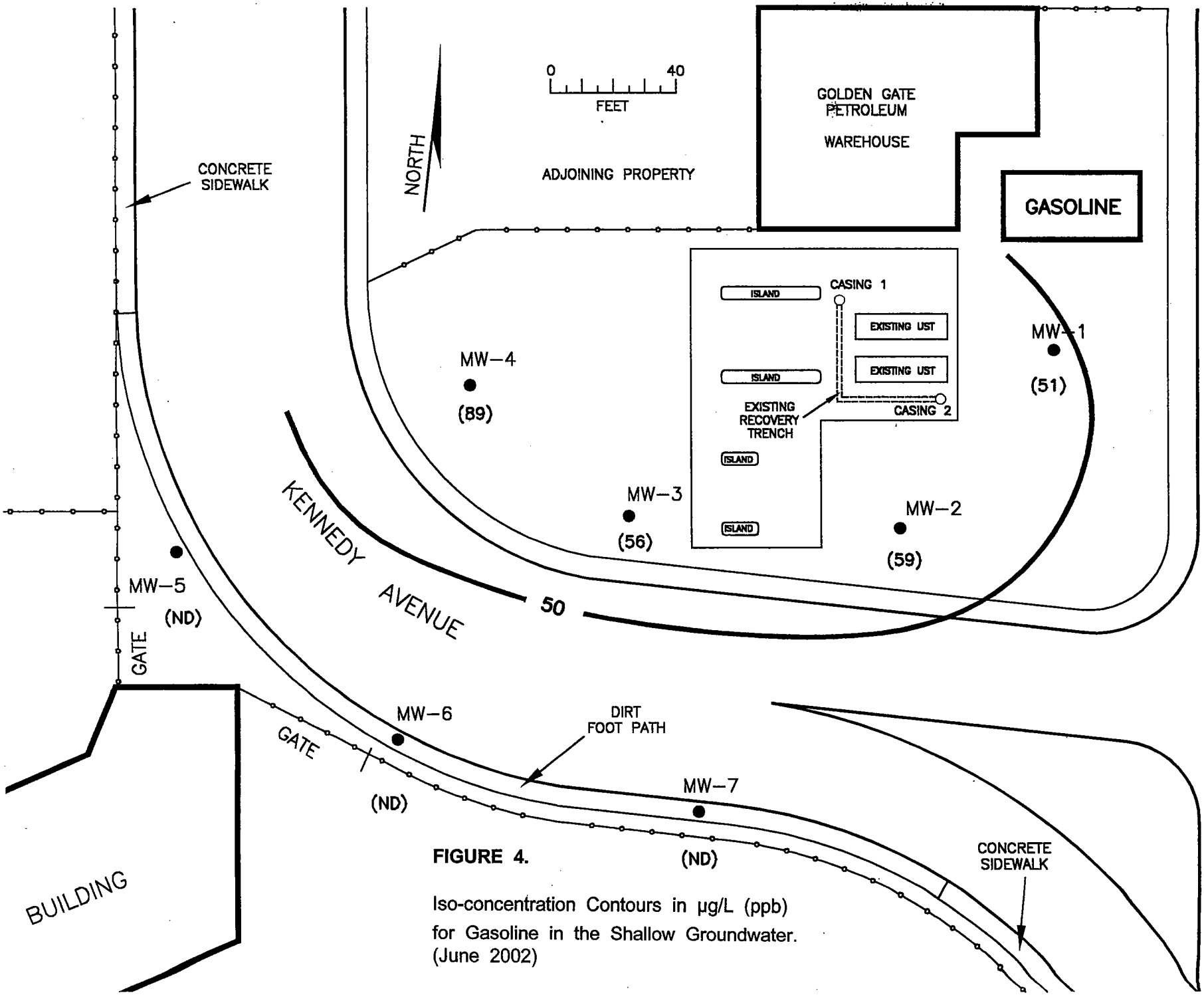

FIGURE 4.

Iso-concentration Contours in µg/L (ppb) for Gasoline in the Shallow Groundwater. (June 2002)

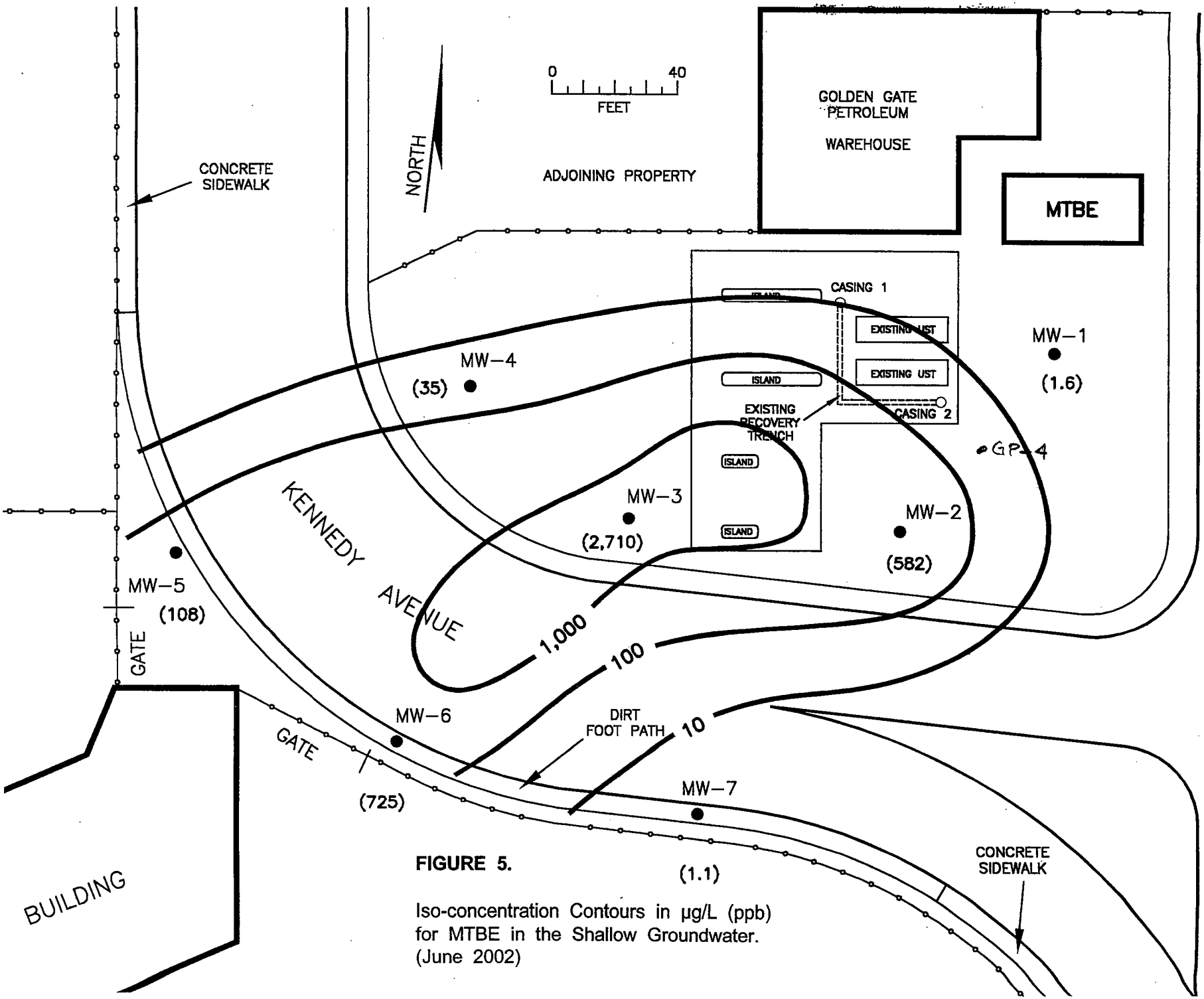

FIGURE 5.

Iso-concentration Contours in µg/L (ppb) for MTBE in the Shallow Groundwater. (June 2002)

B

TANK CAVITY CLOSURE REPORT

GOLDEN GATE PETROLEUM
OAKLAND CARDLOCK

Bonkowski & Associates, Inc.
3650 Mt. Diablo Blvd., Suite 200
Lafayette, California 94549-3765

16 September 1998

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

Sample No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
Truck 4	Soil Pile		3.4	240	19	ND	ND	ND	240	8/19/98
Truck 8	Soil Pile		23	230	41	ND	ND	240	340	8/19/98
Truck 12	Soil Pile		22	270	39	7.1	ND	56	560	8/19/98
Truck 6B	Soil Pile		3.2	210	ND	ND	ND	34	930	8/20/98
Truck 8B	Soil Pile		5	150	6.6	ND	ND	ND	250	8/20/98
Truck 10B	Soil Pile		12	430	12	ND	ND	11	160	8/20/98
Truck 15B	Soil Pile		ND	140	ND	ND	ND	ND	ND	8/20/98
Truck 17B	Soil Pile		60	450	56	96	ND	88	69	8/20/98
Truck 19B	Soil Pile		94	750	87	110	ND	140	ND	8/20/98
Truck 25B	Soil Pile		ND	57	ND	ND	ND	ND	ND	8/20/98
Truck 27B	Soil Pile		99	770	ND	80	ND	ND	ND	8/20/98
Truck 29B	Soil Pile		100	460	ND	80	ND	60	ND	8/20/98

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

Sample No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
T1-Eox	Tank 1 East end over- excavation	11	<1.0	<1.0	ND	ND	ND	ND	150	8/15/98
T1-Wox	Tank 1 West end over- excavation	11	<1.0	<1.0	ND	ND	ND	ND	68	8/15/98
T2-Wox	Tank 2 East end over- excavation	11	8.2	<1.0	10	8.2	ND	6.8	7,300	8/15/98
DI-1c	Dispenser Island 1 Center	7	240	1,400	350	900	1,400	2,800	1,700	8/15/98
DI-2c	Dispenser Island 2 Center	8	<1.0	<1.0	ND	ND	ND	ND	120	8/15/98
DI-3c	Dispenser Island 1 Center	3	87	86	30	120	440	380	130	8/15/98
DI-1-A	Dispenser Island 1 South End	11	20	520	ND	ND	ND	ND	ND	8/20/98
DI-3-South	Dispenser Island 3 South	6	25	140	ND	ND	8.7	110	35	8/20/98
DI-3-South-A	Dispenser Island 3 South	10	ND	1.2	ND	ND	ND	9.4	ND	8/20/98
DI-3-Center-12	Dispenser Island 3-Center	12	30	1,800	<20	95	34	200	1,900	8/20/98

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

Sample No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
PL-5	Product line	2.5	<1.0	540	ND	ND	ND	ND	8.4	8/14/98
DI-1E	Dispenser Island 1 East end	4	510	8,000	<200	390	<200	2,200	<200	8/14/98
DI-1W	Dispenser Island 1 West end	4	870	22,000	<200	1,400	350	7,600	<200	8/14/98
DI-2E	Dispenser Island 1 East end	4	290	1,900	<50	130	<50	<50	<50	8/14/98
DI-2W	Dispenser Island 1 West end	4	580	9,300	<200	310	<200	<200	<200	8/14/98
DI-3E	Dispenser Island 1 East end	4	680	4,600	<200	430	<200	900	<200	8/14/98
DI-3W	Dispenser Island 1 West end	4	21	31	230	2,000	350	3,400	240	8/14/98
DI-4E	Dispenser Island 1 East end	4	<1.0	<1.0	6.4	ND	ND	ND	7.0	8/14/98
DI-4W	Dispenser Island 1 West end	4	<1.0	<1.0	ND	ND	ND	ND	ND	8/14/98

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

Sample No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
Tank 1	East end	11	3,100	4,400	5,400	3,000	30,000	45,000	2,700	8/13/98
	West end	11	2,000	2,300	15,000	120,000	45,000	240,000	56,000	8/13/98
Tank 2	East end	11	ND	15	ND	ND	ND	ND	850	8/13/98
	West end	11	12,000	9,400	15,000	120,000	45,000	240,000	56,000	8/13/98
Tank 3	East end	11	1.4	1.7	ND	ND	ND	ND	1,800	8/13/98
	West end	11	2.6	8.8	34	5.4	36	200	270	8/13/98
Tank 4	East end	11	2.0	2.7	6.1	ND	ND	ND	2,800	8/13/98
	West end	11	1.8	150	ND	ND	8.1	12	7.1	8/13/98
Tank 5	East end	11	ND	ND	ND	ND	ND	ND	20	8/13/98
	West end	11	ND	1.8	ND	ND	ND	ND	ND	8/13/98
SP-N,S,E,W	Soil Pile		70	760	54	74	49	1.8	66	8/13/98
PL-1	Product line	2.5	<1.0	33	ND	ND	ND	ND	ND	8/14/98
PL-2	Product line	2.5	1,400	20,000	<500	10,000	1,200	5,000	1,200	8/14/98
PL-2A	Product line	2.5	60	670	42	160	<20	360	300	8/14/98
PL-3	Product line	2.5	<1.0	32	ND	ND	ND	ND	ND	8/14/98
PL-4A	Product line	2.5	ND	ND	ND	ND	ND	ND	ND	8/14/98
PL-4B	Product line	2.5	18,000	<50	60,000	1,800,000	370,000	2,200,000	880,000	8/14/98

RECEIVED
By dehloptoxic at 8:57 am, Jul 26, 2006

BUREAU VERITAS

July 13, 2006

Mr. Don Hwang
Hazardous Materials Specialist
ALAMEDA COUNTY ENVIROMENTAL HEALTH
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Clayton Project No.33104-004578.00

Subject: **Second Quarter 2006 Groundwater Monitoring Report**
Former Lemoine Sausage Factory
630 29th Avenue
Oakland, California

Dear Mr. Hwang:

Clayton Group Services is pleased to present the results of the Second Quarter 2006 groundwater monitoring event performed at the Former Lemoine Sausage Factory, located at 630 29th Avenue in Oakland, California. If you have any comments or questions regarding the report, please do not hesitate to contact me at (925) 426-2626.

Sincerely,

Timothy G. Bodkin, C.E.G., R.E.A.
Senior Project Manager
Environmental Services

Jeremy V. Wilson
Environmental Consultant
Environmental Services

JVW/tgb

cc: Bob Pender, AIG Technical Services
Donna Profitt, Bank of America
Richard Tong, Bureau Veritas

Clayton Group Services, Inc.
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6920 Koll Center Parkway, Suite 216
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Second Quarter 2006 Groundwater Monitoring Report

Former Lemoine Sausage Factory
630 29th Avenue
Oakland, California

July 13, 2006
33104-004578.00

Prepared for:
AIG Technical Services, Inc.
80 Pine Street, 6th Floor
New York, New York 10005

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Appendices

A. Field Sampling Data Sheets
B. Chain-of-Custody Documentation and Certified Analytical Reports

1.0 INTRODUCTION

Clayton Group Services, Inc., *a Bureau Veritas Company* (Clayton), has prepared the following Second Quarter 2006 Groundwater Monitoring Report for the former Lemoine Sausage Factory. The site is located at 630 29th Avenue near its intersection with 7th Street in Oakland, California (Figure 1). Groundwater monitoring is being performed at this site on a quarterly basis in accordance with an Alameda County Environmental Health (ACEH) letter dated June 19, 1999. Groundwater monitoring has been required due to past releases from a gasoline underground storage tank (UST) previously located beneath the sidewalk adjacent to the site.

The purpose of the groundwater monitoring is to document groundwater flow conditions and water quality beneath the site. Depth to groundwater measurements were obtained and groundwater samples were collected and analyzed for total petroleum hydrocarbons as gasoline (TPH-g) and associated compounds, including benzene, toluene, ethylbenzene and total xylenes (BTEX), and volatile organic compounds (VOCs).

2.0 SITE DESCRIPTION AND HISTORY

A single 1,000-gallon gasoline UST and associated plumbing/piping were formerly located beneath the sidewalk along 7th Street immediately east of the subject building. The fuel dispenser for the UST was located in a "cubby hole" near the building's roll-up door. The UST, fuel dispenser, and associated piping were removed on November 21, 1996. Confirmation soil samples were collected from the excavation for laboratory analyses. A petroleum hydrocarbon sheen was noted on groundwater that collected in the tank excavation. Analytical results showed the presence of petroleum hydrocarbons in the confirmation samples.

Subsequent groundwater investigations were performed to define the vertical and lateral extent of petroleum hydrocarbons in groundwater and monitor groundwater conditions around the site. Ten (10) groundwater monitoring wells were installed and screened within the first-encountered water bearing zone, which predominantly occurs within low permeability clayey and sandy silts. In general, the highest concentrations of TPH-g and benzene have been detected in the immediate vicinity or just downgradient of the former UST. VOCs have also been detected in monitoring wells located to the south and southwest of the former UST location and are believed to be originating off-site.

3.0 FIELD ACTIVITIES

Groundwater level measurements and samples were collected from ten (10) existing monitoring wells (MW-1, MW-2, and MW-6 through MW-13).

3.1. GROUNDWATER LEVEL MEASUREMENTS

On June 15, 2006, depth to water measurements were obtained in the monitoring wells to calculate groundwater elevations and to estimate the groundwater flow direction and gradient. The wells were opened and allowed to stabilize prior to measuring the groundwater levels. The depth to water in each well was measured using an electronic well sounder. Groundwater depths were measured from a surveyed reference elevation point represented by a V-notch at the top of each casing. Groundwater elevations were calculated by subtracting the measured depth to water from the top of casing elevation at each monitoring well.

3.2. GROUNDWATER PURGING

Prior to groundwater sample collection at each monitoring well, three (3) to four (4) well casing volumes of standing water were removed with the exception of Monitoring Wells MW-1 and MW-2, which were not purged because of the lack of sufficient water and groundwater recharge for purging purposes. Wells MW-6 and MW-8 through MW-13 were purged by hand bailing with 1-liter plastic disposable bailers. Monitoring Well MW-7 was purged using a peristaltic pump because a car was parked over the monitoring well.

The purge volume from each monitoring well was determined by multiplying the nominal cross-sectional area of the well casing by the water column within each well casing. The water column height in each well was determined by subtracting the depth to water from the total well casing depth. Water quality parameters (pH, specific conductivity, and temperature) were measured and recorded onto Field Sampling Data Sheets. Water quality parameter measurements were taken prior to purging and after removing each well casing volume of water from each monitoring well.

Groundwater purged from monitoring wells during sampling was stored onsite in sealed 55-gallon drums meeting U.S. Department of Transportation (USDOT) regulations and labeled with identifying information. Groundwater level measurements for the Second Quarter 2006 monitoring event were recorded on Field Sampling Data Sheets as presented in Appendix A.

3.3 GROUNDWATER SAMPLING

Before groundwater sampling commenced, each purged monitoring well was allowed to recharge to at least 80% of the pre-purged standing water volume. Groundwater samples for laboratory analyses were retrieved using either a peristaltic pump with polytubing or a new disposable bailer. Groundwater samples were poured into appropriate laboratory-supplied containers. Sample containers were sealed, labeled with identifying project information, logged onto a chain-of-custody document, and temporarily stored in a chilled ice chest containing crushed ice for transport to the laboratory.

3.4 LABORATORY ANALYSES

Groundwater samples were analyzed by Curtis and Tompkins Ltd. of Berkeley, California, a State of California-certified laboratory. The samples were analyzed by the following United States Environmental Protection Agency (USEPA) approved analytical methods:

- USEPA Method 8021B for TPH-g/BTEX
- USEPA Method 8260B for VOCs

Certified analytical data sheets and chain-of-custody documentation for the Second Quarter 2006 groundwater sampling event are presented in Appendix B.

4.0 FINDINGS

4.1. GROUNDWATER FLOW CONDITIONS

Groundwater flow conditions were assessed based upon the groundwater level measurements obtained in the wells. Groundwater depths ranged between 4.58 and 9.84 feet below the tops of well casings. Groundwater elevations ranged between 7.95 and 12.18 feet mean sea level. Groundwater flow is to the west-southwest at an estimated gradient of 0.017 feet per foot (ft/ft). Depth to water measurements and groundwater elevation data from this event and previous events are presented in Table 1. The Second Quarter 2006 groundwater elevation map is presented on Figure 2.

4.2. ANALYTICAL RESULTS

Analytical results for groundwater showed the presence of total petroleum hydrocarbons and VOCs. The frequency and range of petroleum hydrocarbons and VOCs detected in groundwater during this quarter are as follows:

- TPH-g was detected in Wells MW-1, MW-2, MW-6, MW-8, MW-9, MW-12, and MW-13 at concentrations ranging between 51 and 67,000 micrograms per liter (µg/L).
- Benzene was detected in Wells MW-1, MW-2, MW-8, MW-9, and MW-13 at concentrations ranging between 78 and 16,000 µg/L.
- Toluene was detected in Wells MW-1, MW-2, and MW-9 at concentrations ranging between 200 and 5,000 µg/L.
- Ethylbenzene was detected in Wells MW-1, MW-2, MW-8, MW-9, and MW-13 at concentrations ranging between 21 and 1,900 µg/L.
- Total xylenes were detected in Wells MW-1, MW-2, MW-7, MW-9, and MW-13 at concentrations ranging between 0.62 and 5,790 µg/L.

- Trichloroethene (TCE) was detected in Wells MW-8, MW-12, and MW-13 at 6.9, 99 and 43 µg/L, respectively.
- Cis-1,2-dichloroethene (cis-1,2-DCE) was detected in Wells MW-8, MW-12, and MW-13 at concentrations ranging between 30 and 700 µg/L.
- Trans-1,2-dichloroethene (trans-1,2-DCE) was detected in Wells MW-8, MW-12, and MW-13 at concentrations ranging between 28 and 39 µg/L.
- Vinyl chloride (VC) was detected in Wells MW-8 and MW-13 at 41 and 18 µg/L, respectively.
- 1,1-dichloroethane (1,1-DCA) was detected in Well MW-6 at a concentration of 0.5 µg/L, which is the laboratory reporting limit for this constituent.

Historical groundwater analytical results for petroleum hydrocarbons and VOCs detected in groundwater are presented in Table 2. TPH-g and benzene concentrations detected in groundwater and isoconcentration contours for these constituents for Second Quarter 2006 are presented on Figures 3 and 4, respectively. TCE and cis 1,2-DCE concentrations detected in groundwater during Second Quarter 2006 are presented in Figure 5.

5.0 CONCLUSIONS

Groundwater conditions for Second Quarter 2006 are relatively consistent with those trends noted during previous monitoring events. TPH-g and BTEX concentrations detected in groundwater have increased or remained similar in comparison with the previous event. The highest concentrations of TPH-g and benzene were detected in Well MW-2, which is near the former UST location, and Well MW-9, which is located within the central portion of the subject building and downgradient of the former UST location. Wells MW-6, MW-7, and MW-10 define the northern, western, and eastern edges of the petroleum hydrocarbon plume.

VOCs detected in groundwater during Second Quarter 2006 include TCE and associated degradation compounds (including cis-1,2-DCE, trans-1,2-DCE, and VC). VOC concentrations were detected in Wells MW-8, MW-12, and MW-13, which are located downgradient from the former UST location. VOC concentrations slightly increased or decreased during this monitoring event. The source of the VOCs is unknown. The source of the VOCs also appears to be located off-site and does not appear to be related to the UST release. In addition, the apparent changes in VOC concentrations over the past several monitoring events indicate that the natural degradation of TCE is occurring.

Report prepared by:_____

Jeremy Wilson
Environmental Consultant
Environmental Services

Report reviewed by:_____

Timothy G. Bodkin, C.E.G., R.E.A.
Senior Project Manager
Environmental Services

July 13, 2006

TABLES

TABLE 1

HISTORICAL GROUNDWATER ELEVATION DATA
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Well Identification	Date Measured	Top of Casing Elevation (ft,msl)	Depth to Water (feet)	Groundwater Elevation (ft,msl)
MW-1	2/8/1999	16.69	3.60	13.09
	6/15/2000	16.69	4.82	11.87
	9/22/2000	16.69	6.30	10.39
	12/19/2000	16.69	5.50	11.19
	3/21/2001	16.69	4.29	12.40
	6/20/2001	16.69	5.85	10.84
	9/25/2001	16.69	6.76	9.93
	12/3/2001	16.69	4.17	12.52
	3/25/2002	16.69	2.77	13.92
	6/28/2002	16.69	5.61	11.08
	9/11/2002	16.69	6.17	10.52
	12/16/2002	16.69	3.91	12.78
	3/28/2003	16.69	4.44	12.25
	6/24/2003	16.69	5.29	11.40
	9/26/2003	16.69	6.88	9.81
	12/16/2003	16.69	NM	NM
	4/6/2004	16.69	3.57	13.12
	6/23/2004	16.69	5.96	10.73
	9/15/2004	16.69	NM	NM
	12/16/2004	16.69	4.40	12.29
	3/22/2005	16.69	3.44	13.25
	6/24/2005	16.69	4.45	12.24
	9/13/2005	16.69	6.03	10.66
	12/2/2005	16.69	4.95	11.74
	3/2/2006	16.69	3.74	12.95
	6/15/2006	16.69	4.58	12.11
MW-2	2/8/1999	20.79	14.20	6.59
	6/15/2000	20.79	10.46	10.33
	9/22/2000	20.79	11.49	9.30
	12/19/2000	20.79	11.38	9.41
	3/21/2001	20.79	10.01	10.78
	6/20/2001	20.79	10.92	9.87
	9/25/2001	20.79	11.78	9.01
	12/3/2001	20.79	11.13	9.66
	3/25/2002	20.79	9.21	11.58
	6/28/2002	20.79	10.65	10.14
	9/11/2002	20.79	10.89	9.90
	12/16/2002	20.79	11.15	9.64
	3/28/2003	20.79	10.27	10.52
	6/24/2003	20.79	10.24	10.55
	9/26/2003	20.79	11.20	9.59
	12/16/2003	20.79	11.50	9.29
	4/6/2004	20.79	9.40	11.39
	6/23/2004	20.79	11.60	9.19

TABLE 1

HISTORICAL GROUNDWATER ELEVATION DATA
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Well Identification	Date Measured	Top of Casing Elevation (ft,msl)	Depth to Water (feet)	Groundwater Elevation (ft,msl)
MW-2	9/15/2004	20.79	10.94	9.85
	12/16/2004	20.79	NM	NM
	3/22/2005	20.79	9.26	11.53
	6/24/2005	20.79	10.03	10.76
	9/13/2005	20.79	10.58	10.21
	12/2/2005	20.79	NM	NM
	3/2/2006	20.79	9.45	11.34
	6/15/2006	20.79	9.84	10.95
MW-3	2/8/1999	21.10	7.45	13.65
	6/15/2000	21.10	10.56	10.54
	9/22/2000	21.10	15.30	5.80
	12/19/2000	21.10	9.72	11.38
	3/21/2001	21.10	8.95	12.15
	6/20/2001	21.10	10.14	10.96
	9/25/2001	21.10	10.74	10.36
	Removed from monitoring program in October 2001			
MW-4	2/8/1999	17.78	4.13	13.65
	6/15/2000	17.78	6.30	11.48
	9/22/2000	17.78	6.90	10.88
	12/19/2000	17.78	6.40	11.38
	3/21/2001	17.78	5.77	12.01
	6/20/2001	17.78	6.78	11.00
	9/25/2001	17.78	7.40	10.38
	Removed from monitoring program in October 2001			
MW-5	2/8/1999	21.12	7.62	13.50
	6/15/2000	21.12	10.36	10.76
	9/22/2000	21.12	9.99	11.13
	12/19/2000	21.12	9.99	11.13
	3/21/2001	21.12	8.68	12.44
	6/20/2001	21.12	9.90	11.22
	9/25/2001	21.12	10.34	10.78
	Removed from monitoring program in October 2001			
MW-6	6/15/2000	16.60	5.47	11.13
	9/22/2000	16.60	6.54	10.06
	12/19/2000	16.60	5.93	10.67
	3/21/2001	16.60	4.70	11.90
	6/20/2001	16.60	6.13	10.47
	9/25/2001	16.60	6.68	9.92
	12/3/2001	16.60	4.72	11.88
	3/25/2002	16.60	3.93	12.67
	6/28/2002	16.60	5.83	10.77

TABLE 1

HISTORICAL GROUNDWATER ELEVATION DATA
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Well Identification	Date Measured	Top of Casing Elevation (ft,msl)	Depth to Water (feet)	Groundwater Elevation (ft,msl)
MW-6	9/11/2002	16.60	5.43	11.17
	12/16/2002	16.60	3.93	12.67
	3/28/2003	16.60	NM	
	6/24/2003	16.60	5.52	11.08
	9/26/2003	16.60	6.70	9.90
	12/16/2003	16.60	4.99	11.61
	4/6/2004	16.60	4.85	11.75
	6/23/2004	16.60	5.76	10.84
	9/15/2004	16.60	6.56	10.04
	12/16/2004	16.60	4.56	12.04
	3/22/2005	16.60	3.63	12.97
	6/24/2005	16.60	4.84	11.76
	9/13/2005	16.60	6.15	10.45
	12/2/2005	16.60	5.24	11.36
	3/2/2006	16.60	3.41	13.19
	6/15/2006	16.60	5.09	11.51
MW-7	12/16/2002	15.47	5.01	10.46
	12/17/2002	15.47	6.95	8.52
	12/18/2002	15.47	6.94	8.53
	12/19/2002	15.47	6.04	9.43
	12/20/2002	15.47	6.48	8.99
	12/21/2002	15.47	7.25	8.22
	12/22/2002	15.47	6.90	8.57
	12/23/2002	15.47	5.53	9.94
	12/24/2002	15.47	7.20	8.27
	12/25/2002	15.47	7.51	7.96
	12/26/2002	15.47	6.40	9.07
	3/28/2003	15.47	5.68	9.79
	6/24/2003	15.47	6.13	9.34
	9/26/2003	15.47	7.22	8.25
	12/16/2003	15.47	5.68	9.79
	4/6/2004	15.47	5.60	9.87
	6/23/2004	15.47	6.20	9.27
	9/15/2004	15.47	6.70	8.77
	12/16/2004	15.47	5.15	10.32
	3/22/2005	15.47	NM	NM
	6/24/2005	15.47	NM	NM
	9/13/2005	15.47	6.45	9.02
	12/2/2005	15.47	5.93	9.54
	3/2/2006	15.47	4.65	10.82
	6/15/2006	15.47	5.71	9.76

TABLE 1

HISTORICAL GROUNDWATER ELEVATION DATA
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Well Identification	Date Measured	Top of Casing Elevation (ft,msl)	Depth to Water (feet)	Groundwater Elevation (ft,msl)
MW-8	6/15/2000	17.58	7.14	10.44
	9/22/2000	17.58	8.33	9.25
	12/19/2000	17.58	7.71	9.87
	3/21/2001	17.58	6.40	11.18
	6/20/2001	17.58	7.96	9.62
	9/25/2001	17.58	8.89	8.69
	12/3/2001	17.58	6.58	11.00
	3/25/2002	17.58	5.40	12.18
	6/28/2002	17.58	7.71	9.87
	9/11/2002	17.58	8.40	9.18
	12/16/2002	17.58	5.63	11.95
	3/28/2003	17.58	6.62	10.96
	6/24/2003	17.58	7.44	10.14
	9/26/2003	17.58	8.71	8.87
	12/16/2003	17.58	6.69	10.89
	4/6/2004	17.58	6.74	10.84
	6/23/2004	17.58	7.98	9.60
	9/15/2004	17.58	8.52	9.06
	12/16/2004	17.58	5.61	11.97
	3/22/2005	17.58	5.54	12.04
	6/24/2005	17.58	6.77	10.81
	9/13/2005	17.58	7.92	9.66
	12/2/2005	17.58	7.36	10.22
	3/2/2006	17.58	5.83	11.75
	6/15/2006	17.58	6.99	10.59
MW-9	12/3/2001	17.61	5.79	11.82
	3/25/2002	17.61	4.98	12.63
	6/28/2002	17.61	7.71	9.90
	9/11/2002	17.61	6.91	10.70
	12/16/2002	17.61	6.58	11.03
	3/28/2003	17.61	6.08	11.53
	6/24/2003	17.61	6.42	11.19
	9/26/2003	17.61	8.14	9.47
	12/16/2003	17.61	6.76	10.85
	4/6/2004	17.61	5.97	11.64
	6/23/2004	17.61	7.80	9.81
	9/15/2004	17.61	7.14	10.47
	12/16/2004	17.61	5.73	11.88
	3/22/2005	17.61	5.31	12.30
	6/24/2005	17.61	6.05	11.56
	9/13/2005	17.61	6.70	10.91
	12/2/2005	17.61	6.92	10.69
	3/2/2006	17.61	5.83	11.78
	6/15/2006	17.61	6.32	11.29

TABLE 1

HISTORICAL GROUNDWATER ELEVATION DATA
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Well Identification	Date Measured	Top of Casing Elevation (ft,msl)	Depth to Water (feet)	Groundwater Elevation (ft,msl)
MW-10	12/3/2001	16.92	4.22	12.70
	3/25/2002	16.92	3.00	13.92
	6/28/2002	16.92	5.65	11.27
	9/11/2002	16.92	6.16	10.76
	12/16/2002	16.92	3.74	13.18
	3/28/2003	16.92	4.54	12.38
	6/24/2003	16.92	5.40	11.52
	9/26/2003	16.92	6.98	9.94
	12/16/2003	16.92	4.94	11.98
	4/6/2004	16.92	4.54	12.38
	6/23/2004	16.92	5.96	10.96
	9/15/2004	16.92	6.86	10.06
	12/16/2004	16.92	4.45	12.47
	3/22/2005	16.92	3.56	13.36
	6/24/2005	16.92	4.58	12.34
	9/12/2005	16.92	6.08	10.84
	12/2/2005	16.92	4.94	11.98
	3/2/2006	16.92	3.90	13.02
	6/15/2006	16.92	4.74	12.18
MW-11	12/3/2001	14.87	5.67	9.20
	3/25/2002	14.87	4.68	10.19
	6/28/2002	14.87	6.35	8.52
	9/11/2002	14.87	6.91	7.96
	12/16/2002	14.87	3.92	10.95
	3/28/2003	14.87	5.17	9.70
	6/24/2003	14.87	5.86	9.01
	9/26/2003	14.87	7.16	7.71
	12/16/2003	14.87	5.61	9.26
	4/6/2004	14.87	5.49	9.38
	6/23/2004	14.87	5.68	9.19
	12/16/2004	14.87	4.69	10.18
	3/22/2005	14.87	4.20	10.67
	6/24/2005	14.87	5.41	9.46
	9/13/2005	14.87	6.23	8.64
	9/15/2005	14.87	6.45	8.42
	12/2/2005	14.87	5.95	8.92
	3/2/2006	14.87	4.31	10.56
	6/15/2006	14.87	5.40	9.47
MW-12	6/28/2002	14.05	6.13	7.92
	9/11/2002	14.05	6.82	7.23
	12/16/2002	14.05	4.94	9.11
	3/28/2003	14.05	5.08	8.97
	6/24/2003	14.05	5.73	8.32
	9/26/2003	14.05	6.94	7.11

TABLE 1

HISTORICAL GROUNDWATER ELEVATION DATA
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Well Identification	Date Measured	Top of Casing Elevation (ft,msl)	Depth to Water (feet)	Groundwater Elevation (ft,msl)
MW-12	12/16/2003	14.05	4.99	9.06
	4/6/2004	14.05	5.04	9.01
	6/23/2004	14.05	5.78	8.27
	9/15/2004	14.05	6.43	7.62
	12/16/2004	14.05	4.34	9.71
	3/22/2005	14.05	3.50	10.55
	6/24/2005	14.05	4.9	9.15
	9/12/2005	14.05	6.11	7.94
	12/2/2005	14.05	5.13	8.92
	3/2/2006	14.05	3.83	10.22
	6/15/2006	14.05	5.18	8.87
MW-13	6/28/2002	13.39	6.21	7.18
	9/11/2002	13.39	6.66	6.73
	12/16/2002	13.39	3.90	9.49
	3/28/2003	13.39	5.34	8.05
	6/24/2003	13.39	5.99	7.40
	9/26/2003	13.39	6.99	6.40
	12/16/2003	13.39	5.01	8.38
	4/6/2004	13.39	5.35	8.04
	6/23/2004	13.39	6.12	7.27
	9/15/2004	13.39	6.63	6.76
	12/16/2004	13.39	4.69	8.70
	3/22/2005	13.39	4.86	8.53
	6/24/2005	13.39	5.13	8.26
	9/12/2005	13.39	6.33	7.06
	12/2/2005	13.39	5.25	8.14
	3/2/2006	13.39	4.33	9.06
	6/15/2006	13.39	5.44	7.95

Notes:

1. All top of casing elevations referenced to mean sea level (msl) and surveyed with reference to the benchmark located at Peterson Street and East 7th Street.
2. NM refers to Not Measured.

TABLE 2

HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Sample Location	Date Sampled	TPH-g ug/L	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Total Xylenes ug/L	TCE ug/L	1,2-DCA ug/L	cis-1,2-DCE ug/L	trans-1,2-DCE ug/L	VC ug/L
	RWQCB ESL	100	1	40	30	20	5	0.5	6	10	0.5
	DHS MCL	-	1	150	300	1750	5	0.5	6	10	0.5
MW-1	2/8/1999	48,000	3,900	6,300	970	4,300	NA	<30	NA	NA	NA
	6/15/2000	29,000	3,900	<100	1,900	4,200	<5.0	<5.0	<5.0	<5.0	<5.0
	9/22/2000	25,000	3,100	1,800	470	3,600	NA	NA	NA	NA	NA
	12/19/2000	25,000	3,200	1,900	480	3,300	<2.5	<2.5	<2.5	<2.5	<2.5
	3/21/2000	21,000	3,200	1,700	290	2,600	<2.5	<2.5	<2.5	<2.5	<2.5
	6/21/2001	12,000	2,000	880	180	1,180	<0.5	3.0	<0.5	<0.5	<0.5
	9/26/2001	16,000	1,100	130	< 10	320	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
	12/3/2001	15,000	2,800	1,200	310	1,660	<3.1	<3.1	<3.1	<3.1	<3.1
	3/25/2002	11,000	3,200	1,200	73	1,860	<5	<5	<5	<5	<5
	6/28/2002	26,000	3,200	1,800	640	2,900	<3.1	<3.1	<3.1	<3.1	<3.1
	9/11/2002	27,000	3,200	1,900	720	3,500	<4.2	<4.2	<4.2	<4.2	<4.2
	12/16/2002	20,000	2,800	490	500	2,300	<4.2	<4.2	<4.2	<4.2	<4.2
	3/28/2003	20,000	2,700	1,500	650	2,300	<3.6	<3.6	<3.6	<3.6	<3.6
	6/24/2003	14,000	2,400	1,400	500	2,100	<4.2	<4.2	<4.2	<4.2	<4.2
	9/26/2003	11,000	1,200	960	370	1,600	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2003	Not Sampled									
	4/6/2004	18,000	2,400	1,300	550	1,730	<2.0	<2.0	<2.0	<2.0	<2.0
	6/23/2004	25,000	2,700	1,700	680	2,300	<2.5	<2.5	<2.5	<2.5	<2.5
	9/15/2004	Not Sampled									
	12/16/2004	1,800	260	89	32	119	<2.5	<2.5	<2.5	<2.5	<2.5
	3/22/2005	19,000	2,400	960	530	1,330	<3.6	<3.6	<3.6	<3.6	<3.6
	6/24/2005	12,000	2,400	450	470	940	<3.6	<3.6	<3.6	<3.6	<3.6
	9/13/2005	17,000	2,700	1,000	740	1,760	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2005	9,300	1,500	500	420	1,060	<3.6	<3.6	<3.6	<3.6	<3.6
	3/2/2006	6,200	1,400	200	180	370	<3.6	<3.6	<3.6	<3.6	<3.6
	6/15/2006	10,000	2,500	200	440	570	<4.2	<4.2	<4.2	<4.2	<4.2

TABLE 2

HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Sample Location	Date Sampled	TPH-g ug/L	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Total Xylenes ug/L	TCE ug/L	1,2-DCA ug/L	cis-1,2-DCE ug/L	trans-1,2-DCE ug/L	VC ug/L
	RWQCB ESL	100	1	40	30	20	5	0.5	6	10	0.5
	DHS MCL	-	1	150	300	1750	5	0.5	6	10	0.5
MW-6	6/15/2000	1,100	3.8	2.2	2.1	4.8	< 0.5	0.78	< 0.5	< 0.5	< 0.5
	9/22/2000	71	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA
	12/19/2000	320	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	3/21/2001	820	< 0.5	< 0.5	1.4	0.52	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	6/21/2001	420	< 0.5	< 0.5	0.59	1	< 0.5	0.9	< 0.5	< 0.5	< 0.5
	9/25/2001	760	< 0.5	< 0.5	< 0.5	2.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	12/3/2001	72	< 0.5	< 0.5	< 0.5	<0.5	< 0.5	1.6	< 0.5	< 0.5	< 0.5
	3/25/2002	1,200	22	8.0	5.7	13.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	6/28/2002	120	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5
	9/11/2002	120	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	12/16/2002	62	< 0.5	0.54	3.0	8.39	0.7	1	< 0.5	< 0.5	< 0.5
	3/28/2003	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/24/2003	130	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	9/26/2003	<50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5
	12/16/2003	<50	< 0.5	< 0.5	< 0.5	0.88	1.7	< 0.5	0.6	<0.5	<0.5
	4/6/2004	260	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	< 0.5	<0.5	<0.5	<0.5
	6/23/2004	63	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	0.8	<0.5	<0.5	<0.5
	9/15/2004	<50	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	< 0.5	<0.5	<0.5	<0.5
	12/16/2004	240	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	3/22/2005	420	< 0.5	< 0.5	< 0.5	0.95	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	6/24/2005	91	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	9/13/2005	<50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	12/2/2005	<50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5
	3/2/2006	120	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	6/15/2006	51	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

TABLE 2

HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Sample Location	Date Sampled	TPH-g ug/L	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Total Xylenes ug/L	TCE ug/L	1,2-DCA ug/L	cis-1,2-DCE ug/L	trans-1,2-DCE ug/L	VC ug/L
	RWQCB ESL	100	1	40	30	20	5	0.5	6	10	0.5
	DHS MCL	-	1	150	300	1750	5	0.5	6	10	0.5
MW-11	12/2/2005	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/2/2006	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/15/2006	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW-12	6/28/2002	71	<0.5	<0.5	<0.5	<0.5	170	<0.5	42	47	0.9
	9/11/2002	89	<0.5	<0.5	<0.5	<0.5	180	<0.5	46	51	0.9
	12/16/2002	130	<0.5	0.9	4.2	9.9	200	<0.5	57	60	0.9
	3/28/2003	110	<0.5	<0.5	<0.5	<0.5	190	<0.7	53	53	0.9
	6/24/2003	140	<0.5	<0.5	<0.5	<0.5	220	<1.0	58	66	<1.0
	9/26/2003	230	2.9	1.1	3.8	6.71	210	<0.7	60	63	<0.7
	12/16/2003	120	<0.5	<0.5	<0.5	0.65	140	<0.5	44	44	<0.5
	4/6/2004	76	<0.5	<0.5	<0.5	<0.5	160	<0.5	49	54	<0.5
	6/23/2004	99	<0.5	<0.5	<0.5	<0.5	200	<0.5	65	74	<0.5
	9/15/2004	130	<0.5	<0.5	<0.5	<0.5	290	<1.7	73	83	<1.7
	12/16/2004	110	0.94	<0.5	<0.5	<0.5	240	<2.0	80	77	<2.0
	3/22/2005	61	<0.5	<0.5	<0.5	<0.5	95	<0.5	26	42	<0.5
	6/24/2005	59	<0.5	<0.5	<0.5	<0.5	120	<1.0	31	39	<1.0
	9/12/2005	64	<0.5	<0.5	<0.5	<0.5	130	<0.7	34	42	<0.7
	12/2/2005	80 Y,Z	<0.5	<0.5	<0.5	<0.5	170	<1.0	43	49	<1.0
	3/2/2006	54 Y Z	<0.5	<0.5	<0.5	<0.5	84	<0.8	27	31	<0.8
	6/15/2006	58 Y,Z	<0.5	<0.5	<0.5	<0.5	99	<0.5	30	38	<0.5
MW-13	6/28/2002	5,600	120	55	130	9.5	61	<0.5	430	14	4.4
	9/11/2002	4,500	58	7.5	150	14	63	<0.5	410	13	<1.3
	12/16/2002	4,800	90	<0.5	85	24	76	<0.5	250	9.4	1.8
	3/28/2003	4,400	55	<0.5	51	14.3	85	<0.5	150	13	1.8
	6/24/2003	8,300	100	<0.5	94	12	68	<1.0	250	19	4.2
	9/26/2003	7,200	150	<1.0	89	57	51	<1.0	270	23	5.1

TABLE 2

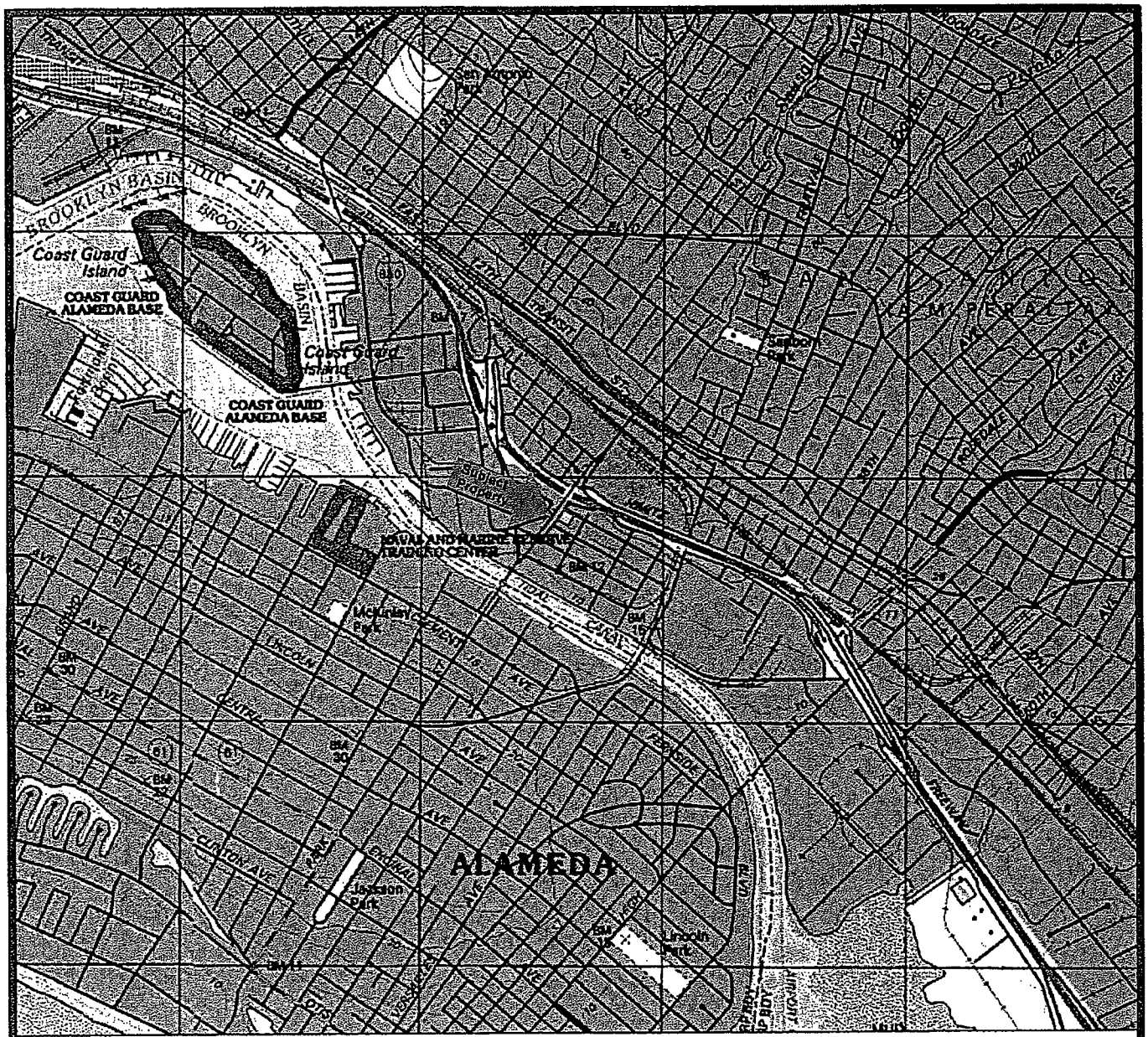
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA

Sample Location	Date Sampled	TPH-g ug/L	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Total Xylenes ug/L	TCE ug/L	1,2-DCA ug/L	cis-1,2-DCE ug/L	trans-1,2-DCE ug/L	VC ug/L
	RWQCB ESL	100	1	40	30	20	5	0.5	6	10	0.5
	DHS MCL	-	1	150	300	1750	5	0.5	6	10	0.5
MW-13	12/16/2003	8,100	120	36	72	26.6	66	<0.7	240	23	10
	4/6/2004	3,300	22	<1.0	37	9.0	90	<0.5	190	23	8
	6/23/2004	7,000	140	25	88	21	53	<2.0	350	31	25
	9/15/2004	6,700	84	<1.0	78	7.2	37	<1.7	300	40	31
	12/16/2004	4,300	61	<0.5	44	11.5	69	<2.0	240	32	15
	3/22/2005	3,000	24	<0.5	20	7.6	72	<0.5	120	23	6.6
	6/24/2005	2,600	63	<0.5	25	4.3	42	<1.0	150	36	16
	9/12/2005	2,500	20 C	<0.5	33	6.7 c	25	<1.3	170	38	22
	12/2/2005	4,200 Y	70 C	<0.5	21 C	15.5 C	17	<1.3	140	40	24
	3/2/2006	3,200 L Y	67 C	<0.5	27	5.19 C	43	<0.8	110	32	16
	6/15/2006	3,400	92 C	<0.5	26	3.4 C	43	<0.8	120	39	18

Notes:

1. All results are reported in micrograms per liter (µg/L).
2. NA refers to Not Analyzed.
3. NS refers to Not Sampled.
4. TPH-g refers to Total Petroleum Hydrocarbons as Gasoline.
5. MTBE refers to Methyl tert-butyl ether.
6. TCE refers to Trichloroethene.
7. trans-1,2-DCE refers to trans-1,2-dichlororethene.
8. cis-1,2-DCE refers to cis-1,2-Dichlororethene.
9. VC refers to Vinyl Chloride.
10. 1,2-DCA refers to 1,2-dichloroethane.
11. Y=Sample exhibits chromatographic pattern which does not resemble standard.
12. Z=Sample exhibits unknown single peak or peaks.
13. C=Presence confirmed, but RPD between columns exceed 40%.
14. L=Lighter hydrocarbons contributed to the quantitation.
15. RWQCB ESL refers to the California Regional Water Quality Control Board Environmental Screening Level for shallow soils less than 10 feet deep assuming groundwater is a current or potential source of drinking water, as presented in Table A of the RWQCB ESLs (2005).
16. DHS MCL refers to California Department of Health Services Maximum Contaminant Level.

FIGURES



Map Source: TOPO!© 2000 National Geographic Holdings

Note: Boundaries and Location Information is Approximate

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

Portion of the 7.5-Minute Series Oakland East, California
Quadrangle Topographic Map (Datum: NAD 27)
United States Department of the Interior
Geological Survey
1997

N

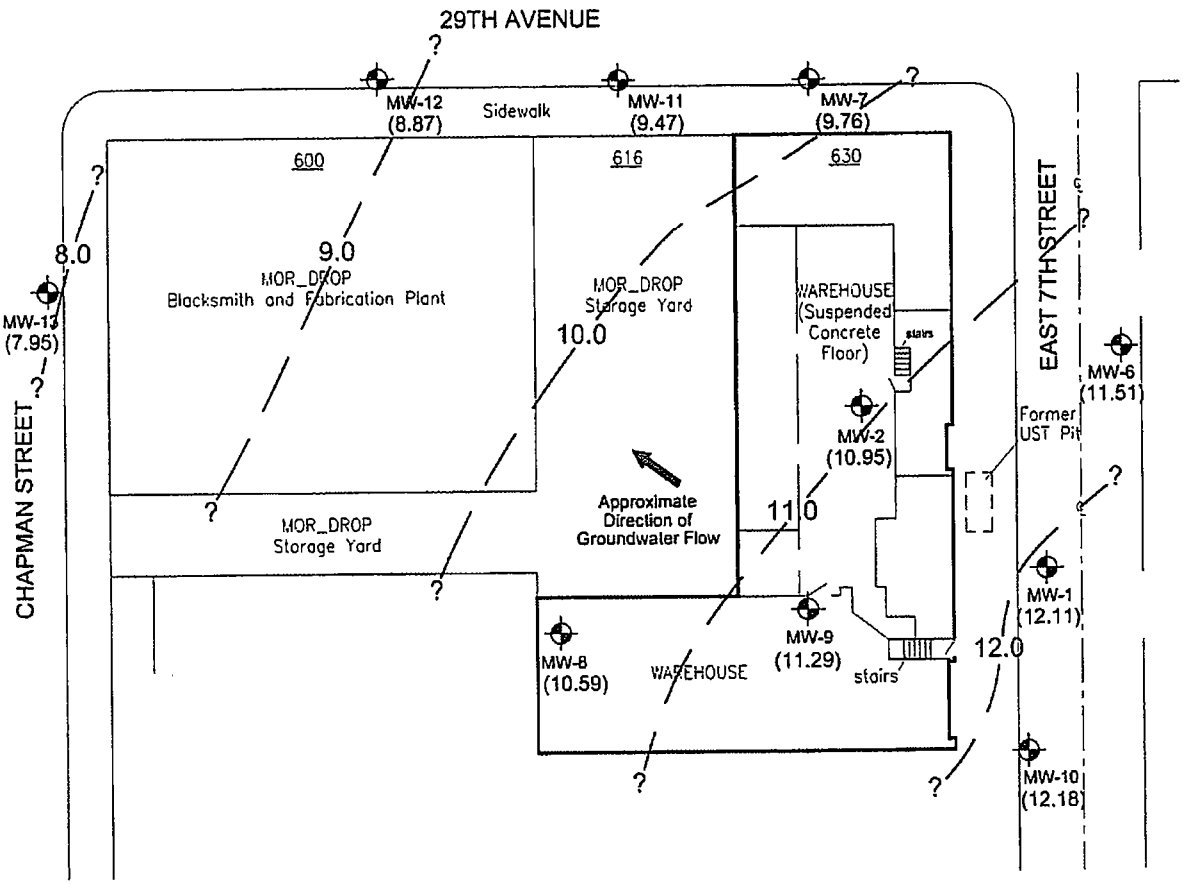
CALIF

QUADRANGLE LOCATION

PROPERTY LOCATION MAP
Former Lemoine Sausage Factory
630 29th Avenue
Oakland, California
Clayton Project No. 70-04578.00

Figure
1

BUREAU VERITAS



LEGEND:

MW-1 ⊕ Existing Monitoring Well Location

(12.11) Groundwater Elevation (ft msl), 06/15/06

10 Groundwater Surface Elevation Contour (ft msl)

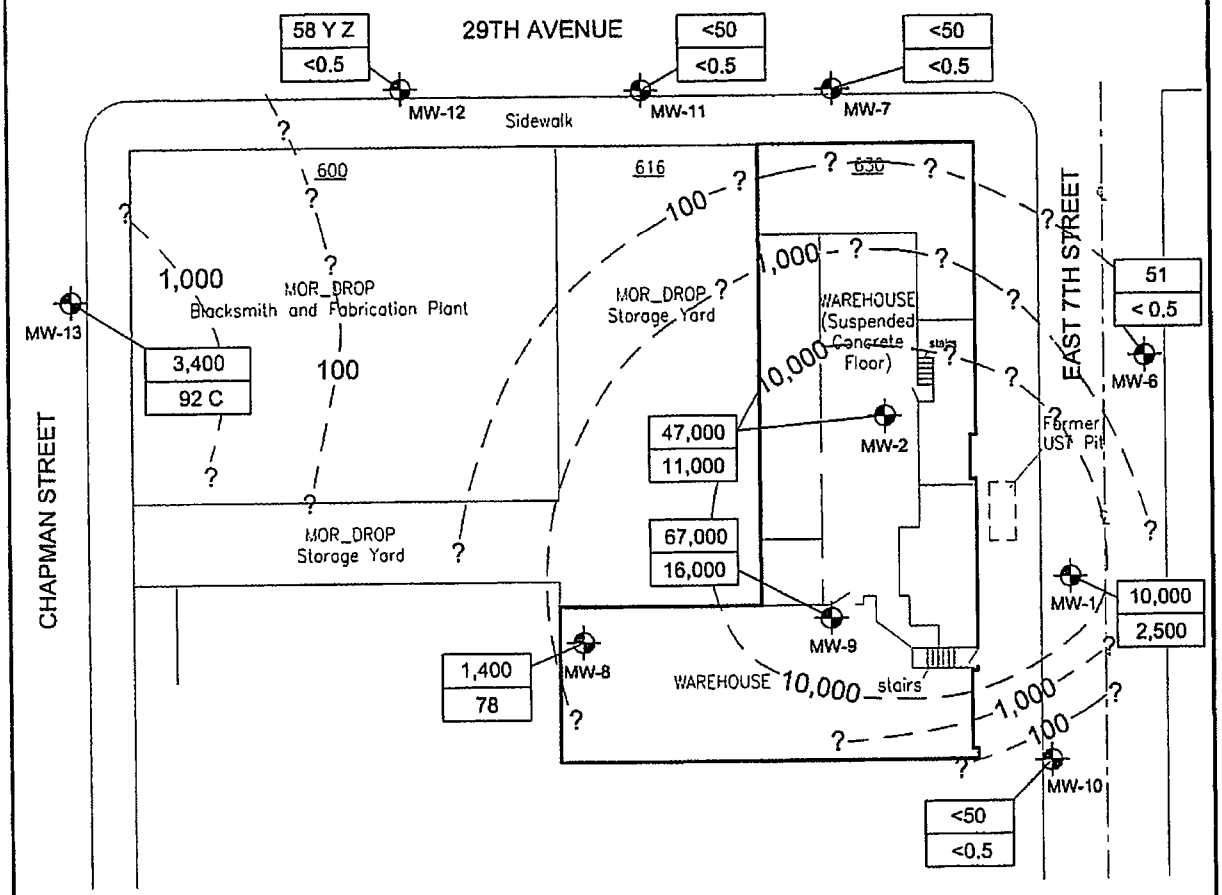
ft msl Feet Above Mean Sea Level

N

0 40

SCALE: feet

GROUNDWATER ELEVATION MAP, 2ND QUARTER 2006 FORMER LEMOINE SAUSAGE FACTORY 630 29TH AVENUE OAKLAND, CALIFORNIA Clayton Project No. 33104-004578.00	Figure **2** 06/29/06 SITE0606.DWG	BUREAU VERITAS



LEGEND:

MW-1 — Existing Monitoring Well Location

10,000 — TPH-g Concentration (ug/L), 06/15/06

2,500 — Benzene Concentration (ug/L), 06/15/06

100 — TPH-g Isoconcentration Contour (ug/L)

TPH-g — Total Petroleum Hydrocarbons as Gasoline

ug/L — micrograms per liter

N

0 40

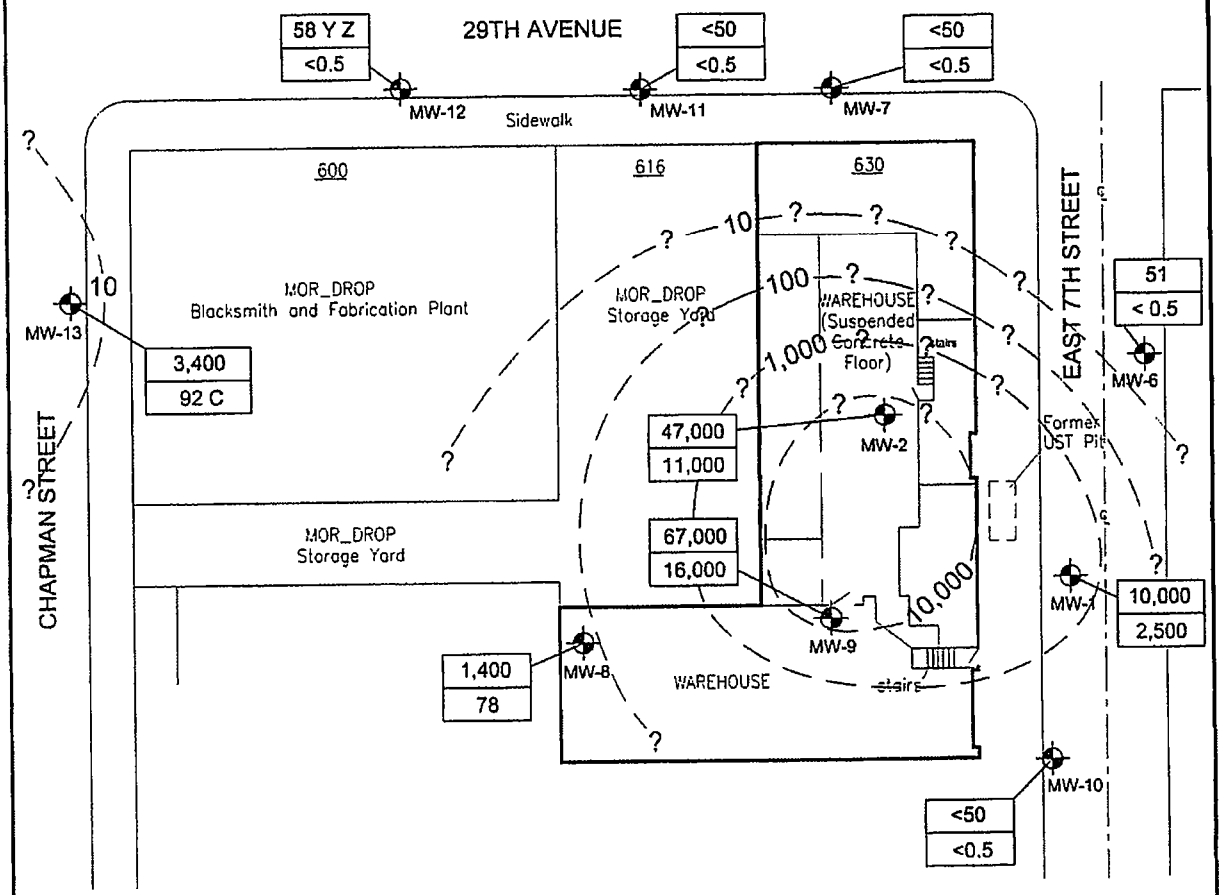
SCALE: feet

TPH-g CONCENTRATIONS IN GROUNDWATER, 2ND QUARTER 2006

FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA
Clayton Project No. 33104-004578.00

Figure
3
06/29/06
SITE0606.DWG

BUREAU VERITAS



LEGEND:

MW-1 — Existing Monitoring Well Location

10,000 — TPH-g Concentration (ug/L), 06/15/06

2,500 — Benzene Concentration (ug/L), 06/15/06

10 — Benzene Isoconcentration Contour (ug/L)

TPH-g — Total Petroleum Hydrocarbons as Gasoline

ug/L — micrograms per liter

N

0 40

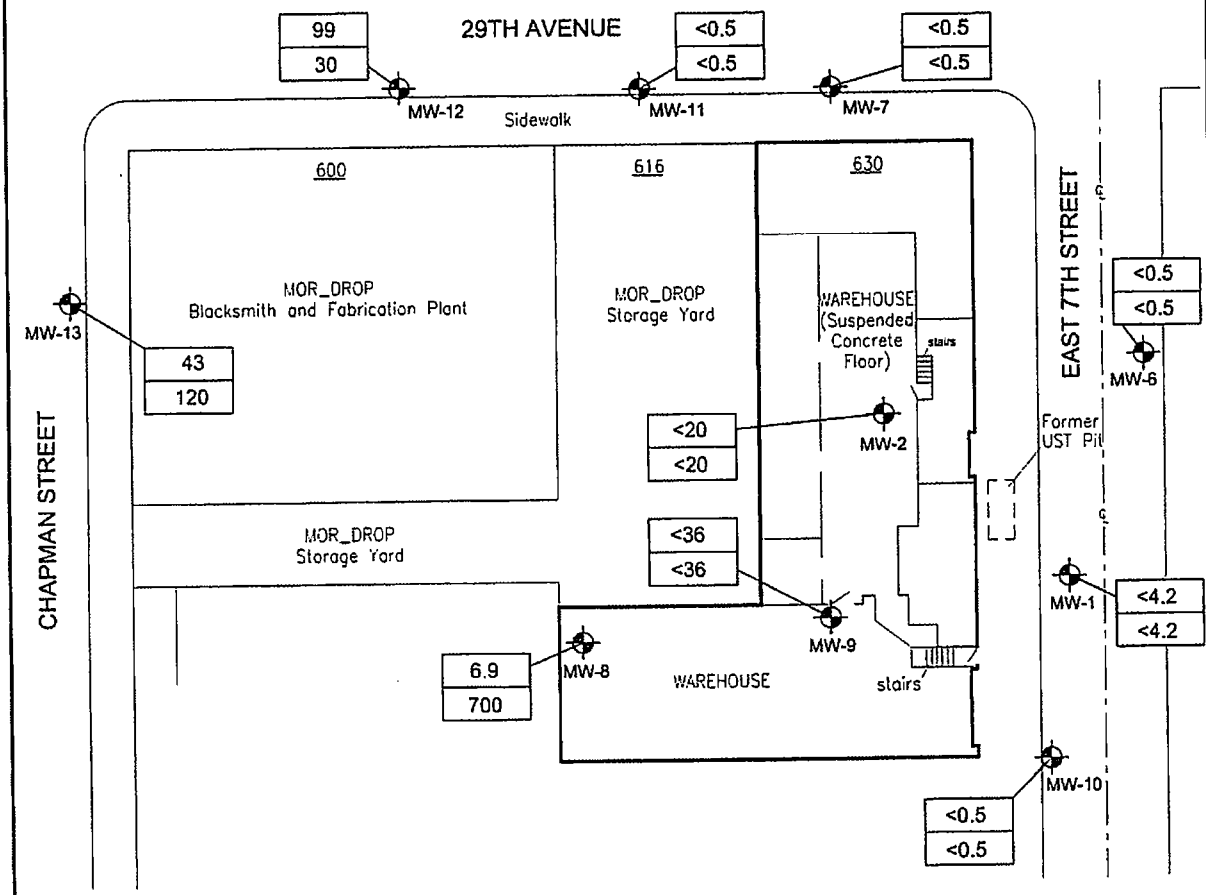
SCALE: feet

BENZENE CONCENTRATIONS IN GROUNDWATER, 2ND QUARTER 2006

FORMER LEMOINE SAUSAGE FACTORY
630 29TH AVENUE
OAKLAND, CALIFORNIA
Clayton Project No. 33104-004578.00

Figure
4
06/29/06
SITE0606.DWG

BUREAU VERITAS



LEGEND:

MW-1 ⊕ Existing Monitoring Well Location

6.9 — TCE Concentration (ug/L), 06/15/06

700 — cis 1,2-DCE Concentration (ug/L), 06/15/06

TCE Trichloroethene

cis 1,2-DCE cis 1,2-Dichloroethene

ug/L micrograms per liter

0 40

SCALE: feet

TCE AND cis-1,2-DCE CONCENTRATIONS IN GROUNDWATER, 2ND QUARTER 2006 FORMER LEMOINE SAUSAGE FACTORY 630 29TH AVENUE OAKLAND, CALIFORNIA Clayton Project No. 33104-004578.00	Figure **5** 06/29/06 SITE0606.DWG	BUREAU VERITAS

APPENDIX A

FIELD SAMPLING DATA SHEETS

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory	Job #:	70-04578.00
	630 29th Avenue	Date Purged:	6-15-06
	Oakland, California	Purge Method:	Peristaltic Pump
Sampling Location:	MW-1	Date & Time Sampled:	6-15-06 1220
Top of Casing Elevation:	16.69 (ft, msl)	Sampling Method:	Peristaltic Pump
Depth to Water:	4.58 (ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	12.11 (ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	7.69 (ft)	# of Containers:	6
Water Column Height:	4.42 (ft)	Sampling Personnel:	JVW
Well Casing Volume:	JVW 0.1810.0442 (WC* 0.01)	Weather Conditions:	Clear, Sunny, Warm
Casing Volumes Purged:	0		
Purge Rate:		Well Diameter:	3/4"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
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Field Notes: Very little GW within MW, ~~Purged~~ Purging not conducted

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory	Job #:	70-04578.00
	630 29th Avenue	Date Purged:	6-15-06
	Oakland, California	Purge Method:	Peristaltic Pump
Sampling Location:	MW-2	Date & Time Sampled:	6-15-06 1150
Top of Casing Elevation:	20.79 (ft, msl)	Sampling Method:	Peristaltic Pump
Depth to Water:	9.84 (ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	10.95 (ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	0.79 (ft)	# of Containers:	6
Water Column Height:	10.16 (ft)	Sampling Personnel:	JVW
Well Casing Volume:	0.1016 (WC* 0.01)	Weather Conditions:	Clear/Sunny/Warm
Casing Volumes Purged:	0		
Purge Rate:		Well Diameter:	3/4"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
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Field Notes: Very little water in well; Purging not conducted

BUREAU VERITAS

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory		Job #:	70-04578.00
	630 29th Avenue		Date Purged:	6-15-06
	Oakland, California		Purge Method:	Disposable Bailer
Sampling Location:	MW-6		Date & Time Sampled:	6-15-06 1355
Top of Casing Elevation:	16.60	(ft, msl)	Sampling Method:	Disposable Bailer
Depth to Water:	5.09	(ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	11.51	(ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	-3.40	(ft)	# of Containers:	6
Water Column Height:	14.91	(ft)	Sampling Personnel:	JVW
Well Casing Volume:	2.38	(WC* 0.16)	Weather Conditions:	Clear/Sunny/warm
Casing Volumes Purged:	10			
Purge Rate:			Well Diameter:	2"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
13:30	0	7.68	0.867	—	22.9	clear
13:34	2.5	7.42	0.945	—	22.1	clear
13:38	5.0	7.21	1.009	—	20.6	clear
13:44	7.5	7.22	1.016	—	20.5	clear
13:47	10.0	7.21	1.019	—	20.6	clear
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Field Notes: Petroleum odor

BUREAU VERITAS

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory	Job #:	70-04578.00
	630 29th Avenue	Date Purged:	6-15-06
	Oakland, California	Purge Method:	~~Disposable Bailer~~ Peristaltic Pump
Sampling Location:	MW-7	Date & Time Sampled:	6-15-06 1645
Top of Casing Elevation:	15.47 (ft, msl)	Sampling Method:	Disposable Bailer Peristaltic Pump
Depth to Water:	5.71 (ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	9.76 (ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	-4.53 (ft)	# of Containers:	6
Water Column Height:	14.29 (ft)	Sampling Personnel:	JVW
Well Casing Volume:	2.29 (WC* 0.16)	Weather Conditions:	Clear/sunny/warm
Casing Volumes Purged:	6		
Purge Rate:		Well Diameter:	2"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
~~13:20~~	~~0~~	~~7.51~~	~~0.591~~	—	~~22.1~~	~~Clear~~
~~13:24~~	~~2.5~~	~~7.32~~	~~0.649~~	—	~~20.4~~	~~clear~~
~~13:28~~	~~5.0~~	~~7.29~~	~~0.641~~	—	~~20.5~~	~~Clear~~
~~13:32~~	~~7.5~~	~~7.30~~	~~0.845~~	—	20.4	~~Clear~~
16:12	0	7.74	1,016	—	23.5	Clear
16:22	2	7.32	0.917	~	20.9	clear
16:32	4	7.33	0.924	~	21.0	clear
16:42	6.	7.34	0.925	~	21.0	Clear
:				~		
:				~		
:				~		
:						

Field Notes: ~~Strong Petroleum Odor, Waited 10 min for Recharge~~ No odor

Vehicle over well, used Peristaltic Pump

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory	Job #:	70-04578.00
	630 29th Avenue	Date Purged:	6-15-06
	Oakland, California	Purge Method:	Disposable Bailer
Sampling Location:	MW-8	Date & Time Sampled:	6-15-06 1115
Top of Casing Elevation:	17.58 (ft, msl)	Sampling Method:	Disposable Bailer
Depth to Water:	6.99 (ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	10.59 (ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	-2.42 (ft)	# of Containers:	6
Water Column Height:	13.01 (ft)	Sampling Personnel:	JVW
Well Casing Volume:	2.08 (WC* 0.16)	Weather Conditions:	Clear/Sunny/Warm
Casing Volumes Purged:	8		
Purge Rate:		Well Diameter:	2"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
10:35	0	8.11	1.167	—	16.8	Clear
10:38	2	7.72	1.102	—	16.4	Clear
10:42	4	7.495	1.087	—	16.3	Clear
10:46	6	7.38	1.031	—	16.3	Clear
10:50	8	7.42	1.035	—	16.4	Clear w/some sediment
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Field Notes: Petroleum odor (Strong)
Well almost purged Dry, Moving to MW-9 + wait for recharge + Sampling

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory	Job #:	70-04578.00
	630 29th Avenue	Date Purged:	6-15-06
	Oakland, California	Purge Method:	Disposable Bailer
Sampling Location:	**MW-12**	Date & Time Sampled:	6-15-06 1515
Top of Casing Elevation:	14.05 (ft, msl)	Sampling Method:	Disposable Bailer
Depth to Water:	5.18 (ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	8.87 (ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	-0.95 (ft)	# of Containers:	6
Water Column Height:	9.82 (ft)	Sampling Personnel:	JVW
Well Casing Volume:	1.57 (WC* 0.16)	Weather Conditions:	clear/sunny/warm/windy
Casing Volumes Purged:	4.5		
Purge Rate:		Well Diameter:	2"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
15:02	0	7.74	1.157	—	21.7	Clear
15:04	1.5	7.64	1.~~108~~ 103	—	20.5	clear
15:09	3.0	7.63	1.101	—	20.4	Clear
15:11	4.5	7.62	1.103	—	20.5	Clear
:				—		
:				—		
:				—		
:						
:						
:						
:						
:						

Field Notes: No odor

BUREAU VERITAS

FIELD SAMPLING DATA SHEET

Job Location:	Former Lemoine Sausage Factory	Job #:	70-04578.00
	630 29th Avenue	Date Purged:	6-15-06
	Oakland, California	Purge Method:	Disposable Bailer
Sampling Location:	MW-13	Date & Time Sampled:	6-15-06 1445
Top of Casing Elevation:	13.39 (ft, msl)	Sampling Method:	Disposable Bailer
Depth to Water:	5.44 (ft)	Lab Analysis:	TPH-g/BTEX/VOCs
Groundwater Elevation:	7.95 (ft)	Preservatives:	Ice/HCL
Well Bottom Depth:	-1.61 (ft)	# of Containers:	6
Water Column Height:	9.56 (ft)	Sampling Personnel:	JVW
Well Casing Volume:	1.53 (WC* 0.16)	Weather Conditions:	Clear/sunny/warm
Casing Volumes Purged:	4.5		
Purge Rate:		Well Diameter:	2"

Time	Volume Removed (gal)	pH	Specific Conductivity (µmhos/cm)	Redox Potential (mVolts)	Temperature (°F or °C)	Turbidity (Visual)
13:20	0	7.51	0.891	—	22.1	clear
13:24	1.5	7.32	0.849	—	20.4	clear
13:28	3.0	7.29	0.844	—	20.5	clear
13:32	4.5	7.30	0.845	—	20.4	clear
:				—		
:				—		
:						
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:						
:						

Field Notes: No Odor

APPENDIX B

CHAIN-OF-CUSTODY DOCUMENTATION AND CERTIFIED ANALYTICAL REPORTS

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Clayton Group Services
6920 Koll Center Parkway
Suite 216
Pleasanton, CA 94566

Date: 30-JUN-06
Lab Job Number: 187475
Project ID: 70-04578.00
Location: Sausage Factory

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signatures. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis.

Reviewed by: _____
Project Manager

Reviewed by: _____
Operations Manager

This package may be reproduced only in its entirety.

Curtis & Tompkins, Ltd.

CASE NARRATIVE

Laboratory number:	187475
Client:	Clayton Group Services
Project:	70-04578.00
Location:	Sausage Factory
Request Date:	06/16/06
Samples Received:	06/15/06

This hardcopy data package contains sample and QC results for ten water samples, requested for the above referenced project on 06/16/06. The samples were received cold and intact.

TPH-Purgeables and/or BTXE by GC (EPA 8015B and EPA 8021B):
High surrogate recovery was observed for bromofluorobenzene (FID) in MW-13 (lab # 187475-010); the corresponding trifluorotoluene (FID) surrogate recovery was within limits. No other analytical problems were encountered.

Volatile Organics by GC/MS (EPA 8260B):
No analytical problems were encountered.

187175

CHAIN OF CUSTODY

Lab: Curtis&Tompkins

TAT: Standard

Report results to:

Name	Jeremy Wilson
Company	Clayton Group Services
Mailing Address	6920 Koll Center Parkway, Ste. 216
City, State, Zip	Pleasanton, California 94566
Telephone No.	(925) 426-2600
Fax No.	(925) 426-0106
E-mail:	jeremy.wilson@us.bureauveritas.com

Project Information

Project No.	70-04578.00
Name	Sausage Factory
Location	630 29th Avenue, Oakland
Global_Id	T0600102114
Log_code	CGSP

Special Instructions and/or specific regulatory requirements:

	Sample Identification	Sample Date	Sample Time	Matrix/ Media	No. of Containers	Analyses Requested: 8021B for TPH-g/BTEX	Analyses Requested: 8260B for HVOCs	Sample Condition/Comments	Preservative
-1	MW-01	6-15-06	1220	Water	6	X	X		HCl
-2	MW-02		1150		6	X	X		HCl
-3	MW-06		1355		6	X	X		HCl
-4	MW-07		MS 1645		6	X	X		HCl
-5	MW-08	MS	0835		6	X	X		HCl
-6	MW-09		1235		6	X	X		HCl
-7	MW-10		1300		6	X	X		HCl
-8	MW-11		1542		6	X	X		HCl
-9	MW-12		1515		6	X	X		HCl
10	MW-13		1445		6	X	X		HCl

Collected by: Jeremy Wilson **Date/Time** 6-15-06 **Collector's Signature:** **Date/Time** 6-15-06

Relinquished by: **Date/Time** 6-15-06 1738 **Received by:** Lavanna **Date/Time** 6-15-06 5:35 pm

Relinquished by: **Date/Time** **Received by:** **Date/Time**

Method of Shipment: **Sample Condition on Rcpt:** REC'D ON ICE; intact

Electronic Submittal Information

Main Menu | View/Add Facilities | Upload EDD | Check EDD

SUCCESSFUL EDF CHECK - NO ERRORS

ORGANIZATION NAME:	Curtis & Tompkins, Ltd.
USER NAME:	CTBERK
DATE CHECKED:	6/30/2006 2:10:38 PM
GLOBAL ID:	NOT SELECTED
FILE UPLOADED:	187475_edf.zip

No errors were found in your EDF upload file.

If you want to submit this file to the SWRCB, choose the "Upload EDD" option in the above menu and follow the instructions.

When you complete the submittal process, you will be given a confirmation number for your submittal.

Because you have not chosen a facility, field point names have not been checked.

Logged in as CTBERK (LABORATORY) CONTACT SITE ADMINISTRATOR.

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00		
Matrix:	Water	Sampled:	06/15/06
Units:	ug/L	Received:	06/15/06
Batch#:	114487		

Field ID:	MW-01	Diln Fac:	20.00
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-001		

Analyte	Result	RL	Analysis
Gasoline C7-C12	10,000	1,000	EPA 8015B
Benzene	2,500	10	EPA 8021B
Toluene	200	10	EPA 8021B
Ethylbenzene	440	10	EPA 8021B
m,p-Xylenes	400	10	EPA 8021B
o-Xylene	170	10	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	111	69-137	EPA 8015B
Bromofluorobenzene (FID)	98	80-133	EPA 8015B
Trifluorotoluene (PID)	118	64-132	EPA 8021B
Bromofluorobenzene (PID)	113	80-120	EPA 8021B

Field ID:	MW-02	Diln Fac:	500.0
Type:	SAMPLE	Analyzed:	06/17/06
Lab ID:	187475-002		

Analyte	Result	RL	Analysis
Gasoline C7-C12	47,000	25,000	EPA 8015B
Benzene	11,000	250	EPA 8021B
Toluene	800	250	EPA 8021B
Ethylbenzene	1,200	250	EPA 8021B
m,p-Xylenes	1,800	250	EPA 8021B
o-Xylene	430	250	EPA 8021B

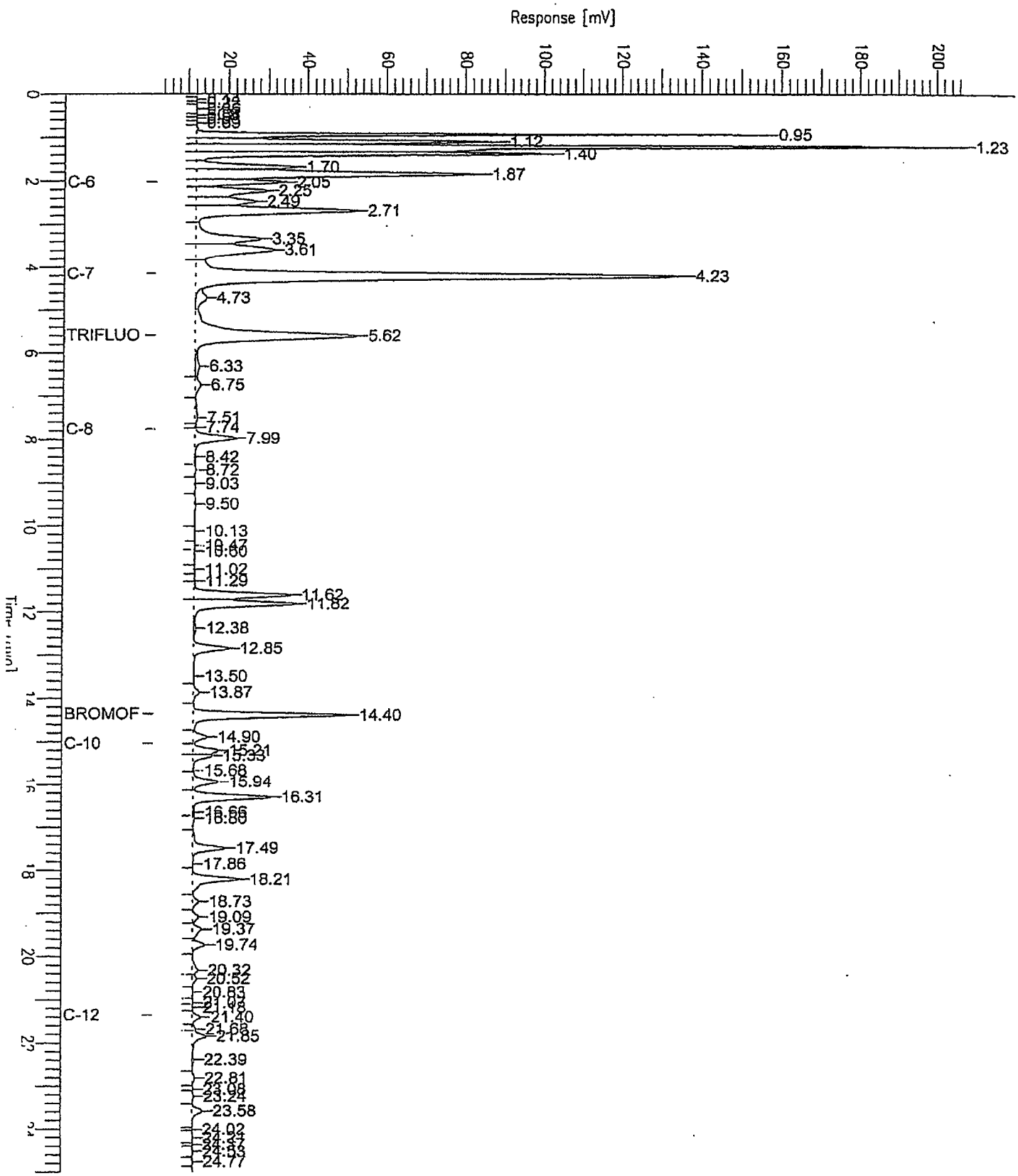
Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	94	69-137	EPA 8015B
Bromofluorobenzene (FID)	100	80-133	EPA 8015B
Trifluorotoluene (PID)	103	64-132	EPA 8021B
Bromofluorobenzene (PID)	109	80-120	EPA 8021B

= Value outside of QC limits; see narrative
C= Presence confirmed, but RPD between columns exceeds 40%
V= Sample exhibits chromatographic pattern which does not resemble standard
= Sample exhibits unknown single peak or peaks
)= Not Detected
RL= Reporting Limit

Chromatogram

: mple Name : 187475-001,114487,btxe+tvh
: :eName : G:\GC05\DATA\167G009.raw
:..hod : TVHBTXB
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset:.2 mV

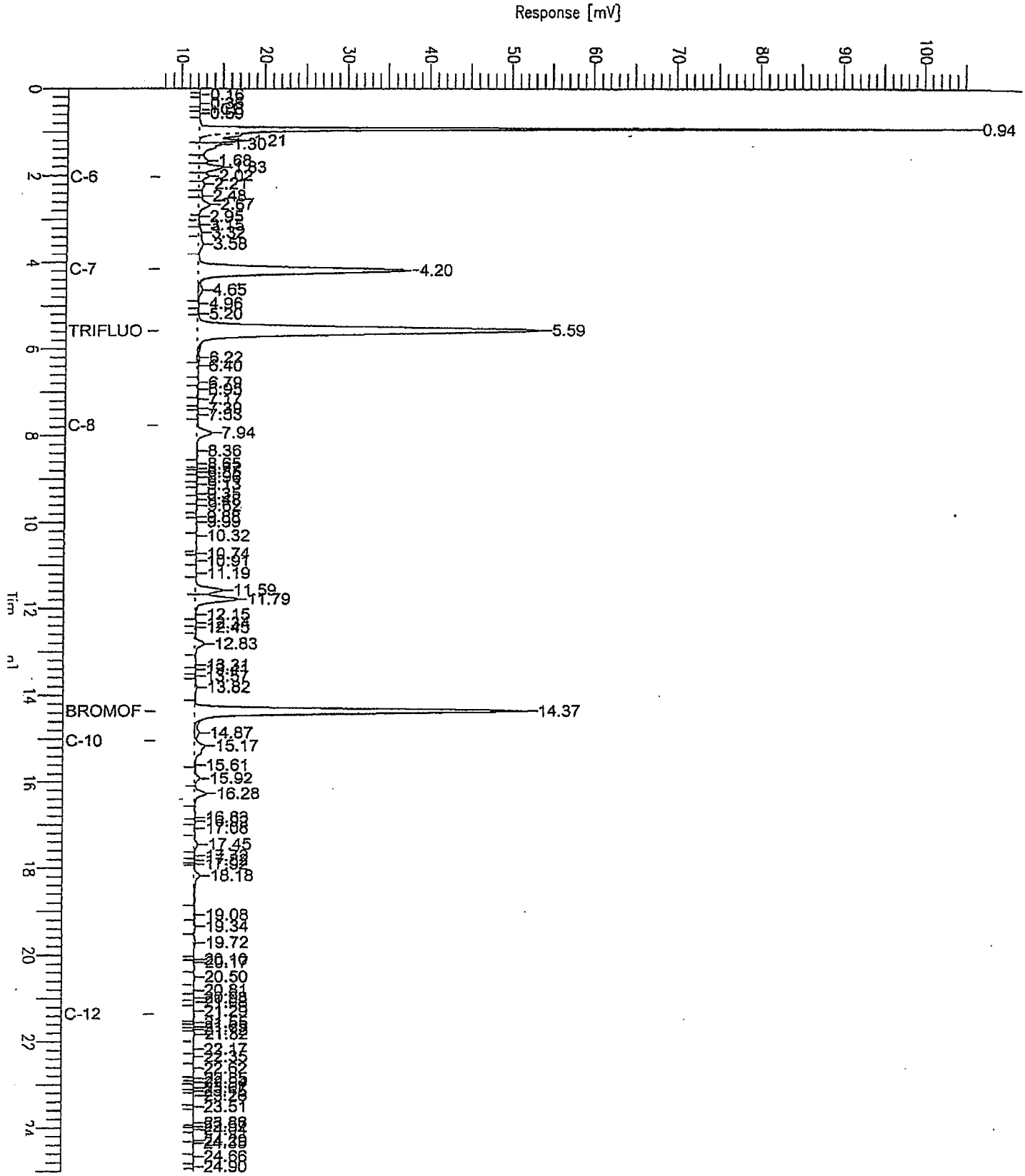
Sample #: bl.3 Page 1 of 1
Date : 6/16/06 04:44 PM
Time of Injection: 6/16/06 04:19 PM
Low Point : 2.09 mV High Point : 207.26 mV
Plot Scale: 205.2 mV



Chromatogram

mple Name : 187475-002,114487,btxe+tvh
leName : G:\GC05\DATA\167G033.raw
:thod : TVHBTXE
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset: 7 mV

Sample #: c1.3 Page 1 of 1
Date : 6/17/06 06:12 AM
Time of Injection: 6/17/06 05:46 AM
Low Point : 7.46 mV High Point : 105.82 mV
Plot Scale: 98.4 mV



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00		
Matrix:	Water	Sampled:	06/15/06
Units:	ug/L	Received:	06/15/06
Batch#:	114487		

Field ID:	MW-06	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-003		

Analyte	Result	RL	Analysis
Gasoline C7-C12	51	50	EPA 8015B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	93	69-137	EPA 8015B
Bromofluorobenzene (FID)	102	80-133	EPA 8015B
Trifluorotoluene (PID)	97	64-132	EPA 8021B
Bromofluorobenzene (PID)	112	80-120	EPA 8021B

Field ID:	MW-07	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-004		

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	EPA 8015B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	0.62	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

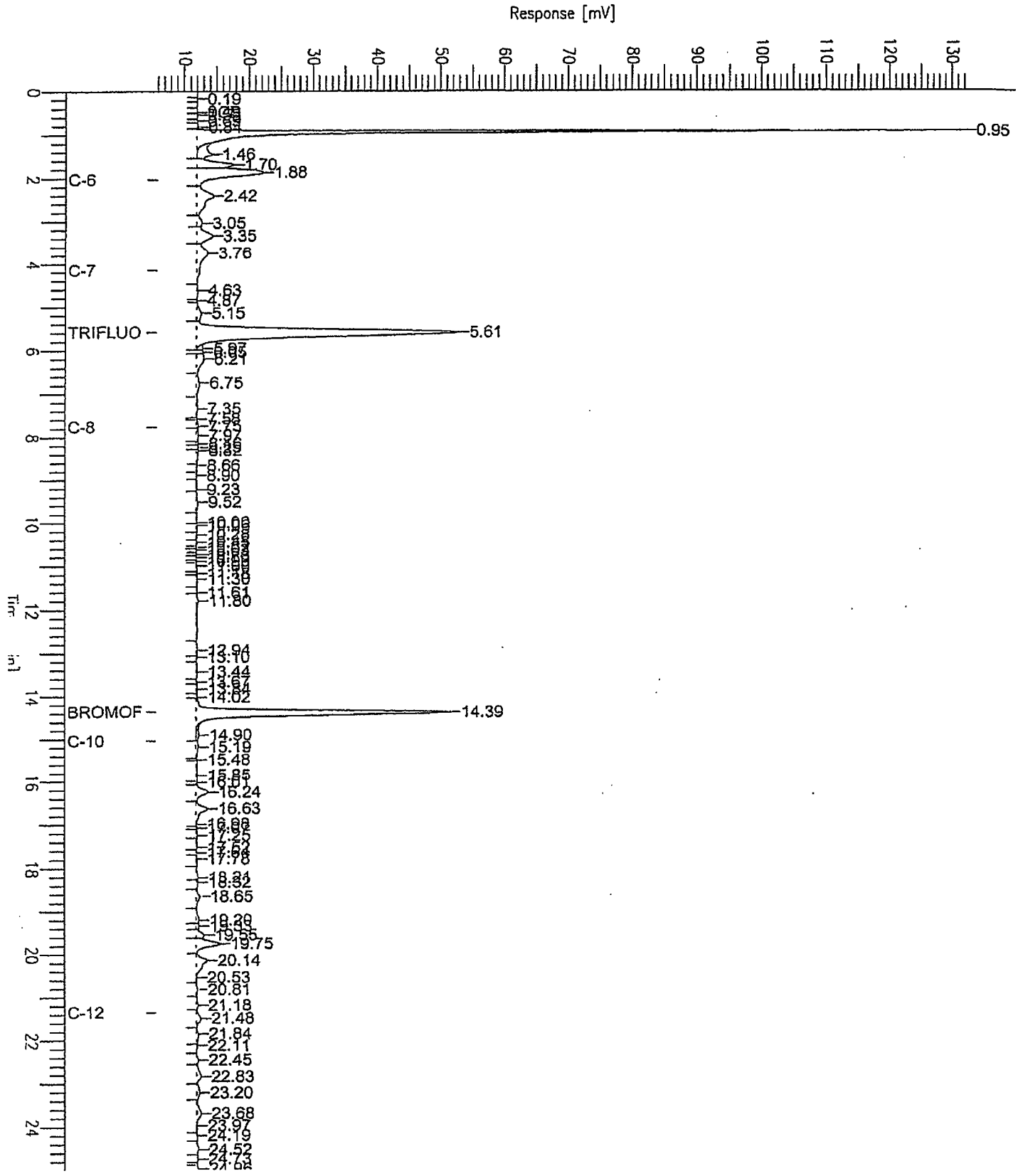
Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	96	69-137	EPA 8015B
Bromofluorobenzene (FID)	103	80-133	EPA 8015B
Trifluorotoluene (PID)	99	64-132	EPA 8021B
Bromofluorobenzene (PID)	112	80-120	EPA 8021B

= Value outside of QC limits; see narrative
C= Presence confirmed, but RPD between columns exceeds 40%
Y= Sample exhibits chromatographic pattern which does not resemble standard
= Sample exhibits unknown single peak or peaks
ND = Not Detected
RL= Reporting Limit

Chromatogram

mple Name : 187475-003,114487,btxe+tvh
ileName : G:\GC05\DATA\167G017.raw
ethod : TVHBTXE
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset: 6 mV

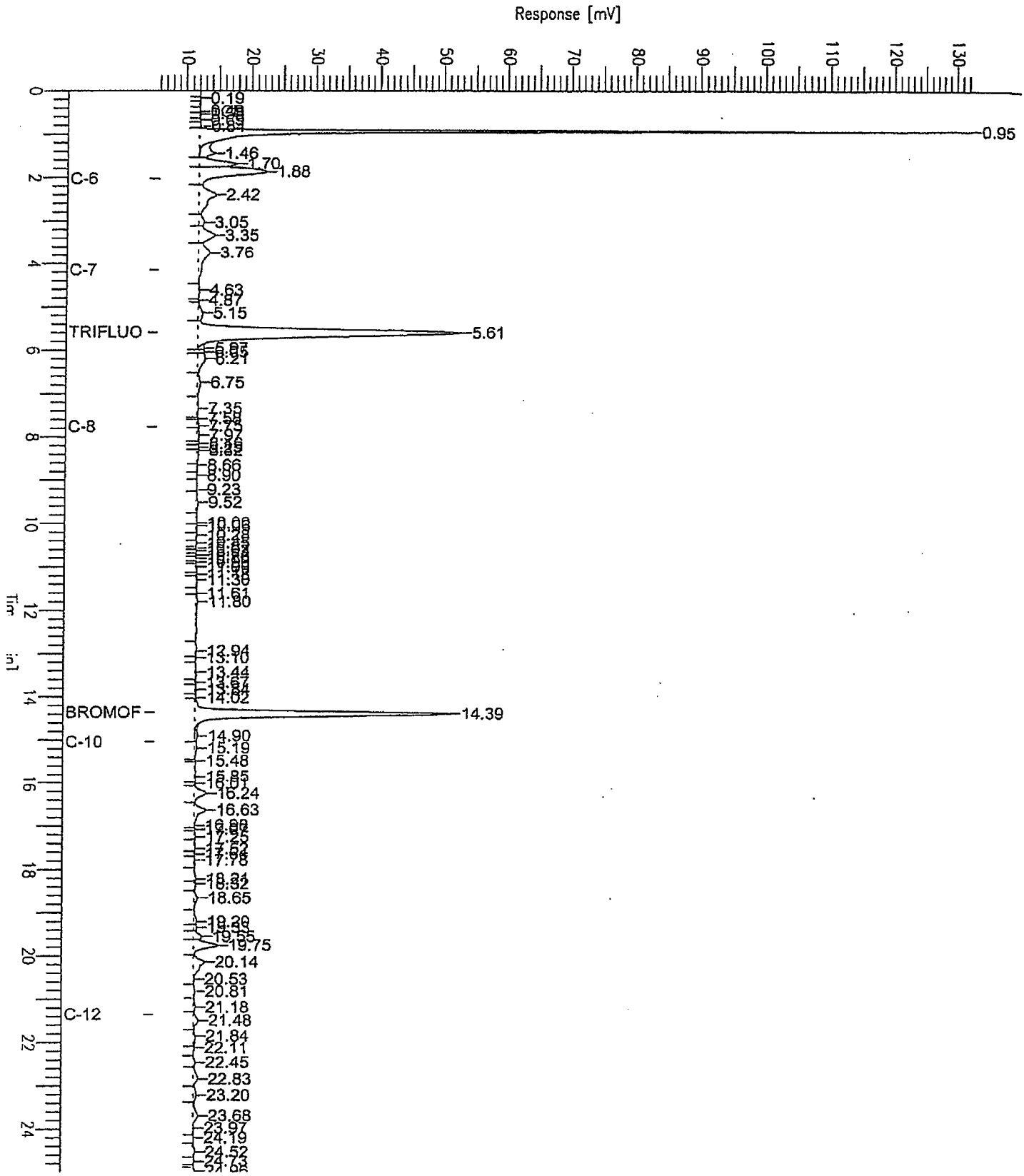
Sample #: b1.3 Page 1 of 1
Date : 6/16/06 09:31 PM
Time of Injection: 6/16/06 09:05 PM
Low Point : 5.90 mV High Point : 132.28 mV
Plot Scale: 126.4 mV



Chromatogram

ımple Name : 187475-003,114487,btxe+tvh
ileName : G:\GC05\DATA\167G017.raw
ısthod : TVHBTXE
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset: 6 mV

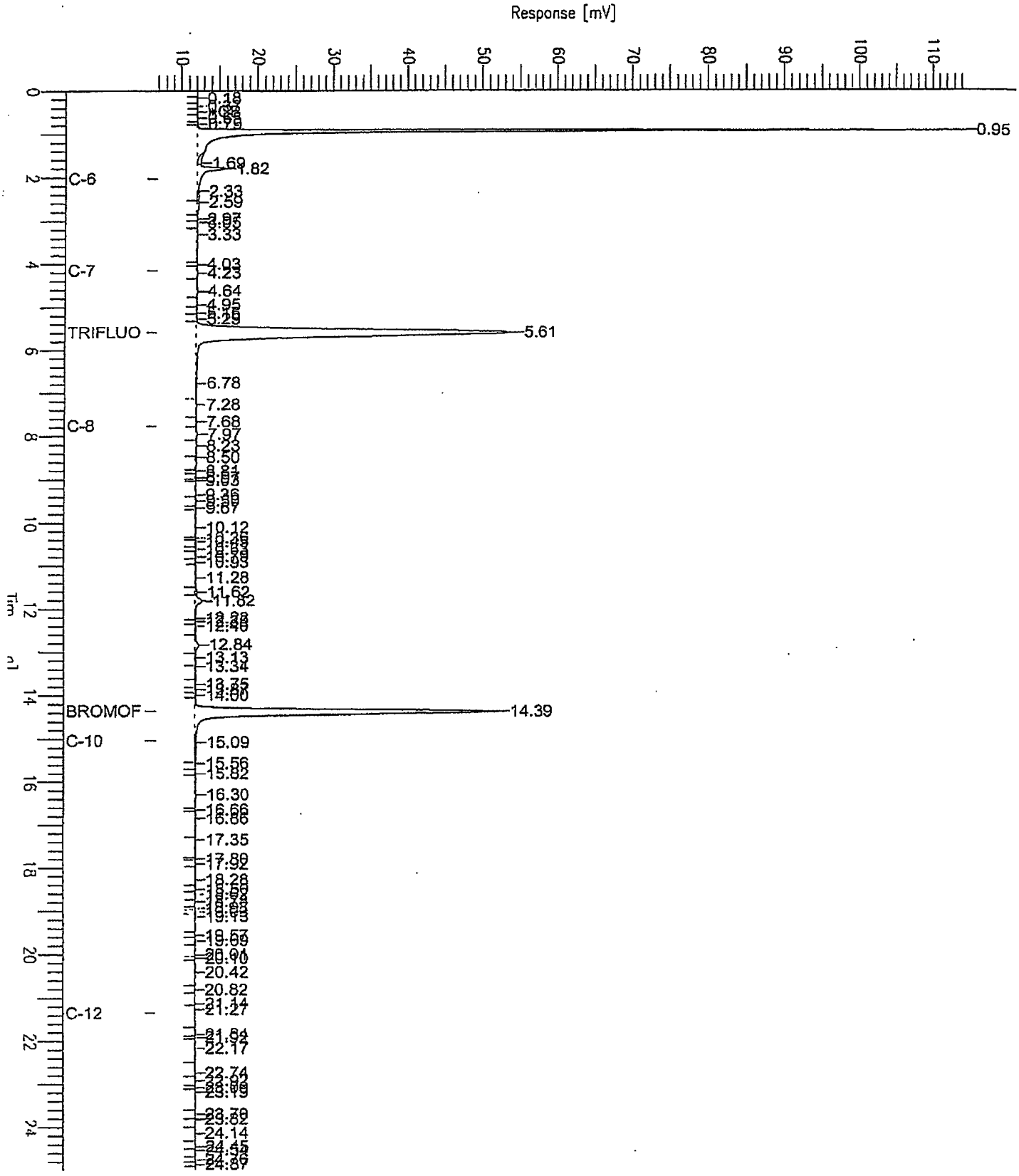
Sample #: b1.3 Page 1 of 1
Date : 6/16/06 09:31 PM
Time of Injection: 6/16/06 09:05 PM
Low Point : 5.90 mV High Point : 132.28 mV
Plot Scale: 126.4 mV



Chromatogram

imple Name : 187475-004,114487,btxe+tvh
ileName : G:\GC05\DATA\167G018.raw
ethod : TVHBTXE
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset: 7 mV

Sample #: b7.0 Page 1 of 1
Date : 6/16/06 10:03 PM
Time of Injection: 6/16/06 09:37 PM
Low Point : 6.82 mV High Point : 114.60 mV
Plot Scale: 107.8 mV



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00		
Matrix:	Water	Sampled:	06/15/06
Units:	ug/L	Received:	06/15/06
Batch#:	114487		

Field ID:	MW-08	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-005		

Analyte	Result	RL	Analysis
Gasoline C7-C12	1,400	50	EPA 8015B
Benzene	78	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	21	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	88	69-137	EPA 8015B
Bromofluorobenzene (FID)	104	80-133	EPA 8015B
Trifluorotoluene (PID)	130	64-132	EPA 8021B
Bromofluorobenzene (PID)	110	80-120	EPA 8021B

Field ID:	MW-09	Diln Fac:	50.00
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-006		

Analyte	Result	RL	Analysis
Gasoline C7-C12	67,000	2,500	EPA 8015B
Benzene	16,000	25	EPA 8021B
Toluene	5,000	25	EPA 8021B
Ethylbenzene	1,900	25	EPA 8021B
m,p-Xylenes	4,800	25	EPA 8021B
o-Xylene	990	25	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	111	69-137	EPA 8015B
Bromofluorobenzene (FID)	102	80-133	EPA 8015B
Trifluorotoluene (PID)	119	64-132	EPA 8021B
Bromofluorobenzene (PID)	114	80-120	EPA 8021B

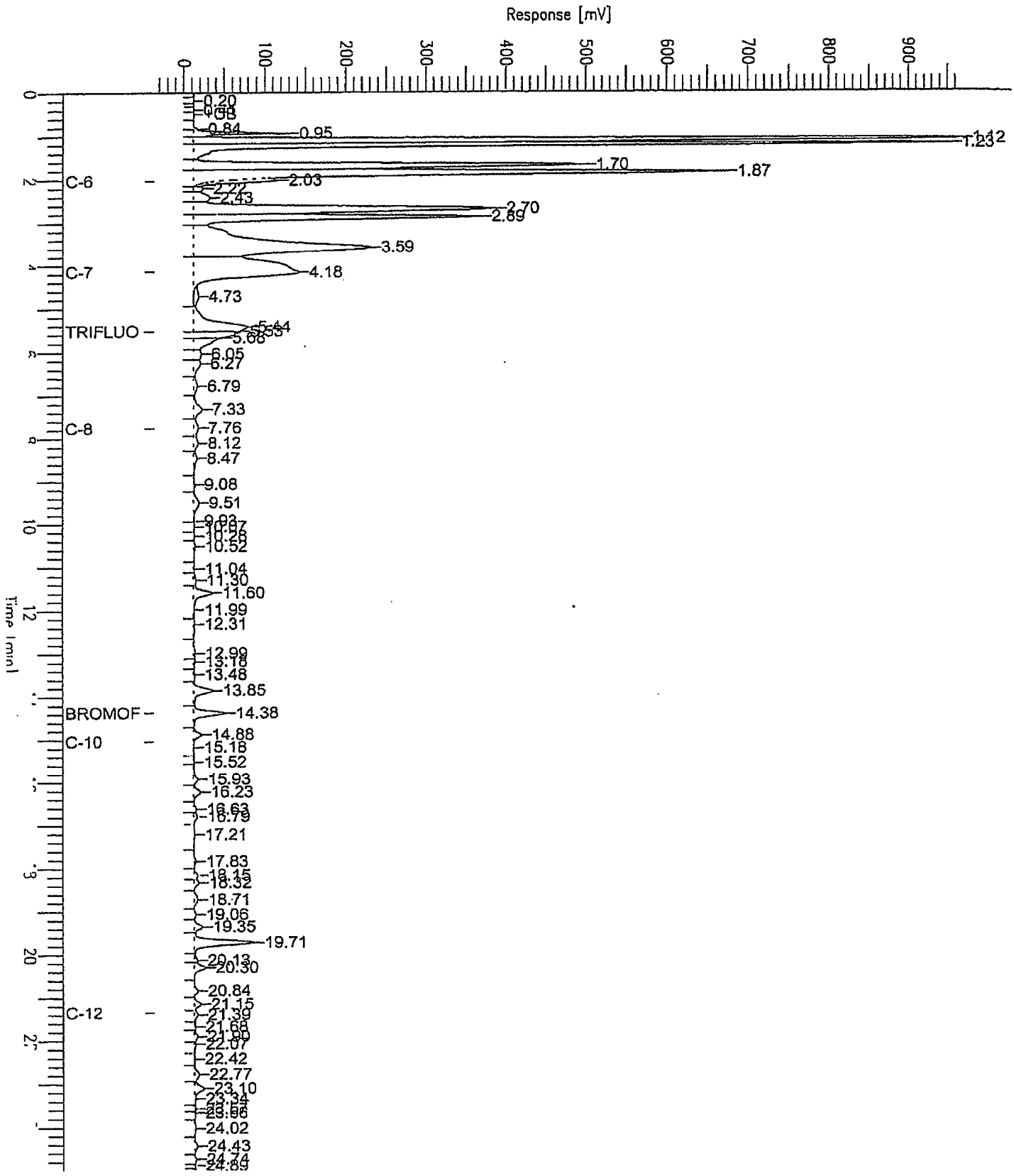
* : Value outside of QC limits; see narrative
C= Presence confirmed, but RPD between columns exceeds 40%
Y= Sample exhibits chromatographic pattern which does not resemble standard
J : Sample exhibits unknown single peak or peaks
ND = Not Detected
RL= Reporting Limit

5.0

Chromatogram

ple Name : 187475-005,114487,btxe+tvh
eName : G:\GC05\DATA\167G019.raw
hod : TVHBTXE
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset: -36 mV

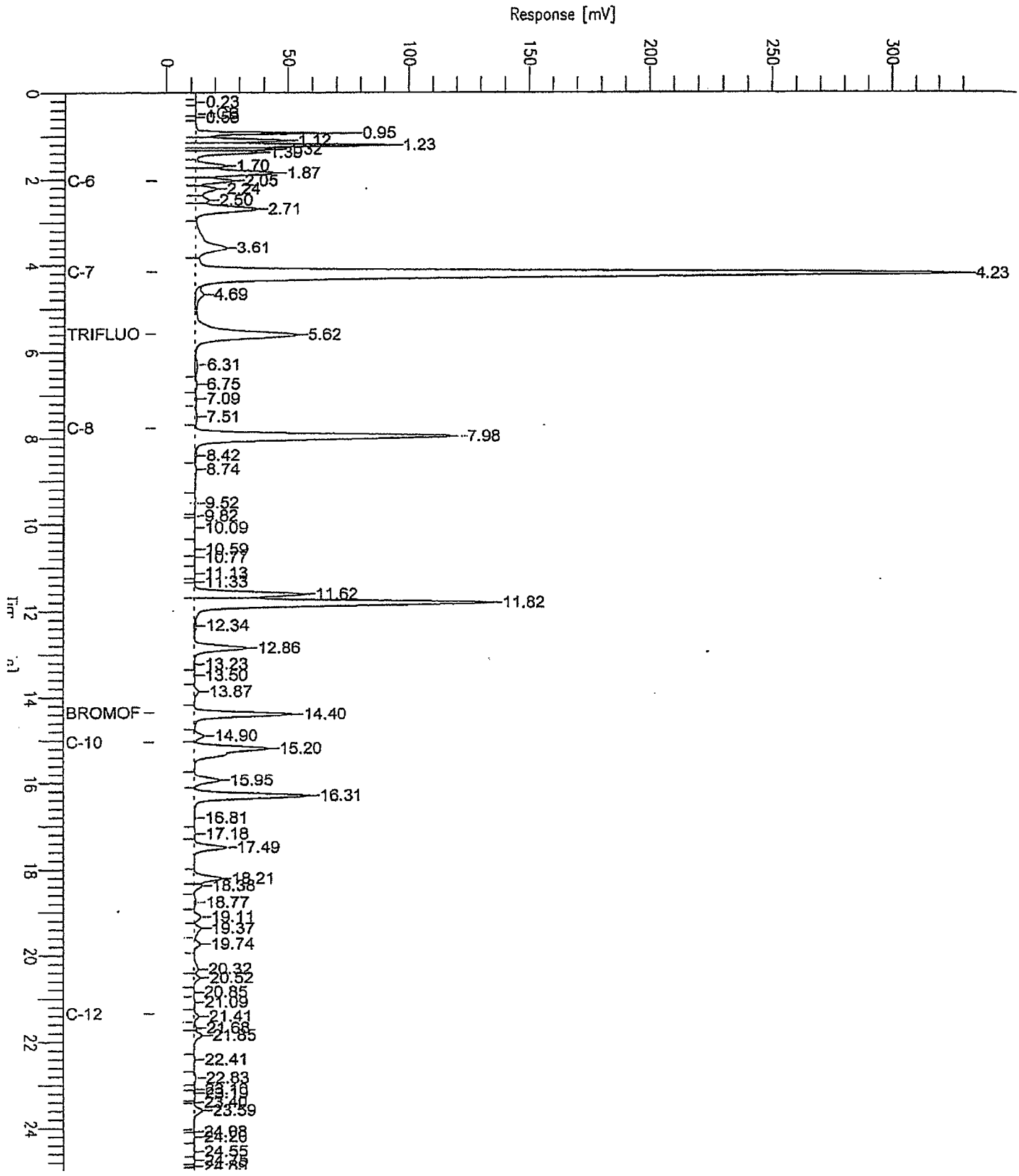
Sample #: b7.0 Page 1 of 1
Date : 6/16/06 11:56 PM
Time of Injection: 6/16/06 10:10 PM
Low Point : -35.88 mV High Point : 969.29 mV
Plot Scale: 1005.2 mV



Chromatogram

ımple Name : 187475-006,114487,btxe+tvh
ıleName : G:\GC05\DATA\167G020.raw
ıethod : TVHBTXE
Start Time : 0.00 min End Time : 25.00 min
Scale Factor: 1.0 Plot Offset: -4 mV

Sample #: b1.6 Page 1 of 1
Date : 6/16/06 11:07 PM
Time of Injection: 6/16/06 10:42 PM
Low Point : -3.96 mV High Point : 331.57 mV
Plot Scale: 335.5 mV



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00		
Matrix:	Water	Sampled:	06/15/06
Units:	ug/L	Received:	06/15/06
Batch#:	114487		

Field ID:	MW-10	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-007		

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	EPA 8015B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	90	69-137	EPA 8015B
Bromofluorobenzene (FID)	100	80-133	EPA 8015B
Trifluorotoluene (PID)	95	64-132	EPA 8021B
Bromofluorobenzene (PID)	111	80-120	EPA 8021B

Field ID:	MW-11	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	06/16/06
Lab ID:	187475-008		

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	EPA 8015B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	92	69-137	EPA 8015B
Bromofluorobenzene (FID)	100	80-133	EPA 8015B
Trifluorotoluene (PID)	97	64-132	EPA 8021B
Bromofluorobenzene (PID)	110	80-120	EPA 8021B

*= Value outside of QC limits; see narrative
C= Presence confirmed, but RPD between columns exceeds 40%
Y= Sample exhibits chromatographic pattern which does not resemble standard
J= Sample exhibits unknown single peak or peaks
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-06	Batch#:	114631
Lab ID:	187475-003	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/22/06
Diln Fac:	1.000		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	0.5	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	107	80-130
Toluene-d8	105	80-120
Bromofluorobenzene	108	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-07	Batch#:	114631
Lab ID:	187475-004	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/22/06
Dil'n Fac:	1.000		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	106	80-130
Toluene-d8	105	80-120
Bromofluorobenzene	104	80-122

ND = Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-08	Batch#:	114672
Lab ID:	187475-005	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/23/06
Dil'n Fac:	10.00		

Analyte	Result	RL
Chloromethane	ND	10
Vinyl Chloride	41	5.0
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	10
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	200
trans-1,2-Dichloroethene	28	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	700	5.0
Chloroform	ND	10
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	6.9	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	103	80-130
Toluene-d8	103	80-120
Bromofluorobenzene	101	80-122

ND = Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-09	Batch#:	114631
Lab ID:	187475-006	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/22/06
Dil'n Fac:	71.43		

Analyte	Result	RL
Chloromethane	ND	71
Vinyl Chloride	ND	36
Bromomethane	ND	71
Chloroethane	ND	71
Trichlorofluoromethane	ND	71
Freon 113	ND	36
1,1-Dichloroethene	ND	36
Methylene Chloride	ND	1,400
trans-1,2-Dichloroethene	ND	36
1,1-Dichloroethane	ND	36
cis-1,2-Dichloroethene	ND	36
Chloroform	ND	71
1,1,1-Trichloroethane	ND	36
Carbon Tetrachloride	ND	36
1,2-Dichloroethane	ND	36
Trichloroethene	ND	36
1,2-Dichloropropane	ND	36
Bromodichloromethane	ND	36
cis-1,3-Dichloropropene	ND	36
trans-1,3-Dichloropropene	ND	36
1,1,2-Trichloroethane	ND	36
Tetrachloroethene	ND	36
Dibromochloromethane	ND	36
Chlorobenzene	ND	36
Bromoform	ND	36
1,1,2,2-Tetrachloroethane	ND	36
1,3-Dichlorobenzene	ND	36
1,4-Dichlorobenzene	ND	36
1,2-Dichlorobenzene	ND	36

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	101	80-130
Toluene-d8	106	80-120
Bromofluorobenzene	103	80-122

ND = Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-10	Batch#:	114631
Lab ID:	187475-007	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/22/06
Dil'n Fac:	1.000		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	109	80-130
Toluene-d8	106	80-120
Bromofluorobenzene	106	80-122

ND = Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-11	Batch#:	114631
Lab ID:	187475-008	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/22/06
Dil'n Fac:	1.000		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	112	80-130
Toluene-d8	108	80-120
Bromofluorobenzene	105	80-122

ND = Not Detected
RL= Reporting Limit

16.0

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-12	Units:	ug/L
Lab ID:	187475-009	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06

Analyte	Result	RL	Dil Fac	Batch#	Analyzed
Chloromethane	ND	1.0	1.000	114686	06/24/06
Vinyl Chloride	ND	0.5	1.000	114686	06/24/06
Bromomethane	ND	1.0	1.000	114686	06/24/06
Chloroethane	ND	1.0	1.000	114686	06/24/06
Trichlorofluoromethane	ND	1.0	1.000	114686	06/24/06
Freon 113	ND	0.5	1.000	114686	06/24/06
1,1-Dichloroethene	ND	0.5	1.000	114686	06/24/06
Methylene Chloride	ND	20	1.000	114686	06/24/06
trans-1,2-Dichloroethene	38	0.5	1.000	114686	06/24/06
1,1-Dichloroethane	ND	0.5	1.000	114686	06/24/06
cis-1,2-Dichloroethene	30	0.5	1.000	114686	06/24/06
Chloroform	ND	1.0	1.000	114686	06/24/06
1,1,1-Trichloroethane	ND	0.5	1.000	114686	06/24/06
Carbon Tetrachloride	ND	0.5	1.000	114686	06/24/06
1,2-Dichloroethane	ND	0.5	1.000	114686	06/24/06
Trichloroethene	99	1.0	2.000	114645	06/22/06
1,2-Dichloropropane	ND	0.5	1.000	114686	06/24/06
Bromodichloromethane	ND	0.5	1.000	114686	06/24/06
cis-1,3-Dichloropropene	ND	0.5	1.000	114686	06/24/06
trans-1,3-Dichloropropene	ND	0.5	1.000	114686	06/24/06
1,1,2-Trichloroethane	ND	0.5	1.000	114686	06/24/06
Tetrachloroethene	ND	0.5	1.000	114686	06/24/06
Dibromochloromethane	ND	0.5	1.000	114686	06/24/06
Chlorobenzene	ND	0.5	1.000	114686	06/24/06
Bromoform	ND	0.5	1.000	114686	06/24/06
1,1,2,2-Tetrachloroethane	ND	0.5	1.000	114686	06/24/06
1,3-Dichlorobenzene	ND	0.5	1.000	114686	06/24/06
1,4-Dichlorobenzene	ND	0.5	1.000	114686	06/24/06
1,2-Dichlorobenzene	ND	0.5	1.000	114686	06/24/06

Surrogate	%REC	Limits	Dil Fac	Batch#	Analyzed
1,2-Dichloroethane-d4	111	80-130	1.000	114686	06/24/06
Toluene-d8	100	80-120	1.000	114686	06/24/06
Bromofluorobenzene	104	80-122	1.000	114686	06/24/06

ND = Not Detected
RL= Reporting Limit

17.0

Curtis & Tompkins, Ltd.

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	MW-13	Batch#:	114686
Lab ID:	187475-010	Sampled:	06/15/06
Matrix:	Water	Received:	06/15/06
Units:	ug/L	Analyzed:	06/24/06
Diln Fac:	1.667		

Analyte	Result	RL
Chloromethane	ND	1.7
Vinyl Chloride	18	0.8
Bromomethane	ND	1.7
Chloroethane	ND	1.7
Trichlorofluoromethane	ND	1.7
Freon 113	ND	0.8
1,1-Dichloroethene	ND	0.8
Methylene Chloride	ND	33
trans-1,2-Dichloroethene	39	0.8
1,1-Dichloroethane	ND	0.8
cis-1,2-Dichloroethene	120	0.8
Chloroform	ND	1.7
1,1,1-Trichloroethane	ND	0.8
Carbon Tetrachloride	ND	0.8
1,2-Dichloroethane	ND	0.8
Trichloroethene	43	0.8
1,2-Dichloropropane	ND	0.8
Bromodichloromethane	ND	0.8
cis-1,3-Dichloropropene	ND	0.8
trans-1,3-Dichloropropene	ND	0.8
1,1,2-Trichloroethane	ND	0.8
Tetrachloroethene	ND	0.8
Dibromochloromethane	ND	0.8
Chlorobenzene	ND	0.8
Bromoform	ND	0.8
1,1,2,2-Tetrachloroethane	ND	0.8
1,3-Dichlorobenzene	ND	0.8
1,4-Dichlorobenzene	ND	0.8
1,2-Dichlorobenzene	ND	0.8

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	112	80-130
Toluene-d8	105	80-120
Bromofluorobenzene	102	80-122

ND = Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

atch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC344849	Batch#:	114631
Matrix:	Water	Analyzed:	06/22/06
Units:	ug/L		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	108	80-130
Toluene-d8	106	80-120
Bromofluorobenzene	103	80-122

D= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC344922	Batch#:	114645
Matrix:	Water	Analyzed:	06/22/06
Units:	ug/L		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	100	80-130
Toluene-d8	100	80-120
Bromofluorobenzene	101	80-122

ND = Not Detected
RL= Reporting Limit

20.0

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC345004	Batch#:	114672
Matrix:	Water	Analyzed:	06/23/06
Units:	ug/L		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	104	80-130
Toluene-d8	105	80-120
Bromofluorobenzene	103	80-122

ND= Not Detected
RL= Reporting Limit

22.0

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC345073	Batch#:	114686
Matrix:	Water	Analyzed:	06/23/06
Units:	ug/L		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	105	80-130
Toluene-d8	100	80-120
Bromofluorobenzene	104	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC345074	Batch#:	114686
Matrix:	Water	Analyzed:	06/23/06
Units:	ug/L		

Analyte	Result	RL
Chloromethane	ND	1.0
Vinyl Chloride	ND	0.5
Bromomethane	ND	1.0
Chloroethane	ND	1.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	0.5
1,1-Dichloroethene	ND	0.5
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	0.5
1,1-Dichloroethane	ND	0.5
cis-1,2-Dichloroethene	ND	0.5
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	0.5
Carbon Tetrachloride	ND	0.5
1,2-Dichloroethane	ND	0.5
Trichloroethene	ND	0.5
1,2-Dichloropropane	ND	0.5
Bromodichloromethane	ND	0.5
cis-1,3-Dichloropropene	ND	0.5
trans-1,3-Dichloropropene	ND	0.5
1,1,2-Trichloroethane	ND	0.5
Tetrachloroethene	ND	0.5
Dibromochloromethane	ND	0.5
Chlorobenzene	ND	0.5
Bromoform	ND	0.5
1,1,2,2-Tetrachloroethane	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	106	80-130
Toluene-d8	101	80-120
Bromofluorobenzene	103	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

atch QC Report

Purgeable Halocarbons by GC/MS

ab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
atrix:	Water	Batch#:	114631
Units:	ug/L	Analyzed:	06/22/06
Diln Fac:	1.000		

T pe: BS Lab ID: QC344847

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	25.00	27.09	108	77-128
richloroethene	25.00	26.45	106	80-120
hlorobenzene	25.00	27.10	108	80-120

Surrogate	%REC	Limits
,2-Dichloroethane-d4	106	80-130
Toluene-d8	106	80-120
romofluorobenzene	100	80-122

T pe: BSD Lab ID: QC344848

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
,1-Dichloroethene	25.00	24.34	97	77-128	11	20
richloroethene	25.00	24.48	98	80-120	8	20
Chlorobenzene	25.00	24.92	100	80-120	8	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	104	80-130
Toluene-d8	106	80-120
romofluorobenzene	101	80-122

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

atch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	114645
Units:	ug/L	Analyzed:	06/22/06
Diln Fac:	1.000		

Type: BS Lab ID: QC344920

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	25.00	28.74	115	77-128
Trichloroethene	25.00	26.88	108	80-120
Chlorobenzene	25.00	27.34	109	80-120

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	97	80-130
Toluene-d8	98	80-120
Bromofluorobenzene	100	80-122

Type: BSD Lab ID: QC344921

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	25.00	30.34	121	77-128	5	20
Trichloroethene	25.00	28.27	113	80-120	5	20
Chlorobenzene	25.00	27.81	111	80-120	2	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	98	80-130
Toluene-d8	100	80-120
Bromofluorobenzene	99	80-122

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	114672
Units:	ug/L	Analyzed:	06/23/06
Diln Fac:	1.000		

Type: BS Lab ID: QC345002

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	25.00	28.94	116	77-128
Trichloroethene	25.00	26.28	105	80-120
Chlorobenzene	25.00	26.27	105	80-120

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	102	80-130
Toluene-d8	105	80-120
Bromofluorobenzene	104	80-122

Type: BSD Lab ID: QC345003

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	25.00	28.55	114	77-128	1	20
Trichloroethene	25.00	25.31	101	80-120	4	20
Chlorobenzene	25.00	25.83	103	80-120	2	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	102	80-130
Toluene-d8	105	80-120
Bromofluorobenzene	100	80-122

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

atch QC Report

Purgeable Halocarbons by GC/MS

ab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
ype:	LCS	Diln Fac:	1.000
ab ID:	QC345072	Batch#:	114686
Matrix:	Water	Analyzed:	06/23/06
nits:	ug/L		

Analyte	Spiked	Result	%REC	Limits
,1-Dichloroethene	25.00	29.00	116	77-128
richloroethene	25.00	27.39	110	80-120
Chlorobenzene	25.00	26.86	107	80-120

Surrogate	%REC	Limits
,2-Dichloroethane-d4	105	80-130
Toluene-d8	99	80-120
romofluorobenzene	99	80-122

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Halocarbons by GC/MS

Lab #:	187475	Location:	Sausage Factory
Client:	Clayton Group Services	Prep:	EPA 5030B
Project#:	70-04578.00	Analysis:	EPA 8260B
Field ID:	ZZZZZZZZZZ	Batch#:	114686
MSS Lab ID:	187617-006	Sampled:	06/20/06
Matrix:	Water	Received:	06/22/06
Units:	ug/L	Analyzed:	06/23/06
Dil'n Fac:	1.000		

Type: MS Lab ID: QC345075

Analyte	MSS Result	Spiked	Result	%REC	Limits
1,1-Dichloroethene	<0.08940	25.00	23.11	92	77-129
Trichloroethene	3.913	25.00	26.68	91	77-123
Chlorobenzene	<0.04954	25.00	23.96	96	80-120

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	104	80-130
Toluene-d8	100	80-120
Bromofluorobenzene	100	80-122

Type: MSD Lab ID: QC345076

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	25.00	26.19	105	77-129	13	20
Trichloroethene	25.00	30.33	106	77-123	13	20
Chlorobenzene	25.00	27.09	108	80-120	12	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	104	80-130
Toluene-d8	99	80-120
Bromofluorobenzene	98	80-122

RPD= Relative Percent Difference

CAMBRIA

January 23, 2004

RECEIVED
OAKLAND FIRE OES
2004 JAN 26 P 3:41

Mr. Keith L. Matthews
Oakland Fire Department, Office of Emergency Services
1605 Martin Luther King, Jr. Way
Oakland, California 94612

Re: **Subsurface Investigation Report**
2834 East 7th Street
Oakland, California
Cambria Project No. 557-1000

Dear Mr. Matthews:

On behalf of Mr. Gunter Kitsch, Cambria Environmental Technology, Inc. (Cambria), is submitting this *Subsurface Investigation Report* for the site referenced above (Figure 1). This report details the drilling and sampling activities as proposed in Cambria's *Investigation Work Plan* (workplan) dated November 3, 2003. This work was requested by the Oakland Fire Department (OFD). The objective of the proposed work was to provide additional assessment of soil beneath the former underground storage tank (UST) at the site. The site background, subsurface investigation activities, investigation results, conclusions, and recommendation are described below.

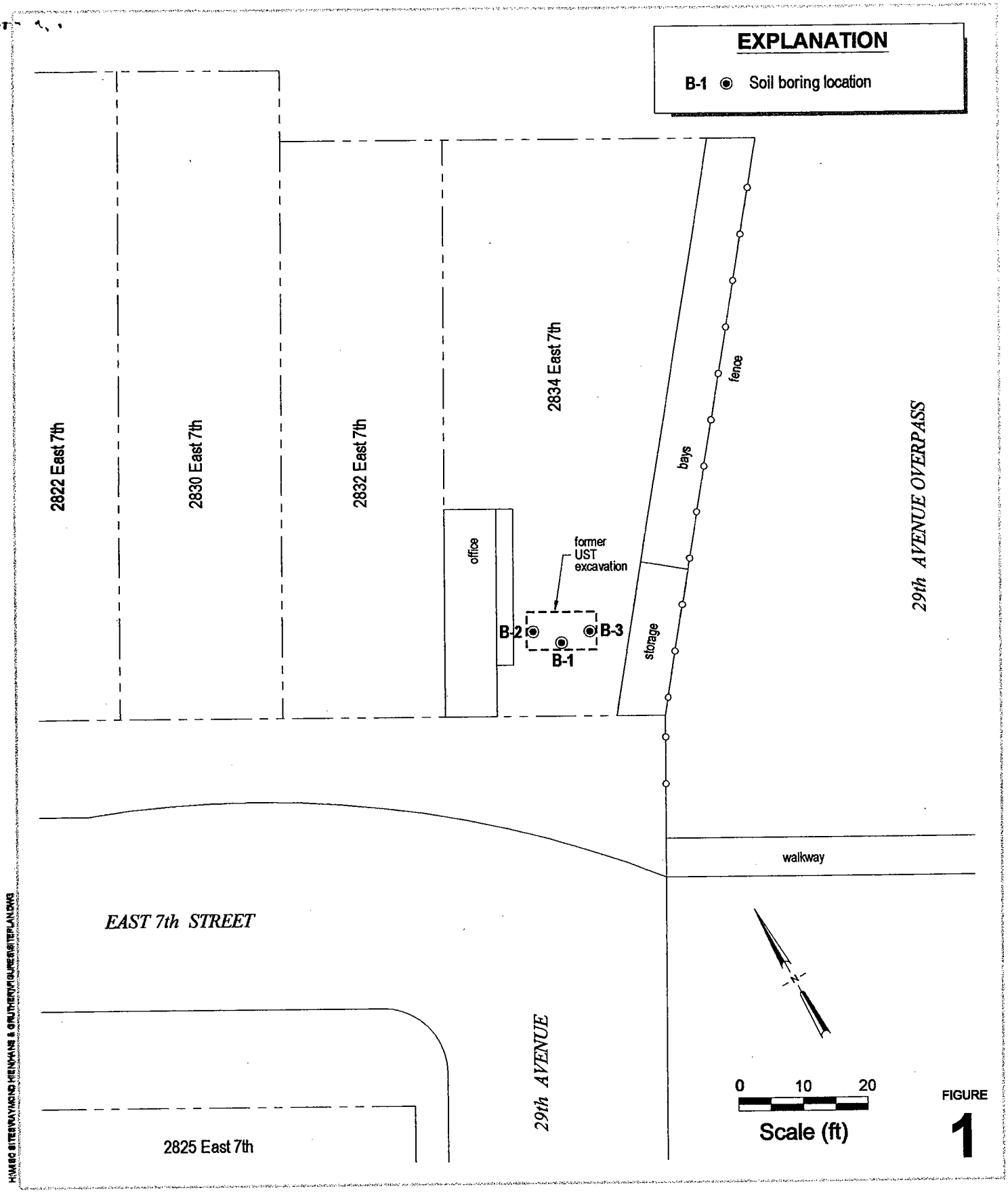
SITE BACKGROUND

Cambria understands that the site had been owned and used by Hans and Gunter Roofing, Inc. since the early 1970's. Based on discussions with former owner Mr. Gunter Kitsch, the former UST at the site was approximately 820 gallons and had been used for gasoline storage at the site for approximately 4 years about 25 years ago during the gasoline crisis in the 1970's. The tank was removed about 2 years ago by the seller's neighbor, a contractor experienced with tank removal. During tank removal the tank looked clean with no holes and no contamination was observed in the native soil or excavation cavity. No documentation regarding the UST removal has been provided to Cambria.

Cambria conducted a subsurface investigation on July 28, 2003. Consistent with the Tri-Regional Guidelines for UST investigations for a UST less than 1,000 gallons in capacity, Cambria collected at least one soil sample from native soil [at 10.5 feet (ft) below grade surface (bgs)] just beneath the UST. Based on logged soil, the bottom of the former tank excavation was encountered at approximately 10 ft bgs. To exceed the recommendations of the Tri-Regional Guidelines, Cambria submitted a second soil sample for analysis (deeper soil at 14.5 ft bgs), and drilled deeper (to 28 ft bgs) to qualitatively assess soil conditions and to collect and analyze groundwater samples (although no groundwater was encountered). Cambria also exceeded the Tri-Regional Guidelines by analyzing soil for total petroleum hydrocarbons as diesel (TPHd) and motor oil (TPHmo), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs) beyond oxygenates and EDB and 1,2-DCA, and LUFT metals beyond total lead. Investigation results presented in Cambria's *Subsurface*

Cambria Environmental Technology, Inc.

5900 Hollis Street
Suite A
Emeryville, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170



Former Hans & Gunther Roofing

2834 East 7th Street

Oakland, California

CAMBRIA

Soil Boring Location Map

California Regional Water Quality Control Board
San Francisco Bay Region

Alan C. Lloyd, PhD
Agency Secretary

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

R0472

January 11, 2005
File No. 01-0482 (BG)

Del Monte Plant 237 Associates, LLP
Attn. Mr. Robert P. Doty
CoxCastleNicholson
555 Montgomery Street, 15th Floor
San Francisco, CA 94111-2585
rdoty@coxcastle.com

SUBJECT: Confirmation of Case Closure for former Del Monte Cannery 37/237, 3100 East 9th Street, Oakland, Alameda County

Dear Mr. Doty:

You have informed the Water Board that you represent Del Monte Plant 237 Associates, LLP, (who owned the subject property until Fall 2004) and that a recent due diligence review by the buyer discovered a July 2001 letter from Alameda County Environmental Health requesting additional testing at the subject property for potential MTBE contamination. Because the Water Board's December 8, 1995, site closure letter preceeded MTBE testing requirements now codified in Section 25296.15 of the Health and Safety Code, you have requested confirmation that: MTBE testing is not required; the July 2001 letter does not apply; and no further action related to the underground tank(s) and other pollution sources is required. As explained below, I concur.

Since 1985, the Water Board has been the lead agency in connection with the investigation and remediation of soil and groundwater contamination at the subject property. The subject property was operated as a cannery prior to its redevelopment as a retail shopping center in the mid 1990s. Cannery operations required the storage and use of petroleum fuels. In 1985, a 1,000 gallon gasoline underground storage tank (UST), and a 16,000 gallon fuel oil UST were removed. A 25,000 gallon fuel oil UST was closed in place. The 25,000 gallon fuel oil UST was subsequently removed in 1995 (pursuant to site redevelopment), and underlying soils were overexcavated. The maximum reported soil residual concentrations after excavation were 310 mg/kg and 210 mg/kg for total petroleum hydrocarbons as motor oil and as gasoline, respectively. No petroleum hydrocarbons were detected in two rounds of groundwater sampling.

By letter dated December 8, 1995, the Water Board concluded that site investigation and remediation for the USTs and other pollution sources were complete and that no further action was required. In response to 1998 requirements for MTBE testing, and pursuant to an evaluation of low risk UST sites closed prior to 1998, the Water Board determined that MTBE testing was

Remedial Action Plan
Del Monte Plants 37 and 237
Oakland, California

Prepared for

Del Monte Foods

Prepared by

CH2M HILL

May 1995

BAE39253.A4.ZZ

Section 1

Introduction

This document is a remedial action plan (RAP) for the remaining remediation activities to be conducted at Del Monte Plants 37 and 237 located at 3100 East 9th Street in Oakland, California (Figure 1-1). This RAP summarizes the previous investigation and remediation activities conducted at Plants 37 and 237 and compiles proposed remediation activities from previous reports. This RAP also incorporates recommendations for remediation and monitoring that were made by the California Regional Water Quality Control Board (RWQCB) and the Alameda County Department of Environmental Health (ACDEH).

The Del Monte property is the planned location for a new retail shopping center. The planned redevelopment includes razing the existing Del Monte facilities and constructing the new shopping complex. The redevelopment also includes an exchange of the eastern portion of the Lazear School yard for the western portion of Plant 37. Del Monte has conducted soil and groundwater investigations and has initiated remediation to prepare the property for the planned redevelopment. A critical component to the success of the planned redevelopment is obtaining a "No Further Action" letter from the RWQCB and the ACDEH.

Remediation activities at Plants 37 and 237 are occurring in two separate stages. The first stage of remediation occurred in December 1994 during the winter-holiday school vacation. The first-stage remediation consisted of tank removals and soil excavation in areas outside the existing buildings where accessibility was not limited. The second-stage remediation will occur during and after the Del Monte facilities are demolished, scheduled to begin in July 1995.

To expedite the process to obtaining a "No Further Action" letter, Del Monte has communicated and met with the RWQCB and the ACDEH regularly to discuss the progress of the investigation and remediation activities and to obtain regulatory input. As agreed at the March 30, 1995 meeting between Del Monte, the RWQCB and the ACDEH, a "Commitment to No Further Action" (previously termed "Commitment to Closure") will be provided by the RWQCB and the ACDEH based on the information and data obtained to date and the planned remediation activities (compiled in this document). In order for the project to obtain funding and proceed, Del Monte needs to obtain the "Commitment to No Further Action" by the end of May 1995. As discussed in the May 10, 1995 letter from Del Monte to the RWQCB and the ACDEH, following completion of the remaining remediation activities, Del Monte will need "No Further Action" letters for both the new Lazear School yard in August 1995 and the Plant 37 and 237 properties in September 1995.

1.1 Purpose

The purpose of this RAP is to provide a plan for the planned redevelopment that will result in "No Further Action" status from the ACDEH and the RWQCB.

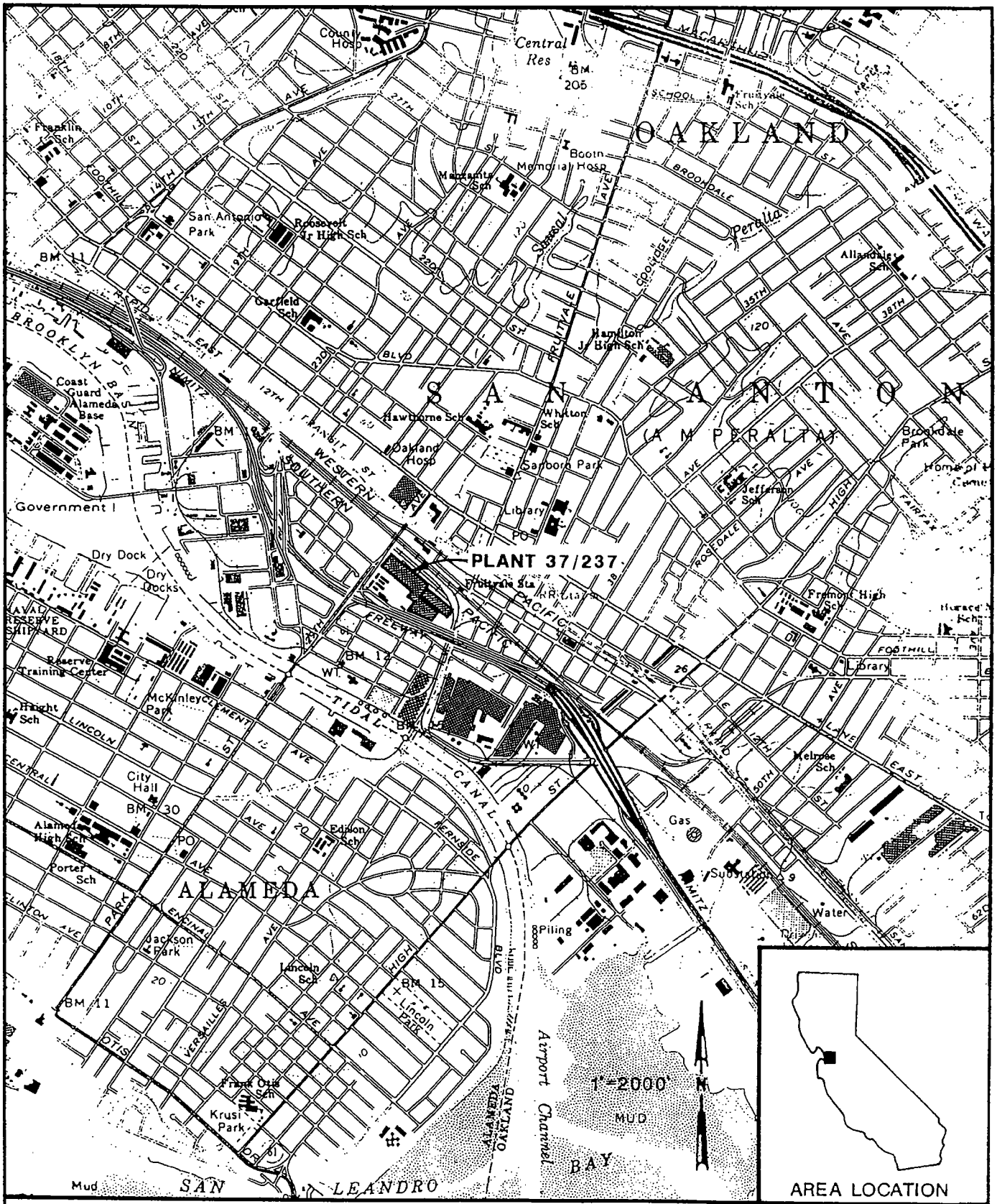


Figure 1-1
Property Location Map
Del Monte Plant 37 and 237
Oakland California

1.2 Objectives

The primary objectives of this RAP are to:

- Provide an overview of the previous investigation and remediation activities at Plants 37 and 237
- Provide a plan for conducting the remaining remediation activities at Plants 37 and 237
- Provide the necessary information for the RWQCB and the ACDEH to issue a "Commitment to No Further Action" letter

1.3 Background

Del Monte Plants 37 and 237 are located adjacent to each other in an industrial area of Oakland. Plant 37 is situated on approximately 8 acres, and was operated as a cannery and warehouse from approximately the 1920s until the 1980s. Plant 237 is situated on approximately 5 acres, and has operated as a can manufacturing facility since its construction in 1953. Prior to 1953, the western portion of Plant 237 was used as a truck terminal. Figure 1-2 shows the facility layout.

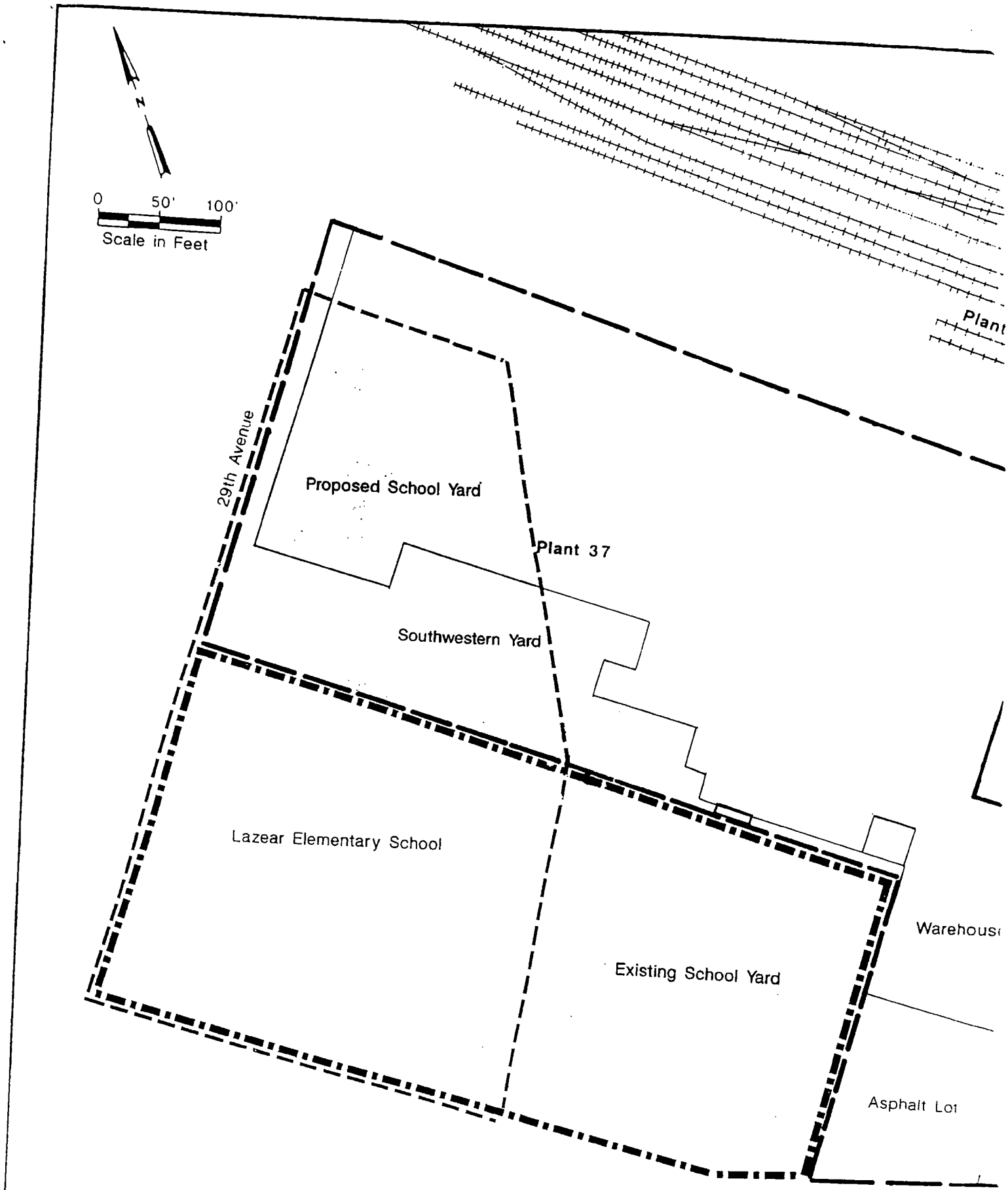
In 1990, CH2M HILL conducted Phase I Property Assessments for Plants 37 and 237 (CH2M HILL, 1991a,b). The Phase I Property Assessments resulted in the recommendation that soil and groundwater be sampled and analyzed from areas where a potential release of hazardous materials to the soil or groundwater may have occurred.

In 1993, Green Environment, Inc. conducted a Phase I Environmental Property Assessment of Plant 237 for Del Monte (Green Environment, Inc., 1993). Their recommendations included conducting further research on past underground tank removal activities and investigating soil surrounding the tanks to assess the potential that leaks may have occurred in the past.

Table 1-1 lists the areas recommended for subsurface investigation in the property assessments. These areas were investigated in 1994 and the results are summarized in Section 2 of this document. Table 1-1 includes the status of investigation and remediation at each location.

1.4 Geology and Hydrogeology

The site is located within the Bay Plain, a gently-sloping region underlain by alluvial or Bay deposits that lies to the west of the Hayward fault and extends to the San Francisco Bay (DWR, 1980). Small water-bearing zones exist throughout the Bay Plain sediments as sand and gravel layers, separated both vertically and horizontally by silts and clays of lower


N
0
50'
100'
Scale in Feet
29th Avenue
Proposed School Yard
Plant 37
Southwestern Yard
Lazear Elementary School
Existing School Yard
Asphalt Lot

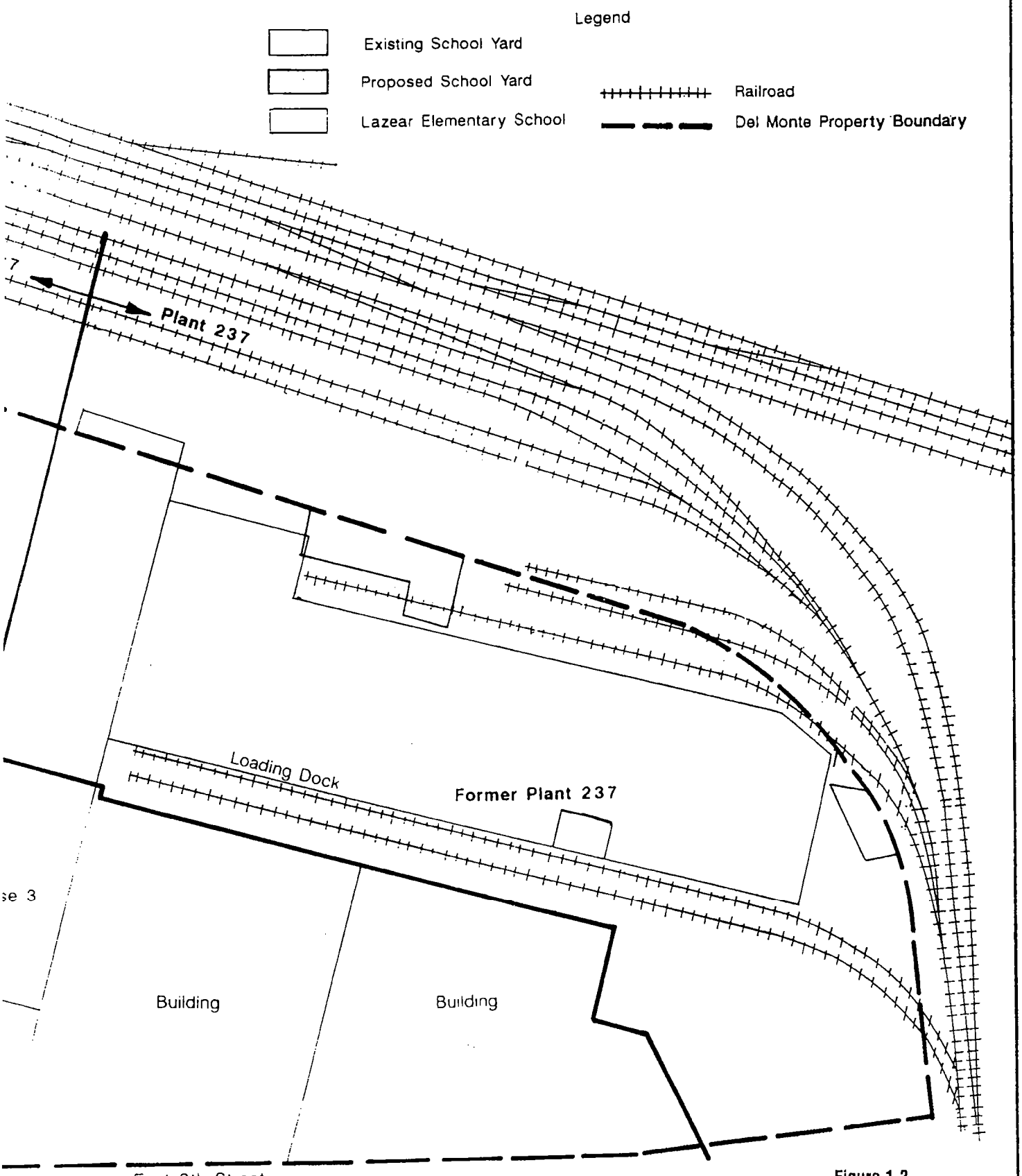


Figure 1-2
Facility Layout
Del Monte Plant 37/237
Oakland California

CH2M HILL

Table 1-1
Recommended Areas for Investigation
Del Monte Plants 37 and 237 - Oakland, California

Reference in Phase I Property Assessments	Reference in Phase II Investigation	Location	Status	
			Investigation	Remediation
Del Monte Plant 37				
Tank No. 1	Tank No. 1	Northwestern corner of Plant 37	soil and groundwater samples collected	No remediation required
Tank No. 3	Monitoring well located near the former fuel oil storage tanks (Tanks 2 and 3) in the southwestern yard; (Tank No. 2 in the Phase II report)	Near Loading Dock in the Southwestern Yard	groundwater sample collected	1st Stage Remediation
Tank No. 4	Monitoring well located near the former fuel oil storage tanks (Tanks 2 and 3) in the southwestern yard; (Tank No. 3 in the Phase II report)	Beneath Loading Dock in the Southwestern Yard (25K)	groundwater sample collected	1st Stage Remediation
Paint and Oil Shed	Southern edge of the southwestern yard	Southwestern Yard	soil samples collected	1st Stage Remediation
Bulk Chemicals Storage Shed	Southern edge of the southwestern yard	Southwestern Yard	soil samples collected	no remediation required
Materials Storage Area "A"	Southern edge of the southwestern yard	Southwestern Yard	soil samples collected	1st Stage Remediation
Truck Maintenance/ Storage	Former garages located south of Warehouse 3	South of Warehouse 3, adjacent to East 9th St. (Asphalt Lot)	soil samples collected	1st Stage Remediation
Garage/Storage	Former garages located south of Warehouse 3	Adjacent to southwestern corner of Warehouse 3	soil sample collected	no remediation required
Forklift Shop "A"	Grease Pit inside the forklift shop	Southeastern corner of Warehouse 2	soil sample collected	2nd Stage Remediation
Wastewater Facilities	Floor gutters of Plant 37 (and former sump)	Cannery and southwestern yard	soil samples collected	no remediation required
Del Monte Plant 237				
Chemical Storage Room	Former materials storage areas at the northern and eastern edges of the property	Northeastern corner of Plant 237	soil sample collected	2nd Stage Remediation
Materials Storage Area D	Former Materials storage areas at the northern and eastern edges of the property	Northeastern corner of Plant 237, outside of chemical storage room	soil and groundwater samples collected	2nd Stage Remediation
Enamel Room and Flammable Materials Storage	Enamel Room and Flammable Materials Storage	Southern end of Plant 237 Annex	evaluation of surface soil during the 2nd stage remediation	
Materials Storage Area C	Former Materials storage areas at the northern and eastern edges of the property	North of Plant 237 buildings by loading docks	soil sample collected	no remediation required
Forklift Shop B	Grease Pit inside the Forklift Shop	North-central portion of Plant 237	evaluation of surface soil during the 2nd stage remediation	
Forklift Shop C	Grease Pit inside the Forklift Shop	South-central portion of Plant 237	evaluation of surface soil during the 2nd stage remediation	
Machine Shop	Groundwater near former machine shop	South-central portion of Plant 237	groundwater sample collected	no remediation required
Steam Cleaner A	Vicinity of existing steam cleaner	North-central portion of Plant 237, at loading dock	soil sample collected	no remediation required
Steam Cleaner B	Steam Cleaner B	Southeast of Plant 237 buildings adjacent to tracks	evaluation of surface soil during the 2nd stage remediation	
Sanitary Sewers and Storm Drains	Sanitary Sewers and Storm Drains	Distributed across plant	evaluation of surface soil during the 2nd stage remediation	
Not referenced	Stained soil between railroad spur and Plant 237 building on south side	South side of Plant 237, adjacent to loading dock	soil sample collected	no remediation required

permeability. Sands and gravels in the Oakland area are generally discontinuous and interfinger with less permeable layers, as is typical of alluvial systems.

Borings conducted at Plants 37 and 237 indicate that the soil primarily consists of silts and sandy silts from the surface to approximately 15 feet below ground surface (bgs). From 15 feet to 25 feet bgs, sandy silts and lean clays were encountered. Groundwater is first encountered between 15 and 20 feet bgs at Plants 37 and 237. Based on groundwater elevation data collected onsite and at the State Shingle property (800 Fruitvale Avenue), shallow groundwater in the vicinity of Plants 37 and 237 flows toward the west and northwest.

1.5 Groundwater Use

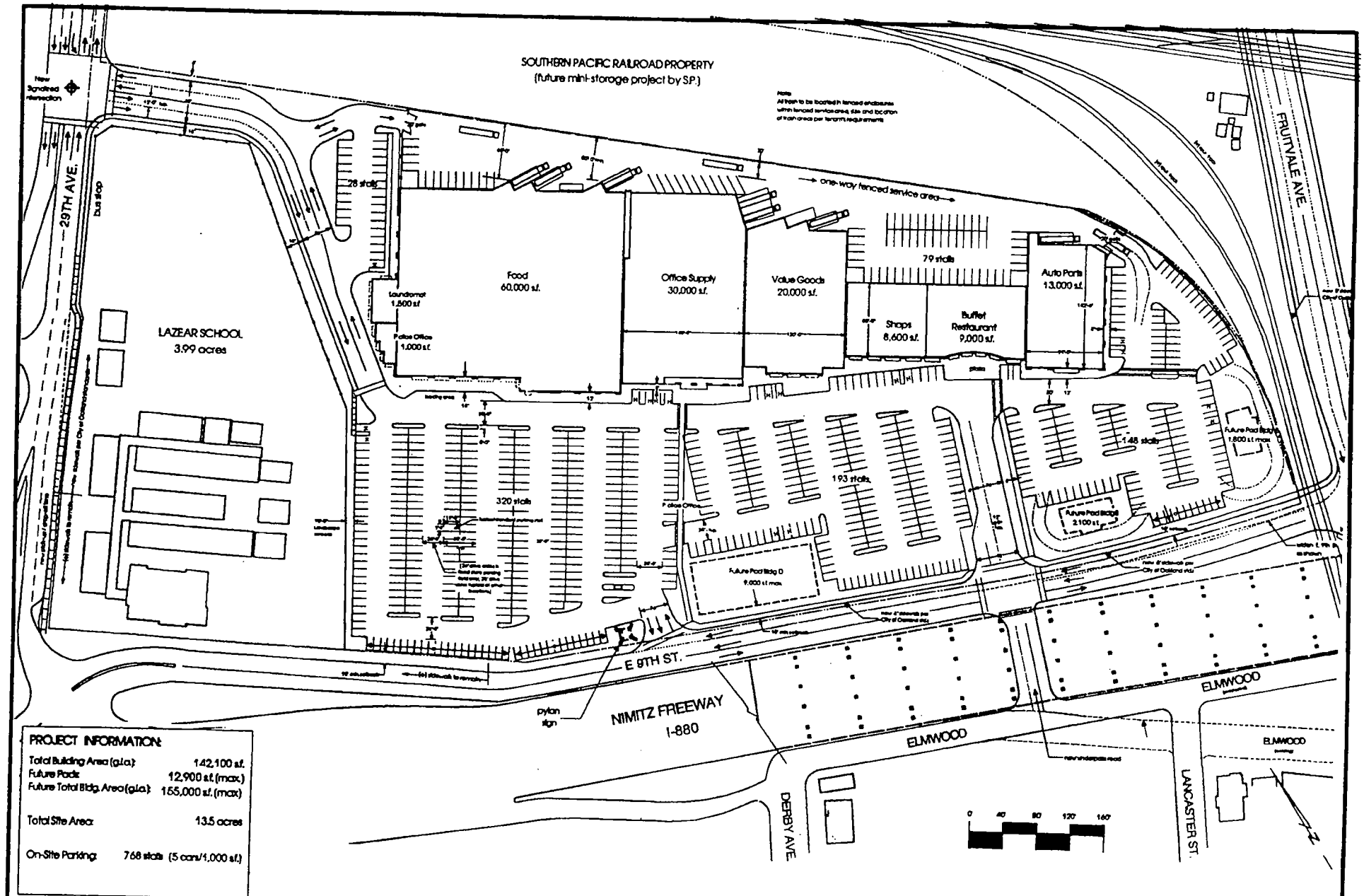
A groundwater well survey for a 0.5-mile radius from Plants 37 and 237 is provided in Appendix A. As indicated by the well survey, groundwater in the vicinity of Plants 37 and 237 is not used for drinking water purposes. The majority of wells in the vicinity of Plants 37 and 237 are used for monitoring and a limited number of wells are used for irrigation. Shallow groundwater use in the subject area is limited due to low-permeable soils.

Also, according to the records in Appendix A, Del Monte owned an industrial-supply well at the northwest corner of the property. The Alameda County well survey indicates that this well was destroyed by being properly filled so that it cannot produce water nor act as a vertical conduit for the movement of groundwater.

1.6 Planned Redevelopment

The planned redevelopment project includes demolition of all facilities on the Del Monte property, remediation of contaminated areas of the property, and the transfer of approximately two acres of the property with the adjacent Lazear School. As shown on Figure 1-2, the existing school yard (blue shading) will be moved to the southern portion of Plant 37 (green shading); the existing school yard will become part of the redevelopment project. Figure 1-3 shows the layout of the planned retail shopping center that will replace the current Del Monte warehouse and can manufacturing facilities.

Del Monte has had several meetings with the City of Oakland, Oakland Unified School District, Lazear School, and potential lending agencies. Based on the benefits to the City of Oakland, the Lazear School, the community, the economy, and the environment, the planned redevelopment has received very positive support. The lending agencies are supportive of the redevelopment and have indicated that they need the "Commitment to No Further Action" from the RWQCB and ACDEH to initiate funding the project.



SOURCE : Flynn Architecture, May 1995

Figure 1-3
Redevelopment Site Plan
Del Monte Plant 37/237
Oakland California

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CH2M HILL

Section 2

Summary of Investigation Results and Screening Health Risk Assessment

Soil and groundwater investigations were conducted at Del Monte Plants 37 and 237 in the areas recommended for investigation in the Phase I Property Assessments prepared by CH2M HILL in March 1991. Additional areas identified during a visual survey of the property were also sampled. Investigations were conducted in August and October, 1994, and March and May, 1995. The results of the August and October, 1994 investigations are discussed in the *Investigation Report for Del Monte Plants 37 and 237, 3100 East 9th Street, Oakland, California (CH2M HILL, November 1994).* The results of the March and May, 1995 investigations are discussed in the *Supplemental Soil and Groundwater Investigation for Del Monte Plants 37 and 237 (CH2M HILL, May 1995).* These documents describe the sampling locations, procedures, results, observations, interpretations, and recommendations. The analytical results of these investigations are summarized in this section.

A Screening Health Risk Assessment (HRA) was conducted by CH2M HILL in April and May, 1995. The HRA was performed at the request of the RWQCB and the ACDEH to assess the potential for health risk to the public and future employees on the property caused by the presence of low concentrations of chlorinated hydrocarbons in the groundwater beneath the eastern portion of Plant 237. The results of this HRA are discussed in the *Del Monte Plant 37/237 - Screening Health Risk Assessment (CH2M HILL, May 9, 1995)* and are summarized below.

2.1 Soil Sampling Results

Soil samples were collected across Plants 37 and 237 from shallow soil borings (1 to 3 feet below ground surface) as well as deeper borings (up to 16 feet below ground surface) that were converted into temporary monitoring wells for groundwater sampling. Soil samples were analyzed for total petroleum hydrocarbons (TPH) as extractables (diesel, motor oil, kerosene) by EPA method 8015 modified, TPH as gas/BTEX (gasoline, benzene, toluene, ethylbenzene, xylenes) by EPA method 8020/8015 modified, oil and grease by Standard method 5520 F, chlorinated hydrocarbons by EPA method 8010, and/or heavy metals (cadmium, chromium, lead, nickel, zinc) by EPA method 6010.

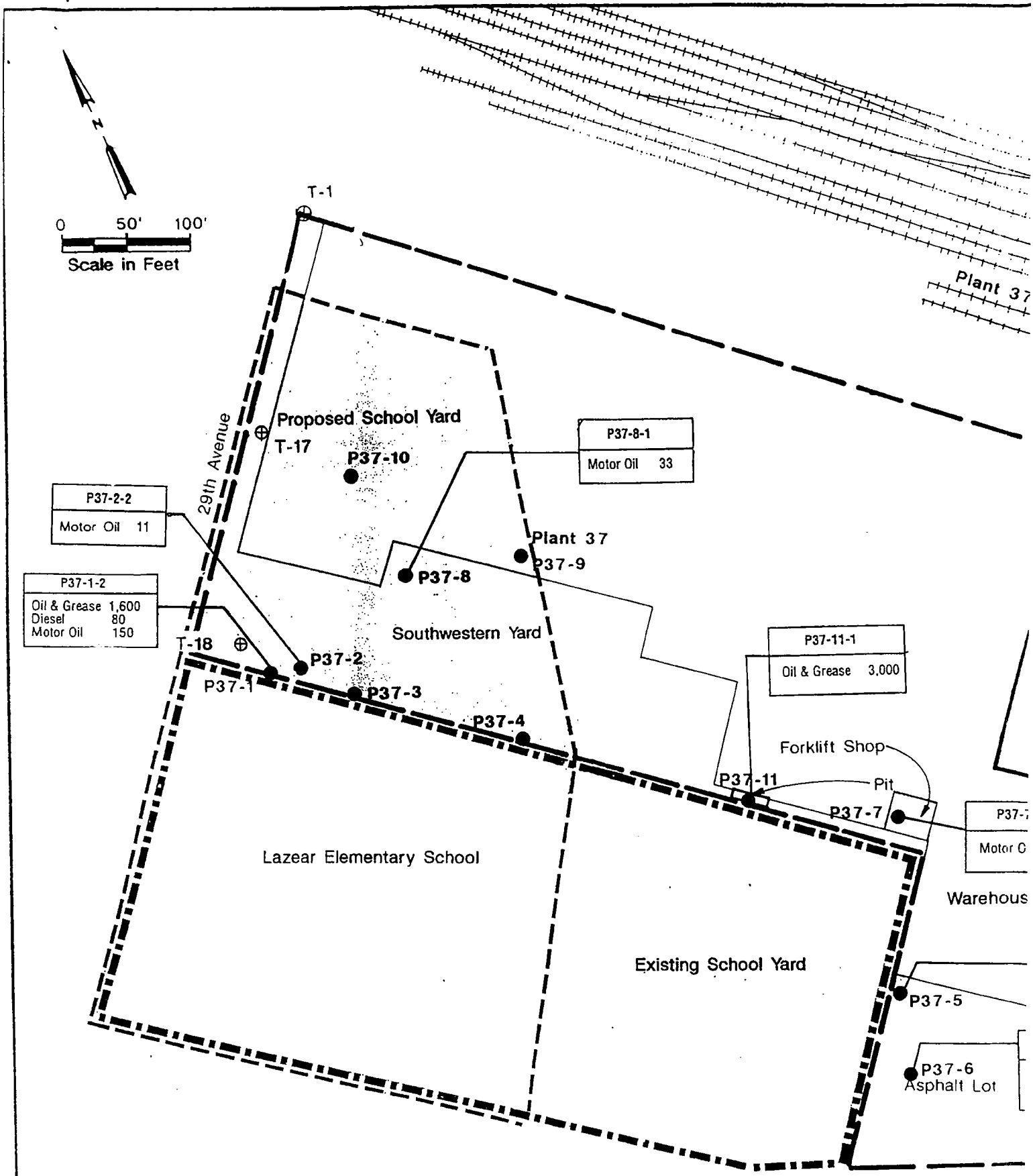
Low concentrations of oil and grease, diesel, motor oil, total xylenes, and heavy metals were detected in select soil samples. Generally, elevated concentrations of the sampling parameters were only detected in the shallow soil (i.e., less than 3 feet bgs). Table 2-1 summarizes the soil analytical results and Figure 2-1 illustrates the soil sample locations.

Table 2-1

Summary of Soil Analytical Results
Del Monte Plant 37 and 237
Oakland, California

Sample Location	Date Sampled	Sample Depth (ft. bgs)	Oil & Grease (mg/Kg)	TPH Kerosene (mg/Kg)	TPH Diesel (mg/Kg)	TPH Motor Oil (mg/Kg)	TPH Gas (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl Benzene (mg/Kg)	Total Xylenes (mg/Kg)	Chlorinated Hydrocarbons (mg/Kg)	Cadmium (mg/Kg)	Chromium (mg/Kg)	Lead (mg/Kg)	Nickel (mg/Kg)	Zinc (mg/Kg)
T-1	8/17/94	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
T-7	8/16/94	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-1	8/18/94	2	1600	ND	80 (a)	150	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-2	8/17/94	2	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	2.2	ND	280	26	110
P37-3	8/18/94	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-4	8/18/94	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-5	8/17/94	2	ND	ND	ND	65	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-6	8/17/94	1	3400	ND	ND	980	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-7	8/17/94	1	ND	ND	ND	330	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-8	8/17/94	1	ND	ND	ND	33	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-9	8/18/94	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-10	8/18/94	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P37-11	8/18/94	1	3000	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
P237-1	8/16/94	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.4	50	12	60	65
P237-2	8/16/94	3	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P237-4	8/17/94	1	720	ND	ND	340	ND	ND	ND	ND	ND	NA	3.5	20	10	2.8	65
P237-5	8/16/94	3	ND	ND	1.5 (a)	ND	ND (b)	ND	ND	ND	0.015	ND	NA	NA	NA	NA	NA
T-15	5/10/95	15	ND (c)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
T-16	5/10/95	10	ND (c)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
T-17	5/11/95	10	ND (c)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
T-18	5/11/95	10	ND (c)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
Lab Detection Limit			<50	<1	<1	<1	<1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<0.5	<0.5	<0.5	<0.25

Notes: ND Non Detect
NA Not Analyzed
(a) Hydrocarbon in diesel range quantified as diesel.
(b) A profile of peaks was found in gasoline range totaling a concentration of 1.1mg/kg
(c) TRPH (EPA method 418.1)



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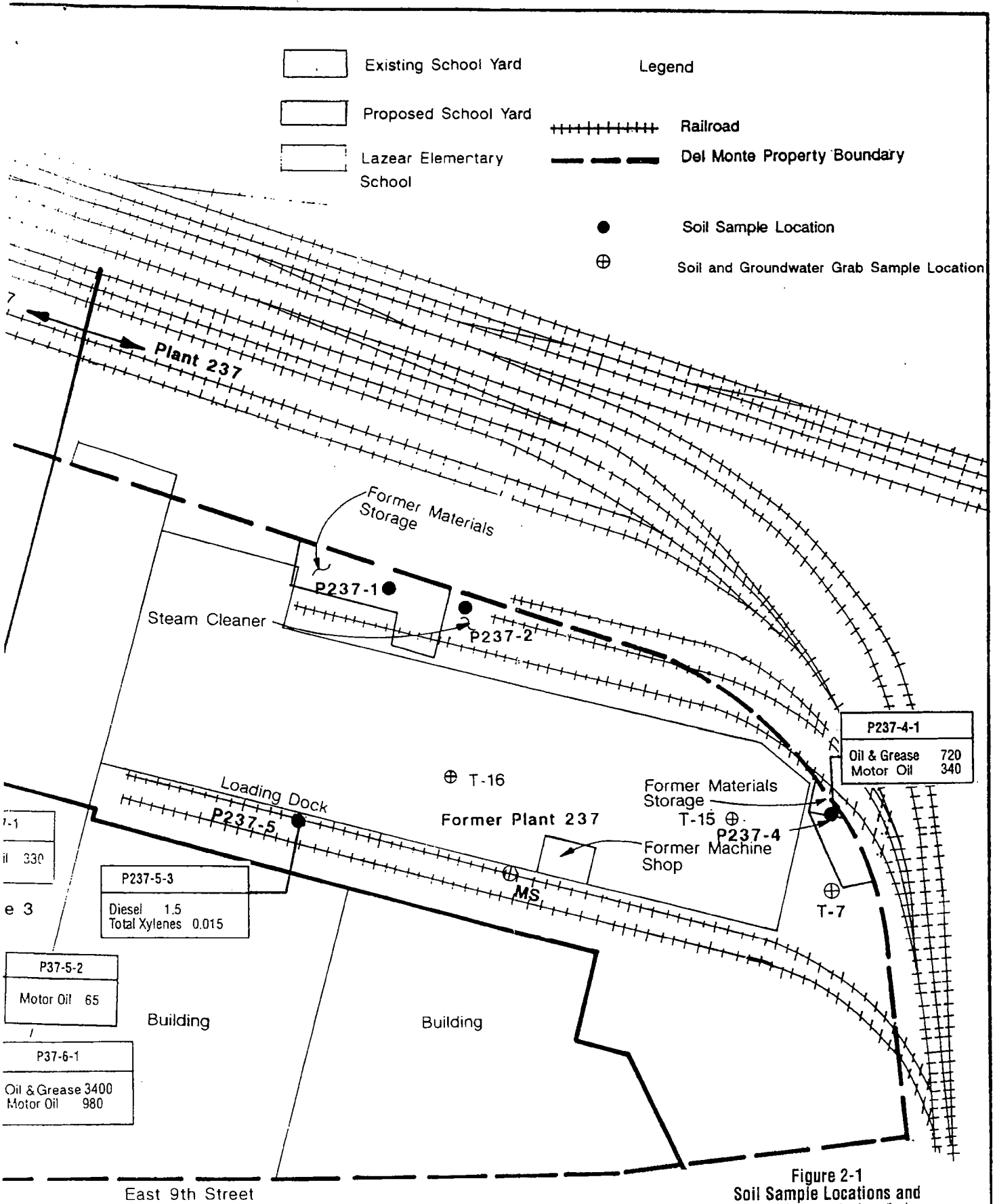

e detections. Compounds not listed in the descriptive location.

Figure 2-1
Soil Sample Locations and Organic Results(mg/kg)
Del Monte Plant 37/237
Oakland California

CH2M HILL

2.2 Groundwater Sampling Results

Groundwater samples were collected across Plants 37 and 237. Samples were collected from an existing monitoring well (MW) located adjacent to a closed-in-place 25,000-gallon underground storage tank, a new monitoring well, and soil borings that were converted into temporary monitoring wells. The existing monitoring well was abandoned and removed during the removal of the 25,000-gallon underground storage tank, and a replacement well was installed immediately downgradient of the tank excavation. The groundwater samples from the property were analyzed for TPH as extractables by EPA method 8015 modified, TPH as gas/BTEX by EPA method 8020/8015 modified, oil and grease by Standard method 5520 F, total recoverable petroleum hydrocarbons (TRPH) by EPA method 418.1, and/or chlorinated hydrocarbons by EPA method 8010.

Oil and grease, TPH-diesel, and TPH-motor oil were detected in the groundwater from the existing monitoring well located adjacent to the underground storage tank, but after removal of the tank and the surrounding contaminated soil (see Section 4 for a discussion of the remediation activities) groundwater samples collected from the new monitoring well revealed no detectable concentrations of these constituents, with the exception of approximately 220-240 µg/l of diesel range constituents, believed to be aged petroleum hydrocarbons that have degraded over time.

Chlorinated hydrocarbons including trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and 1,1-dichloroethene (1,1-DCE), were detected in the groundwater beneath the eastern portion of Plant 237. Table 2-2 summarizes the groundwater analytical results. Figure 2-2 illustrates the groundwater sample locations and detectable levels of chlorinated hydrocarbons on the Del Monte property. Figure 2-2 also indicates the approximate downgradient extent of chlorinated hydrocarbons beneath the Del Monte property (indicated the by non-detectable [ND] concentration contour line).

2.3 Screening Health Risk Assessment Results

The HRA addresses potential future exposure to volatile organic compounds (VOCs) in the groundwater (chlorinated hydrocarbons) in the vicinity of the eastern portion of Plant 237. The HRA was conducted in accordance with California Environmental Protection Agency (CAL-EPA) risk assessment guidance. The HRA includes an exposure assessment, a toxicity assessment, a risk characterization, and a summary of the results.

The most significant exposure pathway identified and quantitatively evaluated in the HRA was exposure of future onsite workers to volatilization of the chlorinated hydrocarbons from the groundwater and transport through the soil to air inside a future onsite building. The maximum concentrations for each constituent detected in the groundwater were used in the assessment. The results of the HRA show that the estimated noncancer hazard index is less than one, the level considered by CAL-EPA to be the noncancer level of concern. In addition, the estimated excess lifetime cancer risk is below 10^{-6}, a risk level considered acceptable by CAL-EPA. The estimated hazard quotients and excess lifetime cancer risks are summarized in Table 2-3.

Table 2-2

Summary of Groundwater Analytical Results

Del Monte Plant 37 and 237

Oakland, California

Sample Location	Date Sample	Oil & Grease (µg/L)	TPH Kerosene (µg/L)	TPH Diesel (µg/L)	TPH Motor Oil (µg/L)	TPH Gas (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl Benzene (µg/L)	Total Xylenes (µg/L)	1,1-Dichloro ethene (µg/L)	Trans-1,2-Dichloro ethene (µg/L)	Cis-1,2-Dichloro ethene (µg/L)	Chloroform (µg/L)	Trichloro-ethene (µg/L)	Tetra-chloro-ethene (µg/L)
T-1	8/17/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-7	8/17/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	2	ND	160	ND
MS	8/16/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-8	10/14/94	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	1	ND	61	ND
T-9	10/14/94	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	ND	1	ND	86	ND
T-10	10/14/94	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	1	ND	190	ND
T-11	3/8/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND
T-13	3/8/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	1.2	ND
T-14	3/8/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	1	ND	42	ND
T-15	5/10/95	ND (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3	ND	240	ND
T-16	5/10/95	ND (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-17	5/11/95	ND (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-18	5/11/95	ND (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW (well)	8/18/94	1400	ND	3200	3100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1	1/26/95	ND (a)	ND	ND (b)	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA
MW-1	3/17/95	ND (a)	ND	ND (b)	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA
Lab Detection Limit		<1000	<50	<50	<500	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5

Notes: ND Non Detect

NA Not Analyzed

(a) TRPH (EPA method 418.1)

(b) Unknown petroleum compounds were detected at 220 to 240 mg/l in the diesel range.

FOUNDATION REPORT

I-880 23RD AVE OVERCROSSING REPLACEMENT OAKLAND, CA

BRIDGE NO. 33-0753

Prepared for
RBF Consulting, Alameda County Transportation Commission and California Department of Transportation

June 22, 2012

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27560836

I-880 Operational and Safety Improvements at 23rd/29th Ave OCs
04-Ala-880

Foundation Report
I-880 23rd Avenue Overcrossing Replace
Bridge No. 33-0753

Submitted to
RBF Consulting, Alameda County Transportation Commission, and California Department of Transportation

This report has been prepared by or under the supervision of the following Registered Geotechnical Engineer. The Registered Geotechnical Engineer attests to the technical information contained herein and has judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

URS CORPORATION

Philip Meymand, Ph.D., G.E.
Registered Geotechnical Engineer

June 22, 2012
Date

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The proposed project is sponsored by Alameda County Congestion Management Agency (ACCMA) and will replace the 29th Avenue overcrossing and the two 23rd Avenue overcrossings of Interstate I-880 (I-880) located at Post Miles 28.69 and 28.95, respectively. In addition to the replacement of the overcrossings, the existing northbound 29th Avenue and 23rd Avenue off ramps and on ramps will be reconstructed to improve operations and safety. A soundwall will be constructed along East 8th Street, between 29th and 23rd Avenues to reduce noise impacts associated with the I-880 freeway within the Jingletown residential community. A project Vicinity Map is presented in Figure 1.

The new overcrossings will provide standard vertical clearances over mainline I-880. Replacement of the overcrossings will also provide room to widen the existing I-880 mainline lanes. In addition, the proposed project will widen the mainline outside shoulders and lengthen existing northbound auxiliary lane between the 29th Avenue on ramp and 23rd Avenue off ramp. These improvements, especially lengthening the auxiliary lane, will increase the flow of vehicles along the mainline and help reduce the rate of congestion related accidents in the area.

1.1 PURPOSE AND SCOPE OF THIS STUDY

The purpose of this Foundation Report (FR) is to document previous field investigations and existing foundation conditions, perform geotechnical and geological investigations or studies, and make foundation recommendations for the replacement of the 23rd Avenue Overcrossing (New Bridge No. 33-0753; Old Bridge No. 33-0149). This Foundation Report supersedes the Foundation Report for I-880 23rd Avenue Overcrossing Replace dated March 30, 2012.

1.2 PROJECT SCOPE OF WORK

The scope of work for this study includes:

- Review of logs of test borings (LOTBs), geologic maps, foundation reports, and other existing information
- Preparation of this FR, which includes:
  - Conduction of field exploration and laboratory tests
  - Preparation of LOTBs
  - Development of seismic design criteria and earthquake ground motions;
  - Description of site geology and evaluation of geologic hazards;
  - Assessment of subsurface conditions;
  - Foundation recommendations for proposed structures; and
  - Discussion of construction considerations

2.1 REGIONAL GEOLOGY

The 23rd Avenue Overcrossing is located near the east side of the structural and topographic basin that contains San Francisco Bay. Elevations on site range between approximately 10 and 20 feet above Mean Sea Level (MSL). The bay trough has formed through processes of faulting, folding, and erosion that have been ongoing for millions of years. The project site lies in a region of very gently sloping to flat lying, unconsolidated, sandy to clayey, Holocene-age (less than 10,000 years old), alluvial fan deposits (Graymer, 2000) as shown in Figure 2. These deposits are derived from sediments that have been eroded from the uplifted East Bay hills and transported to the San Francisco Bay margins by local streams. These and older alluvial and basin fill deposits mantle bedrock of the Franciscan Complex at great depth. Previously drilled exploratory borings extended to depths of 80 feet and did not encounter bedrock. Subsurface information from available LOTB sheets is summarized in Section 3

2.2 SEISMIC SETTING

The I-880 corridor in Oakland is located along the eastern margin of San Francisco Bay in one of the most seismically active regions in California. The majority of earthquakes are associated with the strike-slip faults of the San Andreas system. The trend of most of the faults in this portion of the California Coast Ranges is northwest-southeast, as shown on Figure 3. The major active faults near the 23rd Avenue Overcrossing, the Hayward, Calaveras, and San Andreas faults, are capable of generating earthquakes of Maximum Moment (M_{max}) 7.3, 7.4, and 7.9, respectively (Caltrans Caltrans Seismic Design Criteria, 2010). The Hayward and Calaveras faults are located about 4.6 km and 17.6km northeast of the site; the San Andreas fault is about 24 km to the southwest. As well as these local faults, earthquakes on more distant seismic sources, including the Greenville - Marsh Creek, Concord - Green Valley, Rodgers Creek, and the Mount Diablo blind thrust may also result in significant levels of seismic shaking in the project vicinity.

The last major earthquake on the Hayward fault occurred in 1868 and caused widespread damage throughout much of the East Bay. This earthquake caused surface rupture from Fremont to as far north as Berkeley. Although the fault rupture was poorly documented, the recorded lateral displacements were at least 1 meter. Smaller vertical displacements were also recorded. Based on empirical relationships among earthquake magnitude, fault rupture length, and displacement (Wells and Coppersmith, 1994), a large event on the Hayward fault is capable of generating displacements of several meters. In addition to coseismic rupture, the Hayward fault is undergoing creep, i.e., it is undergoing continuous aseismic slip. This amounts to about 4 to 6 mm/yr on the Hayward fault in Fremont (Lienkaemper and others, 1997).

3.1 PREVIOUS FIELD EXPLORATIONS

A total of 4 exploratory test borings were drilled as part of previous studies in 1993 for a seismic retrofit of the 23rd Avenue Overcrossings. A list of these borings and the maximum depth of exploration for each boring are provided in Table 1. The LOTBs obtained from these subsurface investigations are provided in Appendix A.

Table 1
Existing Logs of Test Borings Reviewed

Boring No.	Location	Depth of Boring (feet)
B-1	23rd Avenue	75
B-2	23rd Avenue	90
B-3	23rd Avenue	80
B-4	23rd Avenue	80

Other LOTB sheets available for nearby structures are summarized below.

- **29th Avenue Overcrossing** (Bridge No. 30-141) – Two test borings were performed in 1993 for a seismic retrofit of the 29th Avenue Overcrossings. The depths of these boring are approximately 80 feet below ground surface (bgs).
- **16th Avenue Overcrossing** (Bridge No. 33-137) – Nine test borings were performed between 1944 and 1946 in the vicinity of the former 16th Avenue Overcrossing alignment to depths of approximately 22 to 51 feet below ground surface.
- **Fruitvale Overhead** (Bridge No. 33-41) – Subsurface exploration was performed around 1959 in conjunction with the widening of the Fruitvale Avenue Overhead. This exploration consisted of twelve penetration borings and eight mud rotary borings. The borings were pushed or drilled to depths of about 40 to 60 feet below ground surface.

3.2 NEW FIELD EXPLORATIONS

The geotechnical investigation program for the project site at 23rd Avenue consisted of drilling three exploratory soil borings and advancing two cone penetrometer test (CPT) soundings. Well permits were obtained from the Alameda County Public Works Agency. Underground Services Alert was notified 48-hours prior to the scheduled drilling date to clear the boring/CPT locations of underground utility lines. In addition, the services of a private utility locator (Cruz Brothers of Scotts Valley, California) were utilized by URS to clear the boring/CPT locations of underground utilities.

The approximate locations of these borings and CPT soundings are shown in Figure 4 and Appendix B. The borings and CPTs were located in the field by measuring from existing structures and landmarks in the vicinity and surveyed using a hand-held GPS.

3.2.1 EXPLORATORY SOIL BORINGS

The three soil borings, designated as R-11-008, R-11-009 and R-11-011, were drilled at the project site from April, 25, 2011 through April, 29, 2011 to depths up to about 100 feet bgs.

Pitcher Drilling Co., of East Palo Alto, California, drilled the soil borings with a truck-mounted CME-55 TMR drill rig. The exploratory borings were advanced by hand auger in top 5 feet. The borings were then advanced using the rotary wash drilling method with an 8-inch diameter drag bit. Soil samples were generally retrieved at approximately 5-foot intervals from the surface to the depth of 50 feet bgs, and at 10-foot intervals below the depth of 50 feet bgs by advancing the sampler into the soils at the bottom of the boring. Sheri Janowski, a geologist with our firm, supervised the drilling, logged and visually classified the soils encountered during drilling in accordance with the Unified Soil Classification System.

Three types of samplers were used for this study as follows:

- Modified California (MC) Sampler – 2.0-inch I.D., 2.5-inch O.D., split-barrel equipped with brass tube liners.
- Shelby Tube Sampler – 3-inch O.D., 36-inch long, thin-walled steel sampler tube.
- Standard Penetration Test Sampler (SPT) – 1.4-inch I.D., 2-inch O.D., 24-inch long, split barrel, with a 1.4-in I.D. cutting shoe.

After the borehole was drilled to the specified depth, the sampler mounted on the drill rods was lowered to the bottom, seated, and then either driven into the soil with a hammer to retrieve a MC, or SPT sample, or was pushed into the soil in one continuous motion by the drill rig to retrieve a Shelby tube sample. The samplers were driven 18 inches into the material at the bottom of the borehole using a 140-pound automatic hammer with a free fall of 30 inches for each blow. The number of hammer blows required to advance the sampler each of the three successive 6-inch increments was counted in the field. The number of blows required to advance the sampler the last 12 inches was recorded as the penetration resistance (blows-per-foot). These blowcounts were used to determine density and consistency of the soils and to evaluate the liquefaction hazard at the site as discussed in Section 4. The MC samplers were generally used to obtain drive samples in clayey material. The split-barrel SPT drive sampler was generally used to sample granular materials.

After completion of the drilling and sampling, borings were tremie backfilled with neat cement grout and inspected in accordance with the Alameda County Public Works Agency regulations and patched with a concrete cap. Soil cuttings and drilling fluid were collected in 55-gallon drums that were temporarily stored on-site.

The MC samples were collected and sealed on both ends with plastic caps. The SPT samples were placed in 1-gallon plastic bags and sealed. All samples were carefully sealed, labeled, and transported to the Signet Testing Laboratory in Hayward, California for further examination and testing. Logs of the test borings were prepared based on the soil classification made in the field and on the laboratory test results, and are presented in Appendix B of this report.

3.2.2 CONE PENETRATION TESTS

Two cone penetrometer test (CPT) soundings, designated as CPT-11-006 and CPT-11-007, were performed as part this study at the 23rd Avenue project site on April 29, 2011. The CPT soundings were about 100 feet in depth, and were performed under the general direction of our site geologist. The soundings were performed using an integrated electronic piezo-cone system with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone has a tip end area ratio

of 0.85. Pore pressures were monitored from a position immediately behind the probe tip during the advancement of the cone. The CPT probe was advanced using a hydraulic push system mounted in a mobile truck with 20-ton capacity. Lankelma, Inc of Richmond, California owns and operates the CPT rig. Tip resistance, sleeve friction, pore pressure and inclination data were obtained electronically at 0.05 m intervals as the sounding was advanced. The CPT testing was performed in general conformance with the requirements of ASTM D3441 and D5778 test methods.

The CPT soundings included Pore Pressure Dissipation Tests (PPDTs). The PPDTs were conducted in the sandy soil layers identified by the exploratory soil borings and CPT soundings to measure hydrostatic water pressures in the soil layers. A PPDT was conducted when the cone was halted at specific intervals determined by our geologist in the field. The pore pressure was monitored until such time as there was no variation in pore pressure with time. This time is commonly referred to as t100, the point at which 100 percent of the excess pore pressure due to probing activity has dissipated.

The CPT soundings also included Seismic Cone Penetrometer Testing (SCPT) performed at 5-foot increments. The SCPT uses a modified CPT cone that contains a built-in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters. The shear waves were generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig. Compression waves were generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements were taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods. Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface. At least two waves are recorded for each test depth for consistency check of the waveforms. Shear wave data is sampled at a frequency of 20 kHz and compression wave data is sampled at 50 kHz. The input sensitivity (gain) is increased with depth to maintain a desired signal resolution.

3.3 SOIL TESTING

Representative soil samples obtained from the exploratory borings were tested at Signet Testing Laboratory in Hayward, California to evaluate their engineering properties. The tests were performed in accordance with the ASTM Standards for Testing. The following tests were performed:

- Moisture Content (ASTM D2216)
- Dry Density (ASTM D2937)
- Particle-size (sieve) Analysis (ASTM D-422 and D-1140)
- Unconfined Compressive Strength (ASTM D2166)
- Unconsolidated Undrained Triaxial Test (ASTM D2850)
- Atterberg Limits (ASTM D4318)
- One-dimensional Consolidation (ASTM Test Method D2435)

The results of the laboratory testing are summarized on the logs of borings at the corresponding sample depths along with the sample blow counts. Detailed results of the laboratory tests are presented in Appendix C of this report.

3.4 CORROSION TESTING

Soil samples for corrosion tests were obtained from Borings R-11-008 and R-11-011 at depths of 25 feet and 70 feet. The samples were submitted to Cerco Testing Laboratory of Concord, California, to test for pH, resistivity, chloride and sulfate in accordance with Caltrans standards. The test results are shown in the following table:

Table 2
Corrosion Test Results

Parameter	R-11-008	R-11-011
Soil Description	Sandy Clay	Fat Clay
Depth (ft)	70	25
pH	7.6	7.8
Resistivity (Ohm-cm)	1600**	1200**
Chloride (mg/kg)	25	N.D.
Sulfate (mg/kg)	N.D.	16

N.D.: None-detected

** Smaller box used as limited amount of soil

4.1 SITE AND SURFACE CONDITIONS

The site is located on the Oakland alluvial plain that generally slopes gently to the west towards the San Francisco Bay. The site, with the exception of the existing approach embankments, is relatively flat. Elevations on site range between approximately 10 and 20 feet above MSL (USGS, 1997). Approach embankment side slopes are up to about 15 feet high with gradients on the order of 1½:1 (horizontal to vertical) to 2½:1 (horizontal to vertical). Retaining walls support portions of the approach embankments.

4.2 SUBSURFACE CONDITIONS

Our review of the geologic mapping and all available geotechnical data indicates the subsurface soil conditions at the project site consist of primarily unconsolidated Holocene alluvial fan deposits. The LOTBs indicate that the borings at the 23rd Avenue Overcrossing encountered alluvial deposits that primary consisted of stiff to hard clay with varying amounts of silt and sand, alternating with compact to very dense gravel and sand layers.

We developed a generalized subsurface profile at the 23rd Avenue Overcrossing based on all available geotechnical data for the purposes of foundation evaluations. In-situ and laboratory tests (including pocket penetrometer, torvane, moisture content, Atterberg limit, unit weight, unconfined compressive strength, unconsolidated–undrained triaxial compression test, grain size distribution) have been performed on samples recovered from previous explorations and new explorations by this study. The unit weights versus elevation for fine-grained soils are presented in Figure 5, indicating that the unit weights are in the range between 110 pcf to 140 pcf. The liquid limits, as shown in Figure 6, are generally in the range between 40-80%. The water contents are typically close to the plastic limit, indicating that the soils have been overconsolidated with high strengths. The undrained shear strengths along with CPT data versus elevation for fine-grained soils are presented in Figure 7. The CPT data correlate well with field and laboratory test results, which also exhibits a classic overconsolidated stress history. The SPT blowcount versus elevation is presented in Figure 8. This data was interpreted to represent shear wave velocity profile.

Based on a review of all geotechnical data, generalized soil engineering parameters were developed for the 23rd Ave Overcrossing for the purposes of this foundation evaluation and are tabulated below. The shear strength parameters were selected taking a reasonable value of the range of available geotechnical data. In an overconsolidated strength profile, soil strengths first decrease with depth, reach a minimum, and then increase with depth as shown in Figure 7.

Table 3
Soil Parameters

Soil Type	Layer Elev. (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Stiff/V. Stiff Clay	20~0	125	2500~1500*	0
Stiff Clay	0~-10	125	1500	0
Stiff/V. Stiff Clay	<-10	125	$Su/\sigma_v'=0.50$	0

* Strength decreases with depth from 2500 psf to 1500 psf

4.3 GROUNDWATER CONDITIONS

During the investigations conducted in 1993, groundwater was encountered between elevation -1.5 feet and elevation -1.7 feet. The CPT data obtained by this study indicate that the water table was at elevation of 10.9 feet and feet and 13.8 feet at boring CPT-11-007 and CPT-11-010, respectively. Groundwater was encountered in the boring by Earth Mechanics Inc. (EMI, 2011) a similar range, between elevation +4.9 feet and elevation +7.9 feet. Therefore, for the purposes of this foundation evaluation, the groundwater level was assumed to be at about EL+10.0 feet at the 23rd Avenue Overcrossing.

5.1 SEISMIC DESIGN METHODOLOGY

The seismic design methodology adopted for this project is based on the following current Caltrans standards:

1) Seismic Design Criteria (SDC), v 1.6, December 2010
2) Caltrans Guidelines for Structures Foundation Reports, v 2.0, updated March 2009
3) California Seismic Hazard Map (2007)
4) Caltrans ARS online (v1.0.4)

The new Caltrans procedures for developing the ARS curve uses the envelope of the deterministic and probabilistic spectra, in contrast to the old procedure that used only the deterministic spectrum. The new deterministic spectrum is now adopting two next generation attenuation (NGA) models: an average of Campbell and Bozorgnia (CB) and Chiou and Youngs (CY) attenuation models. The probabilistic spectrum is based on the 5% in 50 year USGS2008 Hazard map. In addition, the new procedure also updates the site factor, the near fault factor and includes the deep basin effect.

5.2 SITE SOIL PROFILE

Boring logs and CPT soundings from the field explorations at the project site were reviewed. The representative blowcounts as shown in Figure 7 were used to estimate shear wave velocity using an empirical correlation proposed by Pitilakis (1999) for clayey type material. The weighted average of the shear wave velocity over the depth of exploration (to a maximum depth of approximately 100 feet) was used to determine $Vs_{,30}$, which was found to be 249 m/s. In addition, 3 S-CPTs (CPT-11-006, CPT-11-007 and CPT-11-010) at both sites directly measured Vs profile to a maximum depth of approximately 100 feet and $Vs_{,30}$ were found to be 251, 255, and 236 m/sec, respectively The average shear wave velocity of 250 m/sec was used to classify the soil profile based on the guidelines given in SDC Table B.12. Accordingly, this site is classified as a stiff soil site or Soil Profile Type D.

5.3 FAULT TYPE AND NEAR-FIELD SPECTRAL ACCELERATIONS

The technical report that accompanies the California Seismic Hazard Map (2007) indicates that the controlling fault is the Hayward fault, which is 4.6 km away from the site. Since the project site is less than 15 km from the nearest active fault, design spectral accelerations should be modified to account for near-fault effects as follows:

Period (sec)	Increase in Spectral Acceleration (%)
< 0.5	0
0.5 – 1.0	0 – 20 (determined by linear interpolation)
≥1	20

This does not include adjustments for bridges with fundamental periods of vibration greater than 1.5 seconds. As the design proceeds, we will verify the fundamental period of vibration of the planned structures for this project with the Structural Engineer.

5.4 DESIGN ACCELERATION RESPONSE SPECTRUM

Based on Caltrans SDC (Version 1.6), the deterministic seismic response spectrum can be estimated with spectral acceleration values generated by:

- Soil Profile Type D with $Vs_{,30}$ = 250m/sec
- Hayward fault zone (ID = 353) with Maximum Moment (M_{max}) 7.3 and site to fault distance (Rrup) = 4.6km
- No deep basin effect
- ARS increase for near-field effect

The Deterministic Acceleration Response Spectrum corresponding to $Vs_{,30}$ = 250m/sec, magnitude of controlling event 7.3, was obtained from ARS online and modified to account for near field effects as described above. The Probabilistic Acceleration Response Spectrum of corresponding to $Vs_{,30}$ = 250m/sec, 975 yr return period, was also obtained from ARS online and modified to account for near field effects. Since the representative $Vs_{,30}$ is less than 300m/s, additional USGS PSHA deaggregation analysis was performed to obtain 5%-50yr spectrum and compared with those by ARS online. The Design Acceleration Response Spectrum (ARS) curve is the envelope of ARS online deterministic curve (M_{max} = 7.3, R = 4.6 km), the ARS online probabilistic curves (975 yr return period), and USGS probabilistic curves (975 yr return period) and is dominated by the USGS probabilistic curve. The Response Spectra are attached as Figure 9, and the design acceleration spectral values are provided in Table 3.

Table 4
Spectral Acceleration Values

T (sec)	Sa (g)
0	0.719
0.1	1.196
0.2	1.531
0.3	1.568
0.5	1.481
1	1.271
2	0.737
3	0.470
4	0.335
5	0.268

6.1 LIQUEFACTION

Strong ground shaking caused by large earthquakes can induce ground displacement and/or failure such as liquefaction, compaction settlement, and slope movement. A site's susceptibility to these hazards relates to the site topography, soil conditions, and/or depth to groundwater.

Liquefaction is a soil behavior phenomenon whereby saturated sediments temporarily lose shear strength and undergo volume change. This condition is caused by cyclic loading during earthquake shaking that generates high pore water pressures within the sediments. The soil most susceptible to liquefaction is loose, cohesionless, granular soil below the water table. Low plasticity fine-grained soils are also potentially liquefiable. Liquefaction can result in loss of foundation support and settlement of overlying structures, ground subsidence, and translation due to lateral spreading, and differential settlement of affected deposits. The unconsolidated alluvial deposits at the 23rd Avenue Overcrossing site have been mapped as moderately susceptible to liquefaction by the USGS (2006) as shown in Figure 10 and in a zone or required liquefaction investigation by the California Geological Survey.

The liquefaction potential for this site was evaluated using the procedure proposed by Seed *et al*. (2003) that is based on SPT blowcounts and soil characteristics. The recorded blow counts were corrected for various factors including hammer efficiency, fines contents, overburden pressure, borehole diameter, rod length, and sampling technique. The liquefaction analysis was also performed using the CPT data and correlations with the soil properties from the direct push sampling and borings. The analysis was performed in accordance with the methods proposed by Moss *et al.* (2006). As described in Section 5, the Hayward Fault (Mw=7.3) controls the seismic hazard at this site and could induce strong shaking up to 0.72g. Liquefaction potential was predicted at depths where the earthquake loading exceeded the soil resistance, or when the factor of safety against liquefaction, expressed as:

FS_L = *(cyclic shear stress required to cause liquefaction) / (equivalent cyclic shear stress induced by earthquake)*

is less than 1.

As mentioned earlier, the subsurface soil at 23rd Avenue generally consisted of stiff to hard clay that is not susceptible to liquefaction. The few amounts of silt and sand encountered as the project site, which are medium dense to dense with high fines content, could potentially liquefied given the design earthquake. However, because these cohesionless soils covered with a thick cohesive clay stratum and only encountered at localized spots, they are not expected to liquefy extensively. Therefore, liquefaction hazard is judged to be low or will not cause significant ground surface failures.

6.2 FAULT RUPTURE

The nearest active fault is the Hayward fault located approximately 4.6km northeast of the site. The structure does not fall within a CGS Fault-Rupture Hazard Zone (Alquist-Priolo Earthquake Fault Zone). Caltrans (2009) considers a distance of 50 horizontal feet on either side of a field-evaluated active fault trace to have a potential for surface fault rupture displacement hazard (SFRDH). Therefore the potential for ground surface rupture is not a design consideration for the 23rd Ave Overcrossing.

6.3 LANDSLIDE AND SLOPE FAILURE

Due to the relatively flat topography at the site, landsliding is not considered a hazard. The existing fill embankment slopes at the site appear stable, and no slumping or slope distress was noted during the site reconnaissance.

6.4 GROUND SUBSIDENCE/HEAVE

Expansive soils are those that shrink or swell significantly with changes in moisture content. The clay content and porosity of the soil also influence its volume change characteristics. The shrinking and swelling caused by expansive clay-rich soils, , typically LI>50 or PI> 25, often result in damage to overlying structures.

The clayey soils within the effect zone of water table fluctuation encountered during drilling are of low to medium plasticity (PI~20), suggesting that the site soils may be considered marginally expansive. Therefore, expansive soil potential is not considered to be of major concern at the site.

6.5 FLOOD

FEMA flood zone maps (http://www.fema.com) indicate that the project area is located outside the 100-year flood plain. However, during periods of heavy rains and high tides the approaches to the overcrossing may experience flooding. Tsunami, or seismically induced large waves, may be generated by rapid movements on earthquake faults. Studies have been conducted on wave attenuation within San Francisco Bay in the event of a large tsunami, and while this hazard is relatively low, there is the remote possibility that it could affect the project site and should be considered.

6.6 SCOUR

Because the existing and proposed structure supports are located outside waterways, scour is not an issue for foundation design.

6.7 CORROSION

As per California Amendments To AASHTO LRFD Bridge Design Specifications – Fourth Edition (2008b), "Corrosive" water or soil contains more than 500 parts per million (ppm) of chlorides. Sites that are considered corrosive due solely to sulfate content greater than 2,000 ppm and/or a pH of less than 5.5 shall be considered non-corrosive.

The Chloride ion concentration from the chemical analysis ranges from none detected to 25 mg/kg. Because Chloride ion concentration is less than 500 mg/kg, they are determined to be insufficient to attack steel embedded in a concrete mortar coating. The results of low sulfate content and high pH from the chemical analysis indicate that the soil at the 23rd Avenue site is none corrosive. However, pH from the chemical analysis by EMI was measured in a range of 6.5 to 7.6. Based on these measured pH value and sulfate concentration, cement type should be in accordance with table 8.22.2 of Caltrans Bridge Design Specification BDS (Caltrans, 2003) for

"Soil or Water pH from 5.6 to 7". Additional corrosion protection requirements for concrete structural members are presented in Section 8.22 of the Caltrans BDS (Caltrans, 2003).

7.1 DESIGN ASSUMPTIONS

The idealized soil profile with soil stratigraphy, soil engineering parameters, and estimated groundwater level are presented in Table 3 and Section 4.3, respectively. The idealized soil profile is the basis for developing foundation recommendations for the proposed structures within the project area.

7.2 EXISTING FOUNDATIONS

The 23rd Avenue Overcrossing, constructed around 1947, consists of two, two-lane bridges. The northern bridge (Caltrans Bridge No. 33-0139) carries southbound traffic and the southern bridge (Caltrans Bridge No. 33-0149) carries northbound traffic on 23rd Avenue. The southbound bridge spans I-880 between bents 7SB and 9SB and the northbound bridge spans I-880 between bents 4NB and 6NB. The bridges underwent a seismic retrofit in the mid 1990's.

The bents and abutments of the north bridge (southbound) were originally supported by 32-ton design load, reinforced concrete piles with embedment lengths ranging from about 30 to 50 feet. The bottom of pile cap elevations range from EL +5 ft to +12.5 ft. Class 45-modified W piles were installed under select bents as part of the seismic retrofit. Pile caps were enlarged to accommodate the new piles. The ultimate pile capacity for the W-piles was 78 kips for uplift and 180 kips in compression according to as-built plans for seismic retrofit (Parsons De Leuw, 1994).

Similar to the southbound bridge, the bents and abutments for the northbound bridge were originally supported by reinforced concrete piles. The pile embedment lengths also range from about 30 to 50 feet with the bottom of pile cap elevations between EL +5 ft to +8.75 ft. Select bents were also retrofitted with enlarged pile caps and Class 45 W piles.

7.3 NEW FOUNDATION ALTERNATIVES

Spread footings – Spread footing foundations bearing on competent soils are expected to be suitable for support of the bridge bents, as were used for the original 29th Avenue bridge construction. We found that adequate soil bearing capacity exists for spread footing foundations, however, excessive settlements are computed under the design loading.

Cast-in-drilled-hole (CIDH) piles –CIDH piles have the advantages of easy penetration into dense/hard soil zones, the availability of larger diameters for increased lateral capacity, and adaptability of length to variable subsurface conditions. The presence of shallow groundwater or caving soils can complicate the use of CIDH piles. From the constructability standpoint, CIDH piling rigs are more economical to mobilize than pile driving rigs, can work in limited access conditions, and have significantly lower noise and vibration impacts during pile installation than driving operations.

Driven precast concrete piles –The use of driven piles is sometimes limited due to constructability disadvantages such as noise and vibration impacts to adjacent structures during installation, as well as difficult driving conditions in dense sands or gravels. Based on the results of the subsurface investigation, the soil layers encountered at the site consists primarily of stiff to very stiff cohesive soils which are not likely to cause any drivability problem for driven piles.

Precast concrete piles offer advantages in shallow groundwater and caving soil conditions and perhaps most importantly do not produce drill spoils.

7.4 PROPOSED NEW FOUNDATIONS

CIDH piles have the flexibility of larger diameters for increased lateral capacity, which is the key factor for the design at 23rd Avenue to accommodate high lateral force demand. Therefore, 4.0'and 2.0' diameter cast-in-drilled-hole (CIDH) piles are selected for the bent and abutment foundations, respectively. Based on the investigations, we expect the CIDH piles will encounter groundwater between approximately Elevations +7 and +13 ft MSL. Tables 5 and 6 show the foundation design data provided by the Structural Engineer. Tables 7 and 8 present the foundation design for working stress design (WSD) and load and resistance factor design (LRFD), at the bents and the abutments, respectively. The proposed CIDH Pile Data Table is provided in Table 9.

Table 5
Foundation Design Data

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles per Support
					B	L		
Abut 1	WSD	24 inch CIDH	17	8.75**	13	74.25	1	23
Abut 1 RW Lt A	LRFD	24 inch CIDH	16	8.75**	12	69.83	1	18
Abut 1 RW Lt B	LRFD	24 inch CIDH	17	8.75**	12	73	1	16
Abut 1 RW Rt A	LRFD	24 inch CIDH	32	16.25**	12	20.83	1	6
Abut 1 RW Rt B	LRFD	24 inch CIDH	24	12.75**	12	13.67	1	4
Abut 1 RW Rt C	LRFD	24 inch CIDH	18	8.75**	12	26.5	1	7
Abut 1 RW Rt D	LRFD	24 inch CIDH	17	8.75**	12	19.5	1	6
Bent 2	LFRD	48 inch CIDH	20	10.75**	20	106	1	18*
Bent 3	LFRD	48 inch CIDH	Varies 17 to 20	8.75**	20	92	1	16*
Bent 4	LFRD	48 inch CIDH	Varies 15 to 20	6.75**	20	92	1	16*
Abut 5 Lt	WSD	24 inch CIDH	Varies 20 to 23	14.25**	12	70	1	22
Abut 5 Rt	WSD	24 inch CIDH	Varies 23 to 26	17.75**	12	34	1	9
Abut 5 WW Lt	WSD	24 inch CIDH	31	25.46**	4	4	1	1
Abut 5 RW Rt	LRFD	24 inch CIDH	26.5	17.75**	12	59.6	1	14

* Note that "per Support" implies "per Footing"
** Note that the Bottom of Footing is 3IN (0.25FT) below the Cut Off Elevation.

Table 6
Foundation Design Loading

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut 1	4298	196	3537	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 1 RW Lt A	1891	143	1700	2455	191	N/A	N/A	1689	236	N/A	N/A
Abut 1 RW Lt B	1411	179	1411	1618	217	N/A	N/A	1249	275	N/A	-119
Abut 1 RW Rt A	563	112	520	724	151	N/A	N/A	520	163	N/A	N/A
Abut 1 RW Rt B	306	92	278	397	122	N/A	N/A	279	160	N/A	-16
Abut 1 RW Rt C	540	121	486	703	160	N/A	N/A	488	172	N/A	-8
Abut 1 RW Rt D	322	86	322	372	106	N/A	N/A	287	238	N/A	-142
Bent 2	11149*	787	8451*	14196*	956	N/A	N/A	10850*	1087	N/A	N/A
Bent 3	10615*	780	8116*	14189*	1048	N/A	N/A	9329*	857	N/A	N/A
Bent 4	11859*	902	8468*	14672*	1069	N/A	N/A	11241*	1022	N/A	N/A
Abut 5 Lt	3440	189	2860	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 5 Rt	1623	193	1323	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 5 WW Lt	30	30	26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 5 RW Rt	1645	164	1547	2203	233	N/A	N/A	1547	309	N/A	-88

* Note that for strip footings "per Support" implies "per Footing"

Table 7
Foundation Recommendations for WSD

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support (Compression)		LRFD Service-1 Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	24" CIDH	8.75	4298	3537	196	400	-51 (a) -28 (c) -12 (d)	-51
Abut 5 Left	24" CIDH	14.25	3440	2860	189	380	-45 (a) -22.5 (c) -9 (d)	-45
Abut 5 Right	24" CIDH	17.75	1623	1323	193	390	-43 (a) -20 (c) -6 (d)	-43
Abut 5 WW Left	24" CIDH	25.46	30	26	30	60	14 (a) 18 (c) 5 (d)	5

Notes:

1. *Design tip elevations are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load, respectively.*
2. *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3. *Design tip elevation for Lateral Load is typically provided by Structural Engineer.*

Table 8
Foundation Recommendations for LRFD

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (ϕ = 0.7)	Tension (ϕ = 0.7)	Comp. (ϕ = 1.0)	Tension (ϕ = 10)		
Abut 1 RW Left A	24" CIDH	8.75	1891	1	191	N/A	236	N/A	-38 (a-I) N/A (b-I) -33 (a-II) N/A (b-II) -21 (c) -24 (d)	-38
Abut 1 RW Left B	24" CIDH	8.75	1411	1	217	N/A	275	119	-42 (a-I) N/A (b-I) -38 (a-II) -24 (b-II) -27 (c) -12 (d)	-42
Abut 1 RW Right A	24" CIDH	16.25	563	1	151	N/A	163	N/A	-22 (a-I) N/A (b-I) -14 (a-II) N/A (b-II) -19 (c) -6 (d)	-22
Abut 1 RW Right B	24" CIDH	12.75	306	1	122	N/A	160	16	-20 (a-I) N/A (b-I) -18 (a-II) 8 (b-II) -9 (c) -8 (d)	-20
Abut 1 RW Right C	24" CIDH	8.75	540	1	160	N/A	172	8	-32 (a-I) N/A (b-I) -24 (a-II) 5 (b-II) -18 (c) -12 (d)	-32
Abut 1 RW Right D	24' CIDH	8.75	322	1	106	N/A	238	142	-21 (a-I) N/A (b-I) -33 (a-II) -28 (b-II) -10 (c) -17 (d)	-33
Bent 2	48" CIDH	10.75	11149	1	956	N/A	1087	N/A	-77 (a-I) N/A (b-I) -64 (a-II) N/A (b-II) -52 (c) -50 (d)	-77

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (ϕ = 0.7)	Tension (ϕ = 0.7)	Comp. (ϕ = 1.0)	Tension (ϕ = 10)		
Bent 3	48" CIDH	8.75	10651	1	1048	N/A	857	N/A	-84 (a-I) N/A (b-I) -51 (a-II) N/A (b-II) -18.75 (c) -44 (d)	-84
Bent 4	48" CIDH	6.75	11859	1	1069	N/A	1022	N/A	-86 (a-I) N/A (b-I) -65 (a-II) N/A (b-II) -61 (c) -57 (d)	-86
Abut 5 RW Right	24" CIDH	17.75	1645	1	233	N/A	309	88	-37 (a-I) N/A (b-I) -34 (a-II) -5 (b-II) -16 (c) -16 (d)	-37

Notes:

1. *Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, (d)Lateral Load..*
2. *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3. *Design tip elevation for Lateral Load is typically provided by Structural Engineer.*

Table 9
Proposed CIDH Pile Data Table

Location and B.O.F. EL (ft)	Pile Type	Nominal Capacity (kips)		Design* Tip Elevations (ft)	Specified Tip Elevations (ft)
		Compression	Tension		
Abut 1 B.O.F=8.50	24-in CIDH	400	0	-51$^{(A)}$ -12$^{(C)}$	-51
Abut 1 RW Left A B.O.F=8.50	24-in CIDH	280	0	-38$^{(A)}$ -24$^{(C)}$	-38
Abut 1 RW Left B B.O.F=8.50	24-in CIDH	310	120	-42$^{(A)}$ -24$^{(B)}$ -12$^{(C)}$	-42
Abut 1 RW Right A B.O.F=16.00	24-in CIDH	220	0	-22$^{(A)}$ -6$^{(C)}$	-22

Location and B.O.F. EL (ft)	Pile Type	Nominal Capacity (kips)		Design* Tip Elevations (ft)	Specified Tip Elevations (ft)
		Compression	Tension		
Abut 1 RW Right B B.O.F=12.50	24-in CIDH	180	20	-20(A) 8(B) -8(C)	-20
Abut 1 RW Right C B.O.F=8.50	24-in CIDH	230	10	-32(A) 5(B) -12(C)	-32
Abut 1 RW Right D B.O.F=8.50	24-in CIDH	240	150	-33(A) -28(B) -17(C)	-33
Bent 2 B.O.F=10.50	48-in CIDH	1370	0	-77(A) -50(C)	-77
Bent 3 B.O.F=8.50	48-in CIDH	1500	0	-84(A) -44(C)	-84
Bent 4 B.O.F=6.50	48-in CIDH	1530	0	-86(A) -57(C)	-86
Abut 5 Left B.O.F=14.00	24-in CIDH	380	0	-45(A) -9(C)	-45
Abut 5 Right B.O.F=17.50	24-in CIDH	390	0	-43(A) -6(C)	-43
Abut 5 WW Left B.O.F=25.00	24-in CIDH	60	0	14(A) 5(C)	5
Abut 5 RW Right B.O.F=17.50	24-in CIDH	340	90	-37(A) -5(B) -16(C)	-37

*Design tip elevation is controlled by the following demands:

(A) Compression, (B) Tension, (C) Lateral Loads

The drilled piers primarily derive their resistance through skin friction between the pier concrete and surrounding soils. Thorough cleaning of the pier bottom, which is especially difficult if drilling mud is used, is required to develop full end-bearing capacity. The end-bearing capacity was not considered in estimating the pile tip elevations presented in Table 7 and Table 8. The frictional pier resistance was calculated using the procedures recommended by the AASHTO (2010). The pile data are recommended following the LRFD method per Caltrans Amendments to AASHTO Bridge Design Specifications (2008b), and Caltrans Memo To Designer (2008a).

The computer program LPILE plus 6.0 and Group 8.0 were utilized, depending on the availability of pile group configuration, to analyze the individual pier or pile group response to applied lateral and axial loads with a series of nonlinear springs that are internally generated by the program as a function of user-specified soil properties. The drilled piers were modeled with reinforcing steel equal to 1.5 percent of the cross-sectional area of the pier. In addition, the piers

were modeled free head conditions. The required depth to achieve lateral capacities is determined by the location of the second zero moment. The lateral displacements at the pile head are summarized in Table 10.

Table 10
Lateral Displacements at Pile Head

23rd Avenue Overcrossing	Deflection (in)		
	Service Limit State	Strength Limit State	Extreme Event State
Abutment 1	< 0.1	N/A	N/A
Abutment 1 RW Left A	< 0.1	0.2	0.3
Abutment 1 RW Left B	0.1	0.32	< 0.1
Abutment 1 RW Right A	< 0.1	< 0.1	0.3
Abutment 1 RW Right B	< 0.1	< 0.1	< 0.1
Abutment 1 RW Right C	< 0.1	< 0.1	< 0.1
Abutment 1 RW Right D	< 0.1	< 0.1	< 0.1
Bent 2	0.9	0.2	1.8
Bent 3	< 0.1	< 0.1	0.5
Bent 4	1.5	0.22	2.4
Abutment 5A	0.2	N/A	N/A
Abutment 5B	0.1	N/A	N/A
Abutment 5 WW – Left	< 0.1	N/A	N/A
Abutment 5 RW- Right	0.3	0.6	3.0

For initially computing the lateral resistance of piles arrayed in groups, a P-multiplier group efficiency factor should be applied for a single pile lateral resistance in the direction of loading. Table 11 summarizes P-multipliers for pile center to center spacings of 3 Diameters and 5 Diameters, where row 1 is the leading edge of the pile group.

Table 11
P-Multipliers for Pile Group Efficiency

	P-Multiplier		
Spacing	**Row 1**	**Row 2**	**Row 3**
3D	**0.7**	**0.55**	**0.40**
5D	**1.0**	**0.85**	**0.70**

7.5 APPROACH EMBANKMENTS

The existing approach embankment at the east and west ends of the 23rd Avenue Overcrossing will be relocated to accommodate the proposed replacement bridge. At the west side, the planned embankment will be extended from the existing embankment to the bent 3 of existing south bound bridge. The planned approach embankments will be 30 ft high at the new abutment location and slope to 20ft high while approaching to existing embankments. At the east side, the planned embankment, approximate 25 ft high, will be relocated between the existing embankment of south and north bound bridge. The new embankments will be the constructed by MSE walls.

We estimate consolidation settlement due to the proposed fill at the abutments and approach embankments will be on the order of 2.5 to 5.0 inches. Slightly larger values were obtained by the roadway geotechnical consultant (EMI, 2011). We estimate up to 5 month settlement periods are required for 90% of predicted settlements to occur. Slightly longer settlement periods were obtained by the roadway geotechnical consultant (EMI, 2011).

Although the construction schedule can accommodate 5 month periods for the embankment-induced settlement to be completed prior to installing abutment foundations, there is limited right of way available to place surcharge prior to construction at the abutment locations. Therefore, the abutment areas would not adequately settle prior to construction of the abutments. In addition, settlement due to surcharge can impact existing adjacent facilities (e.g. an existing utility corridor and building) at the southerly approach of 23rd Avenue.

At the north approach of 23rd Avenue where no existing adjacent facilities are present, the construction sequence will be to first build embankment and MSE walls, allow the settlement period to occur, install piles, build abutment backwall and wingwalls, and then place backfill between abutment walls and MSE walls.

The same construction sequence applies at the southerly approach of 23rd Avenue but, instead of using conventional, earth fill, light-weight fill (such as EPS block) will be placed between abutment walls and MSE walls. Light weight fill is required to fill this “hole” because piles will already be in the ground and are not designed for additional settlement and downdrag. Therefore, we propose to use lightweight Expanded Polystyrene Block (EPS) in lieu of earth embankments at all abutment locations. At the southerly approach of 23 rd Avenue, placement of conventional earthen fill behind the new overcrossing abutment will also induce settlement and impact the existing foundation of the southerly bridge that needs to remain open in the first stage of construction. Therefore, we recommend extending the limits of the EPS Block to cover the area between the new abutment (Sta. 20+90) and the existing southerly bridge abutment (Sta. 20+20.) The embankments constructed of EPS block will exert minimal surcharge, and therefore settlement, downdrag loads on piles, and impact to existing facilities are mitigated. However, it should be noticed that EPS Block presents a less passive resistance and higher compressibility compared to conventional fills.

7.6 CONSTRUCTION CONSIDERATIONS

Potential construction considerations are expected to include:

- Limited access: resolve the limited access conditions in the median of I-880 at the overcrossing. Given 22 ft free space between K-rails in the median, the drilling work for a 6 foot diameter (or smaller) drilled pier can be performed. However, removing spoil, delivering and installing reinforcing cages, and tremie concrete placement will all require lane closures, and these operations would likely be performed during nighttime lane closures. For constructing larger diameter shafts (more than 6 ft diameter), the crane would typically be 22 ft wide but it needs additional room to swing so it require more than 30 ft between barriers.
- Physical conflicts: resolve potential conflicts with locations of new bridge supports and all existing facilities such as utilities.
- Loading conflicts: resolve potential conflicts with loading imposed on existing facilities by new bridge/retaining wall foundations or approaches.

  Groundwater: dewatering and other groundwater control measures might be required depending on construction methods.

The opinions, conclusions and recommendations presented herein are based on subsurface information developed by others. The recommendations presented in this report are based on the assumption that the soil and geologic conditions do not deviate substantially from those anticipated by the information contained in the existing logs of test borings. If any variations are encountered during construction, the Geotechnical Professional (URS) should be contacted so that supplemental recommendations can be made.

If existing facilities, utilities, soils/bedrock conditions, road/structure distress, slope distress or groundwater/seepage conditions other than those noted in this report are present on the site, then their presence was not known, or was not considered in the preparation of this report. Locating utilities and evaluating potential utility interference is outside the scope of this report. Individuals utilizing this report shall inform URS Corporation if they are aware of any additional facilities or site conditions so that their presence and impact upon the project (or vice-versa) can be properly evaluated and recommendations modified to address geotechnical issues as necessary.

The Geotechnical Professional shall be given the opportunity to review the final specifications and drawings to verify that those documents are consistent with the intent of the geotechnical recommendations.

Geotechnical issues may arise during construction that were not apparent at the time this report was prepared. The Geotechnical Professional should be retained during construction to review the soil conditions encountered and the construction procedures used. All earthwork, pile and wall installation and testing should be completed under the direct observation of the Geotechnical Professional.

Specific review and investigation for environmental issues and subsurface environmental contamination were beyond the scope of our services.

The opinions and recommendations presented in this report were developed with the standard of care commonly used by other professionals practicing at the same time, within the same locality and under the same limitations. No other warranties are included, either express or implied, as to the professional advice included in this report.

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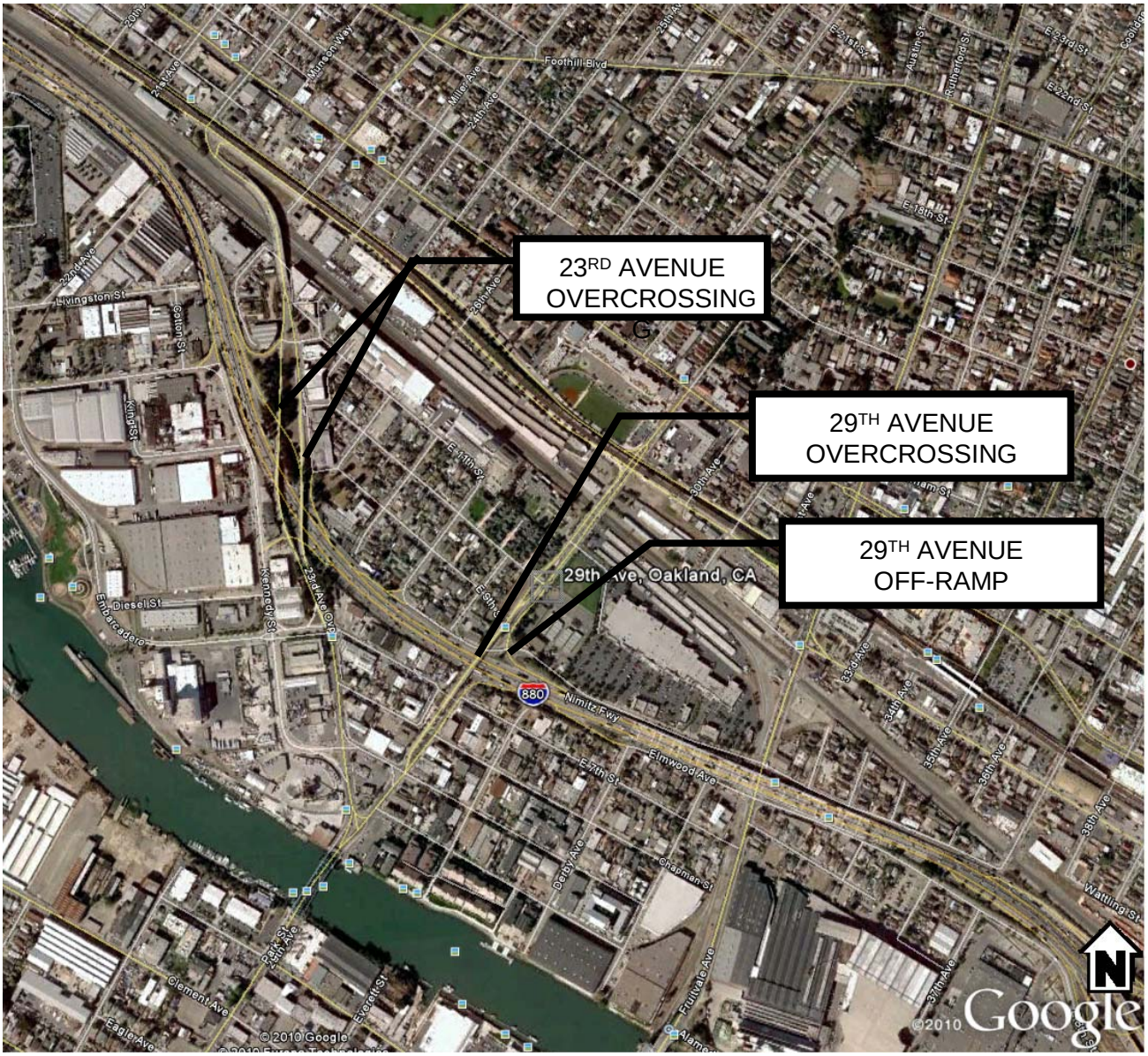
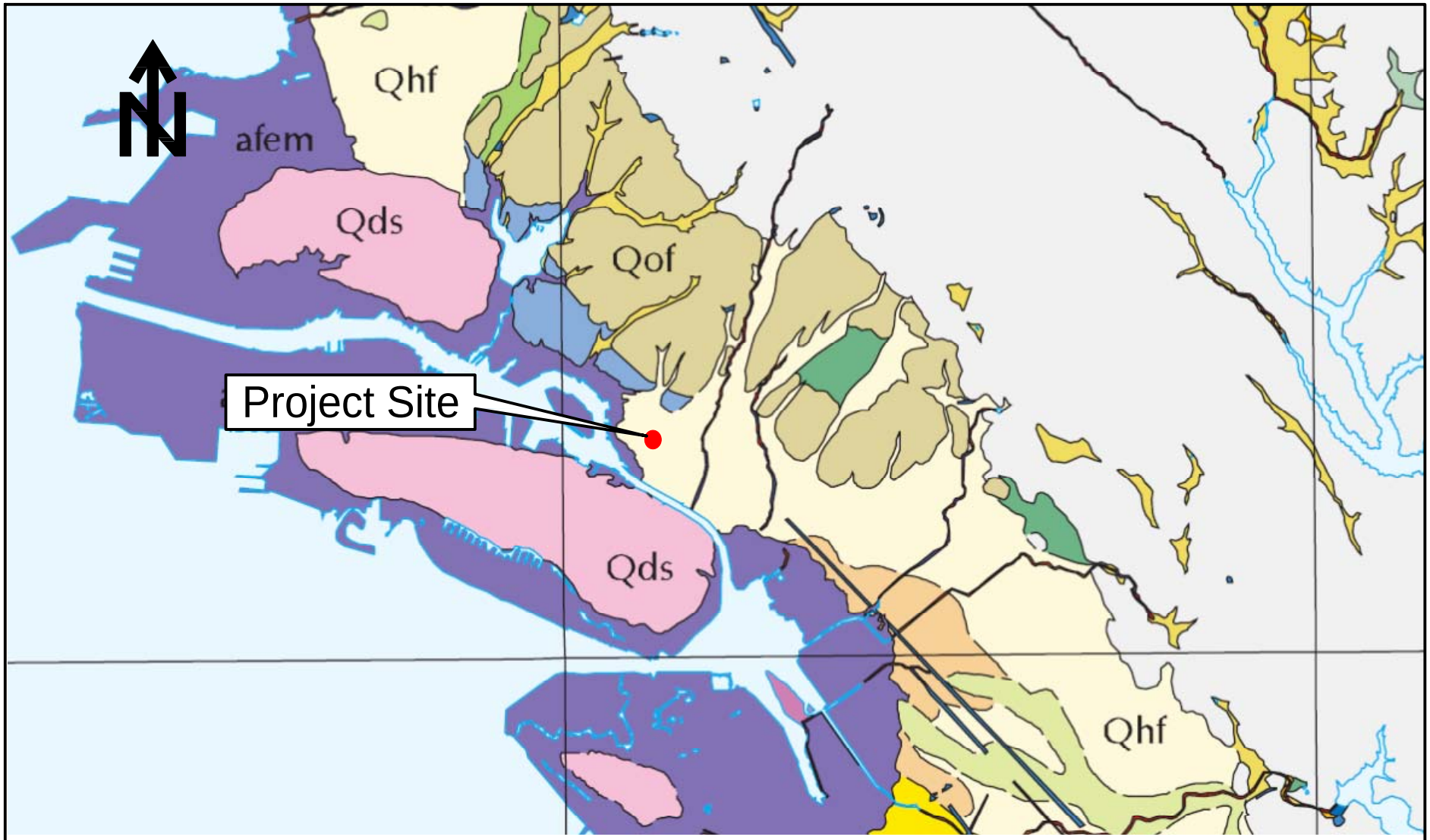
Working Group on California Earthquake Probabilities (WGCEP). 2003. Earthquake probabilities in the San Francisco Bay area: 2002-2031: U.S. Geological Survey Open-File Report 03-214.

Figures



URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Site Vicinity**	Figure 1

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure



USGS Quaternary Deposits Map, Witter (2006)

afem: Artificial fill over estuarine mud

Qhf: Alluvial fan deposits (Holocene)

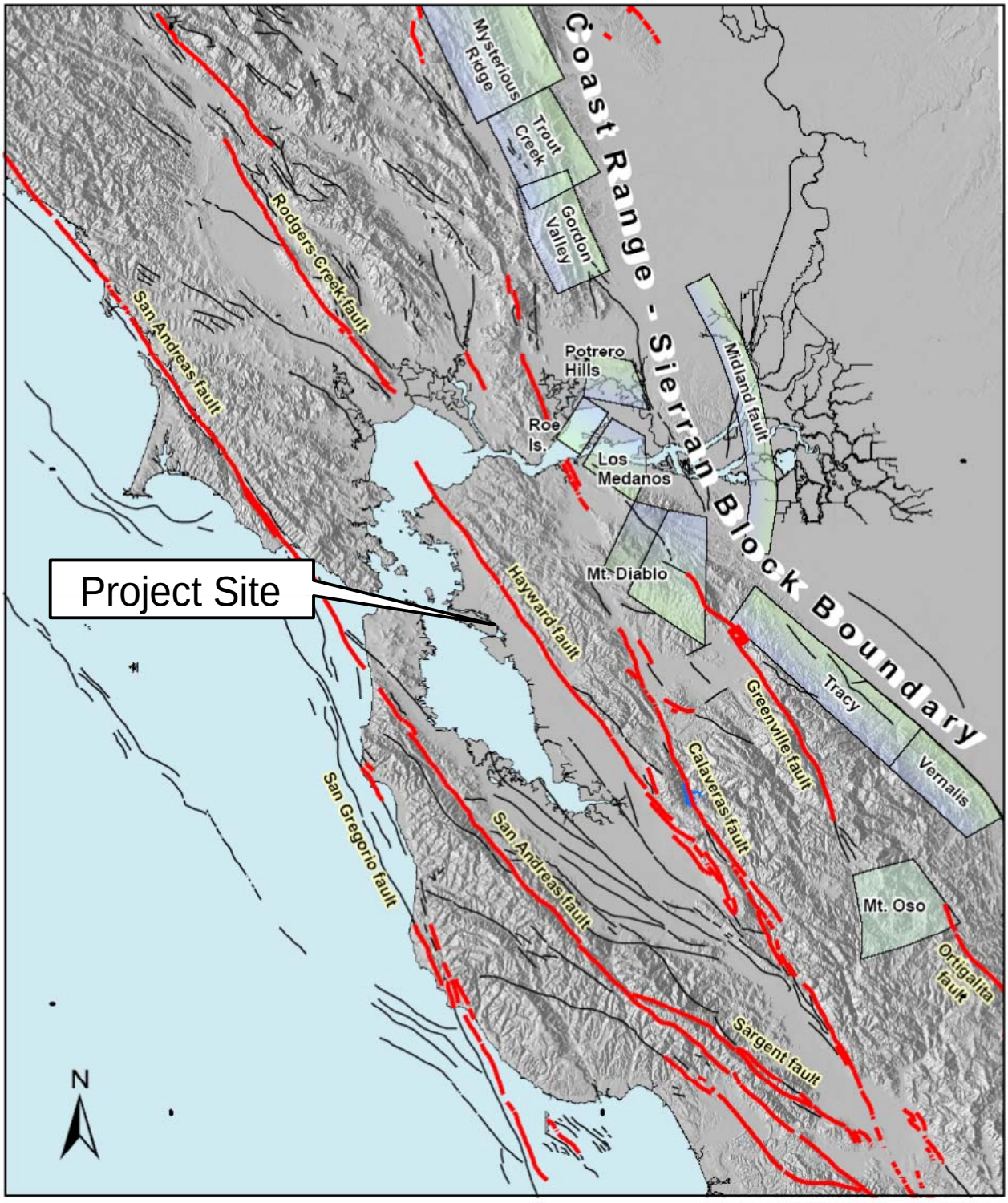
Qof: Alluvial fan deposits (Early to Late Pleistocene)

Qds: Dune sand (Holocene to Latest Pleistocene)

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**Regional Geology**	**Figure 2**

URS

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure



Blind Thrust Depth

Shallow

Deep

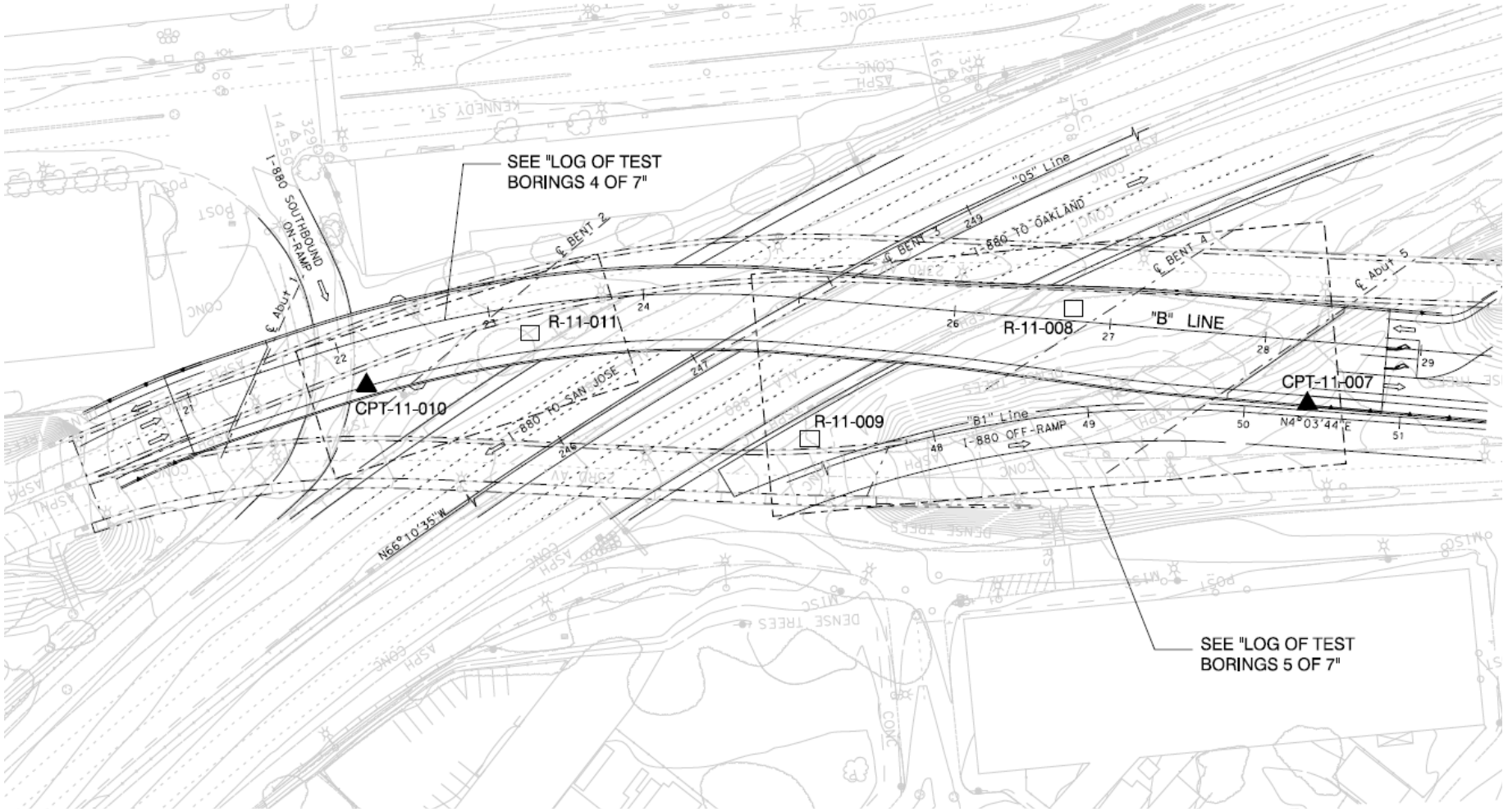
Legend

0 25 50 75 100 Kilometers

Sources:
Jennings 1994
O'Connell et al., 2001
Unruh and Hector, 1999

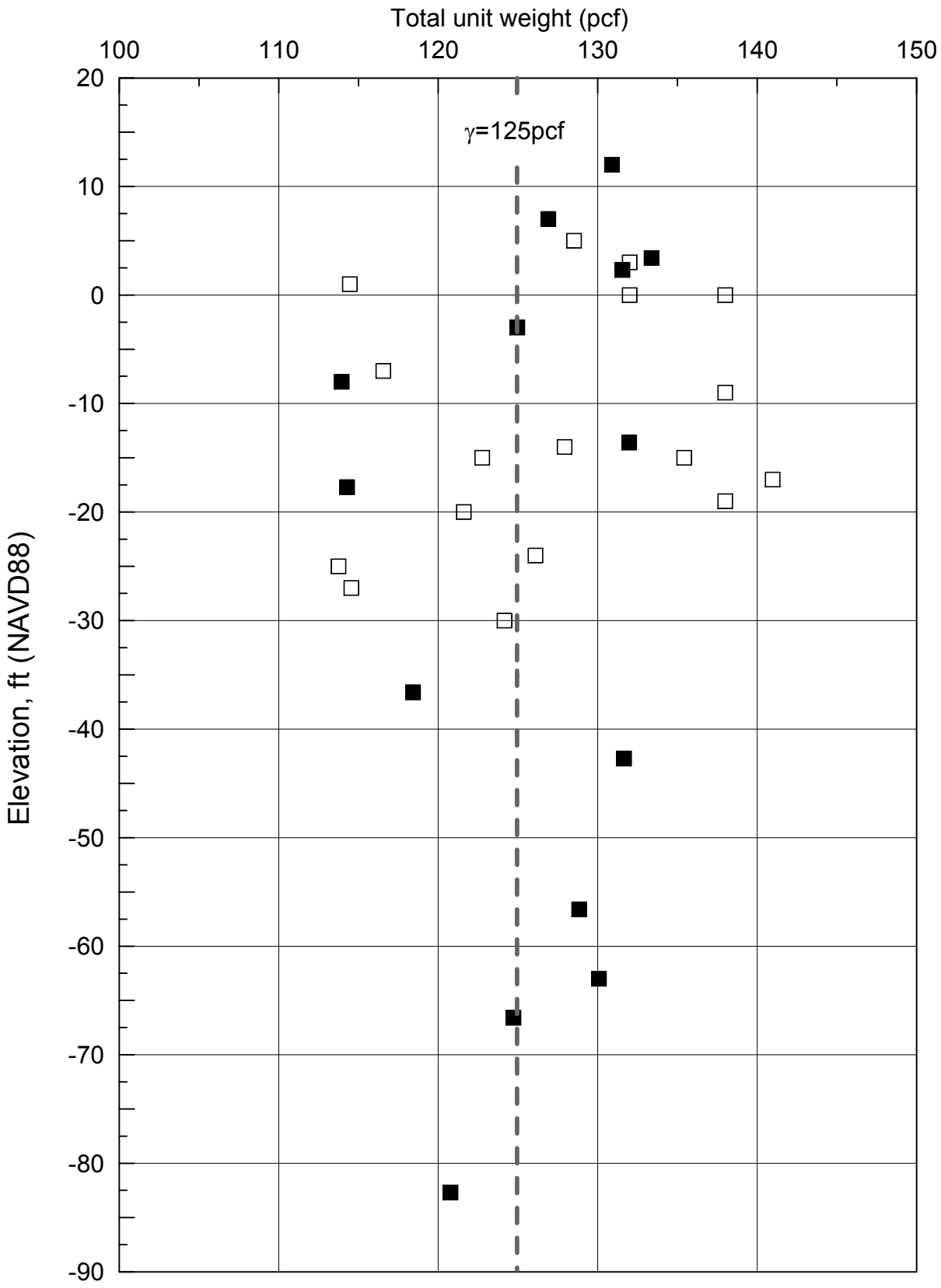
URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Active Faults**	Figure 3

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure



Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**23rd Ave Overcrossing Boring Locations**	**Figure 4**
URS			

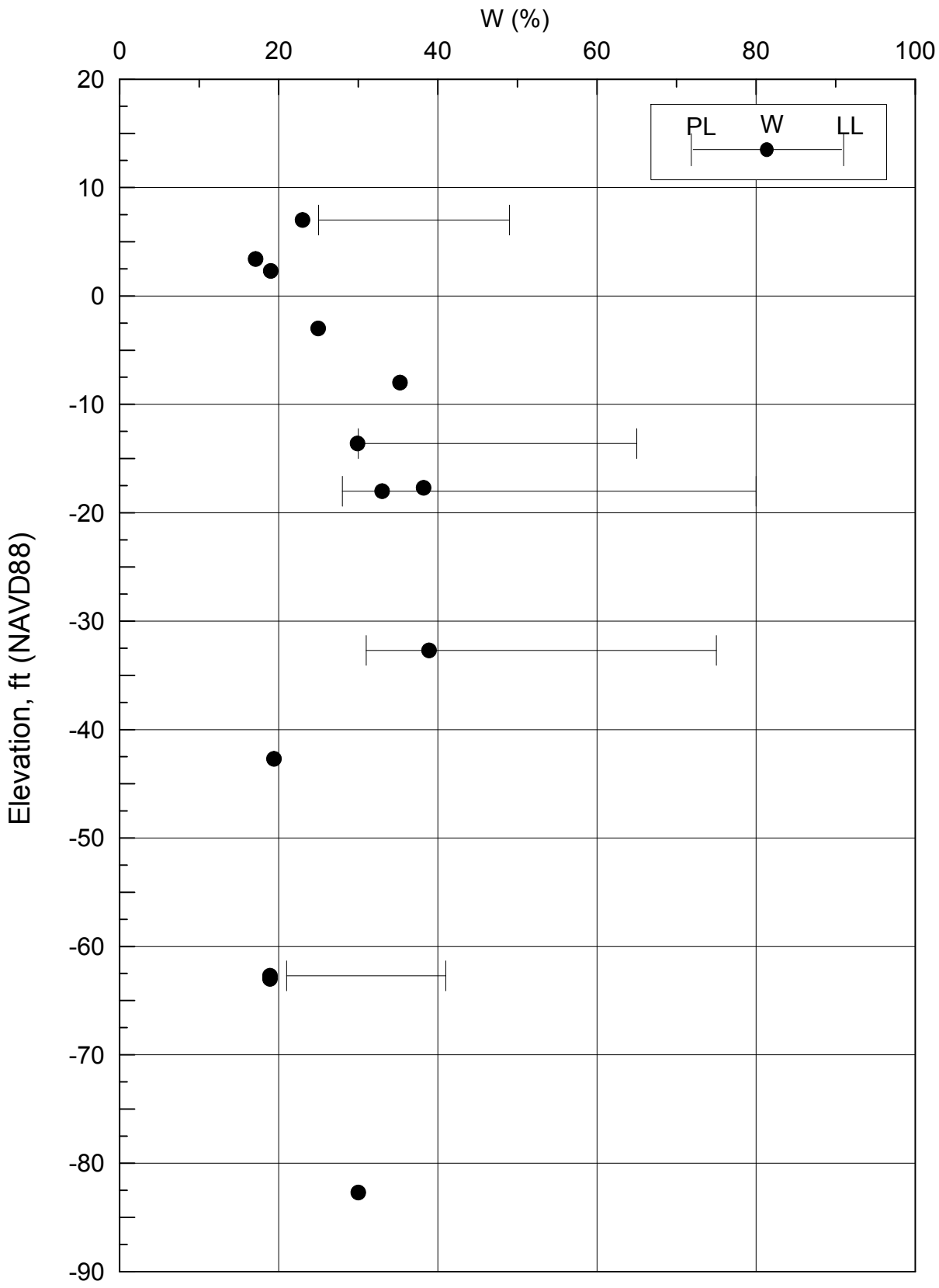
X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\23rd AVE\Foundation Report\Draft\Figure



Note: Solid symbols are URS data (2011); hollow symbols are previous data

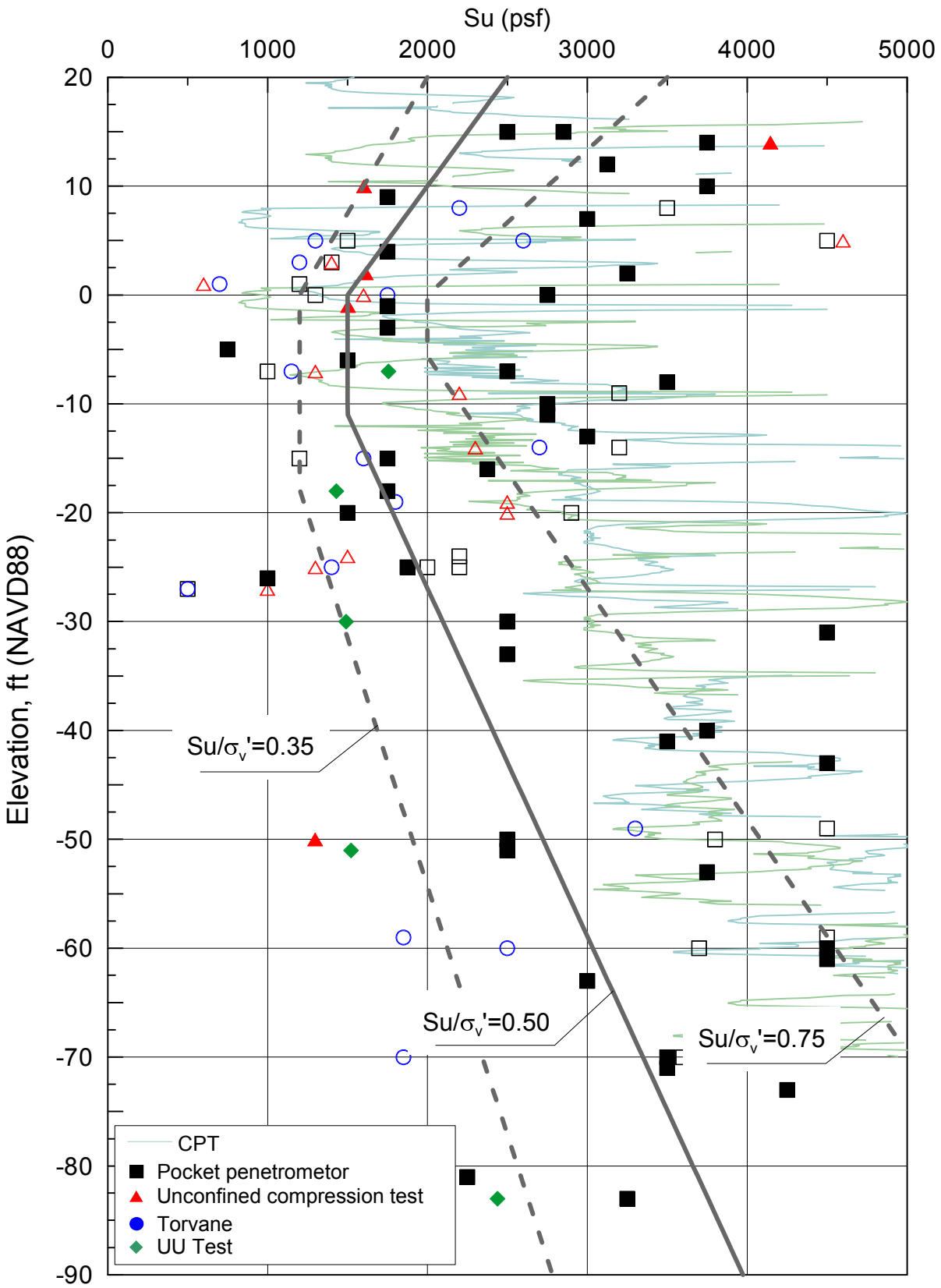
URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Unit Weight**	Figure 5

X:\x_geo\ACCMA 23rd and 29th Ave\02 characterization



URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Water Content,Liquid Limit (LL), and Plastic Limit (PL) of Cohesive Soils**	Figure 6

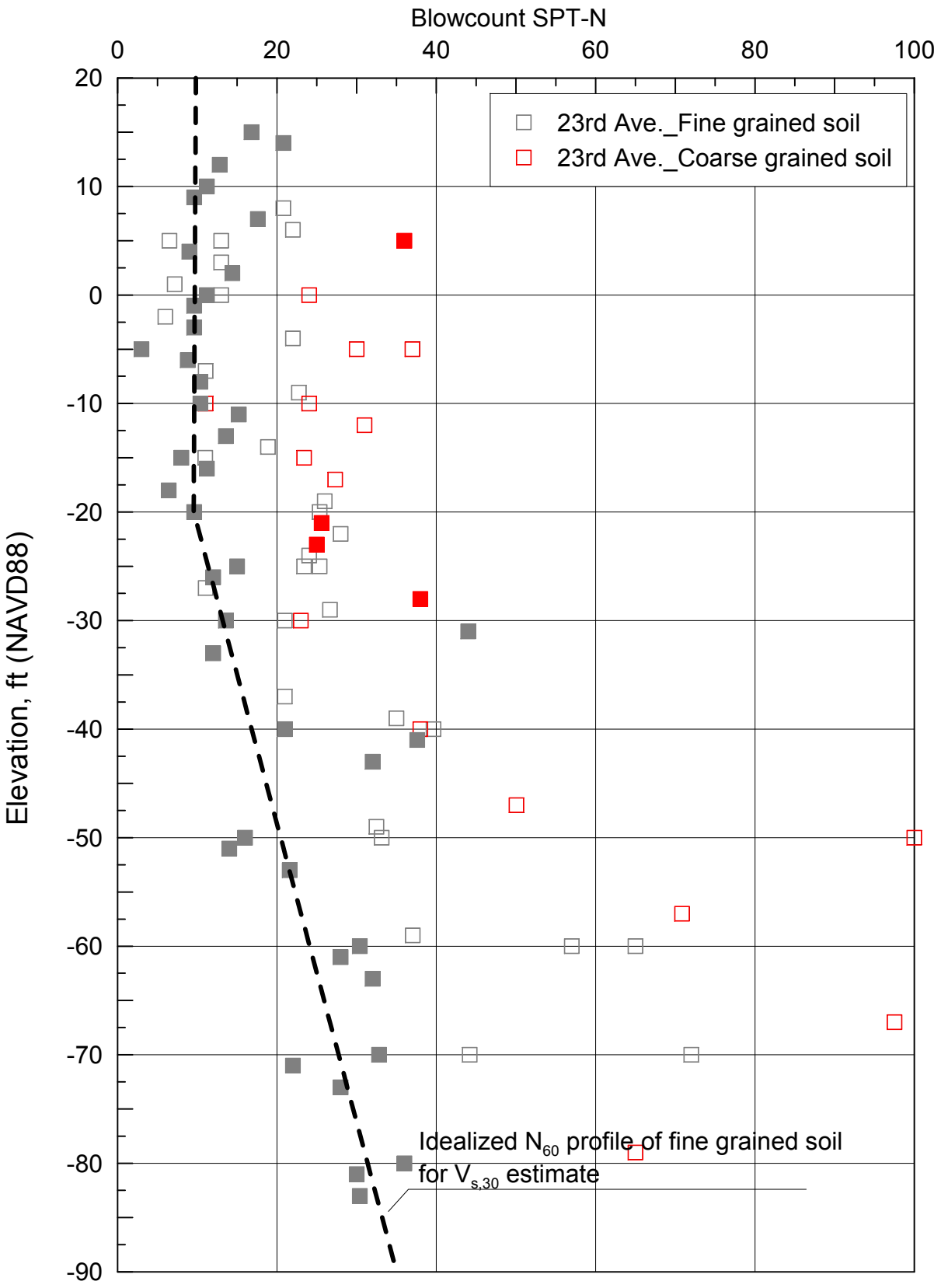
X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: 1. Solid symbols are URS data (2011); hollow symbols are previous data
2. Su estimated by CPT assuming N_{kT}=15

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Undrained Shear Strength of Fine-grained Soils at 23rd Ave.**	Figure 7

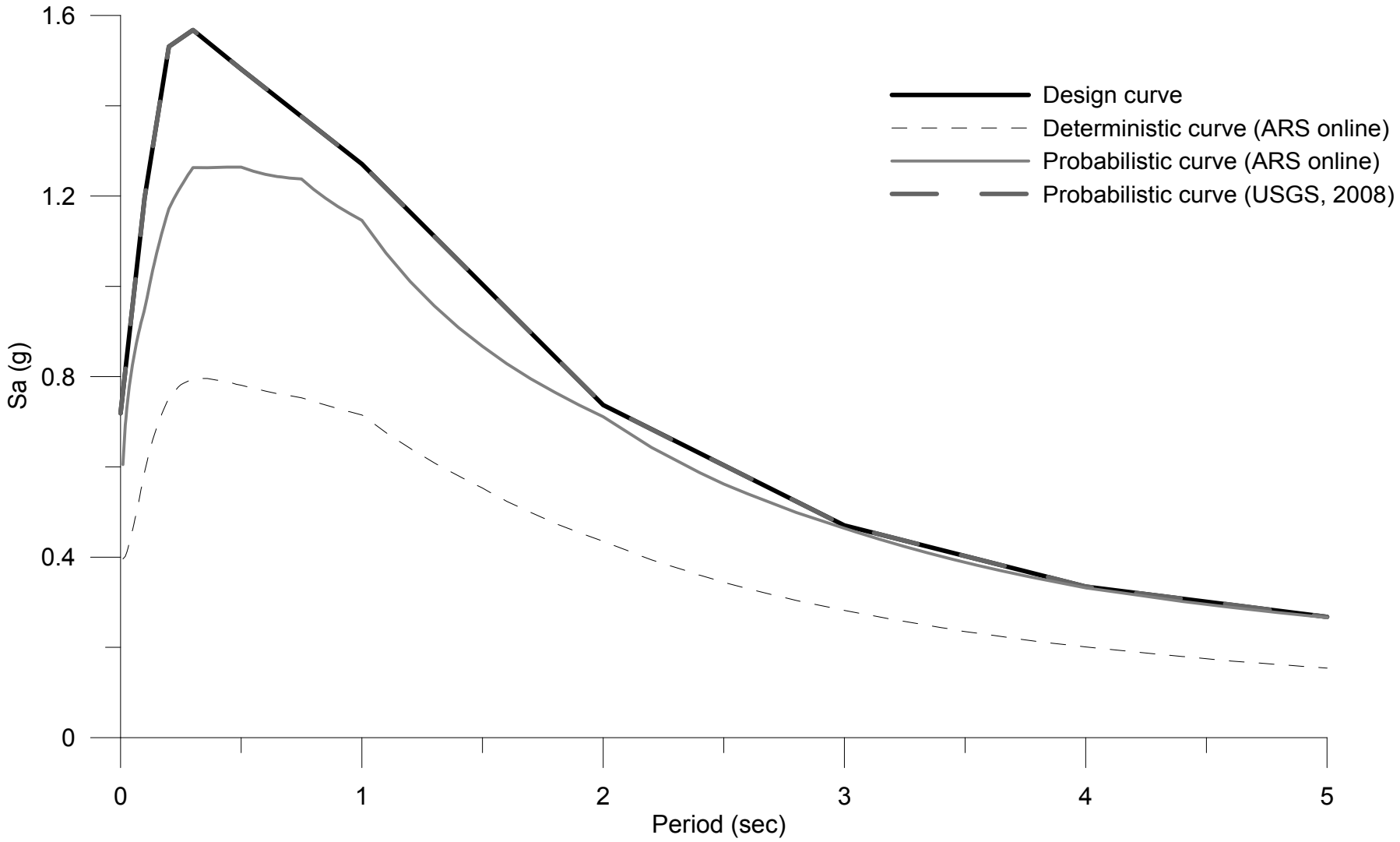
X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: Solid symbols are URS data (2011); hollow symbols are previous data

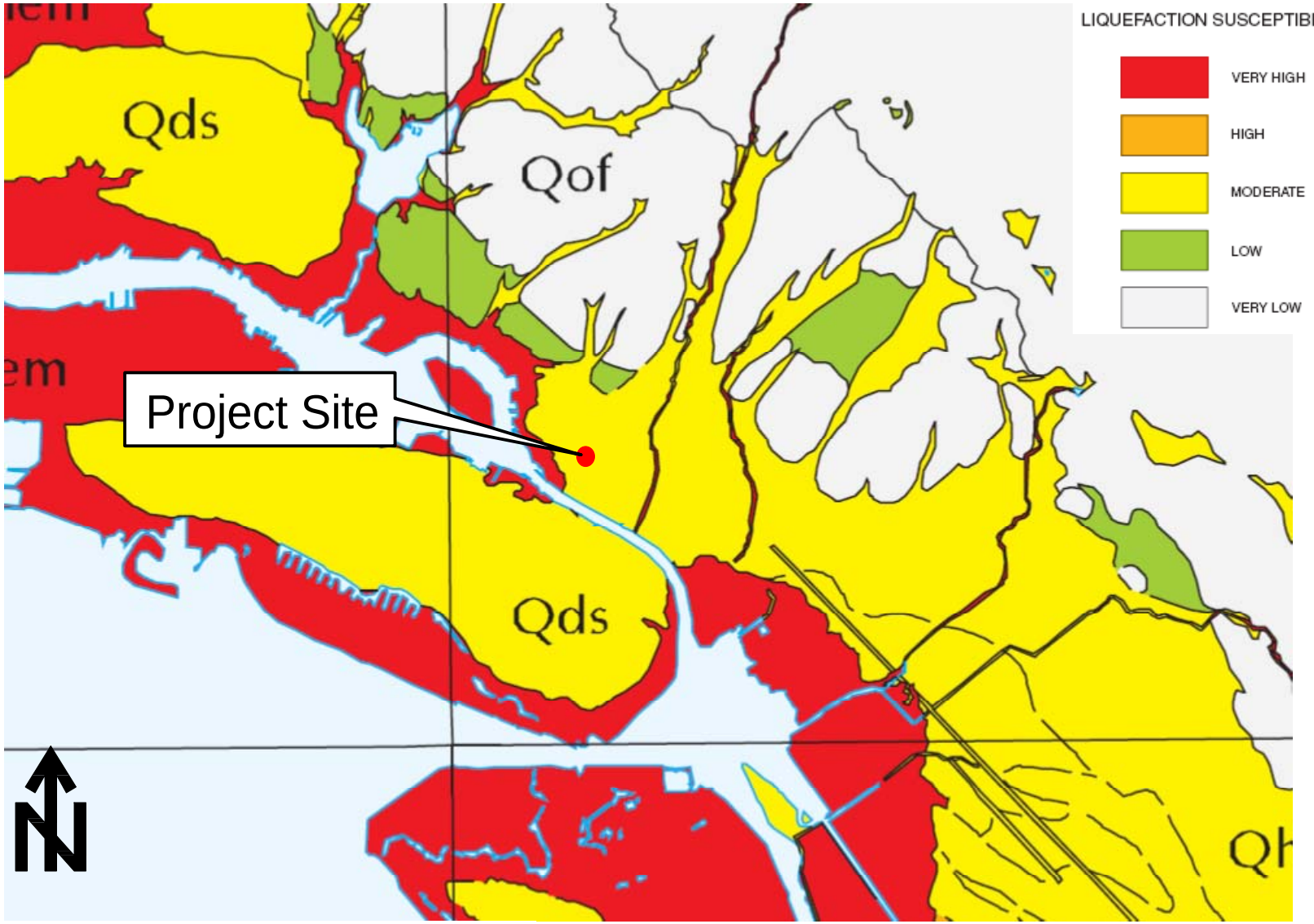
URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Blowcount SPT-N**	Figure 8

X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: 1. 5% damping spectrum
2. Near fault effects are included

URS	ACMMA I-880 23rd and 29th Project # 27560836	ARS Curve $V_{s,30}$=250 m/sec	Figure 9



USGS Liquefaction Susceptibility Map, Witter (2006)

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**Liquefaction Susceptibility**	**Figure 10**
URS			

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure

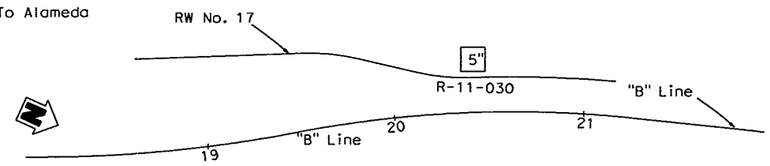
Appendix A
Logs of Test Borings from Previous Subsurface Investigation

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.
DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.
DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF
HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER L. CHEANG NO. GE 2345 EXP. 9-30-13 GEOTECHNICAL STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).
(2) 2.4" samples were taken using a California Modified Sampler.
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

CERTIFIED ENGINEERING GEOLOGIST 6/25/12 DATE

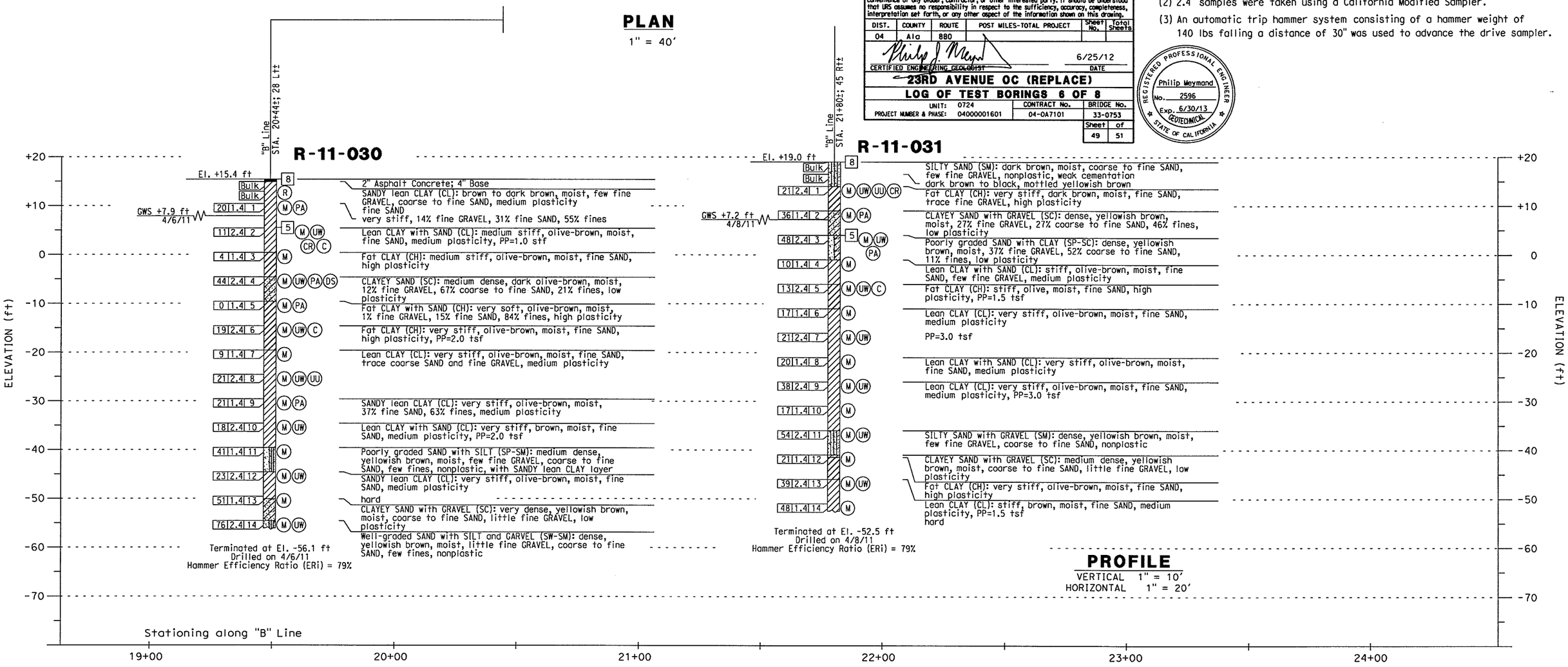
REGISTERED PROFESSIONAL ENGINEER Philip Meymand No. 2596 Exp. 6/30/13 GEOTECHNICAL STATE OF CALIFORNIA

23RD AVENUE OC (REPLACE)

LOG OF TEST BORINGS 6 OF 8

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7101	33-0753
		Sheet 49 of 51

PLAN
1" = 40'



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL No. 17
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011				POST MILES Varies	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

FILE => 33-0753-z-1tb06.dgn

CONTRACT NO.:04-0A7100 PROJECT ID:

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:30 AM

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	77,880	0.3, 27.6/29.2	107	108

Bahram Khamenehpour
GEOTECHNICAL PROFESSIONAL

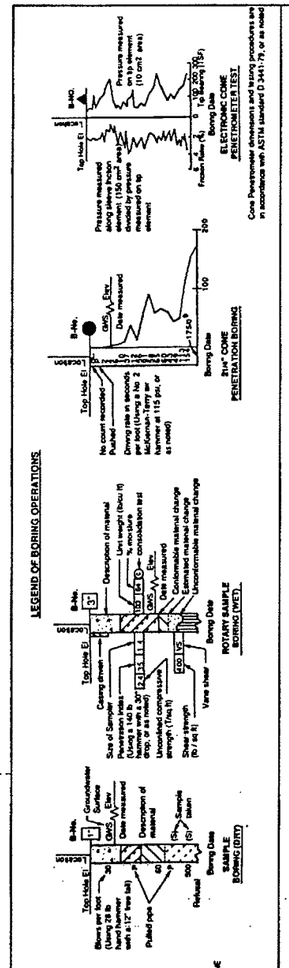
REGISTERED PROFESSIONAL ENGINEER — BAHRAM KHAMENEHPOUR — No. 2104 — Exp. 12/31/93 — GEOTECHNICAL — STATE OF CALIFORNIA

11-7-94
PLANS APPROVAL DATE

AGS, INC.
120 HOWARD STREET
SUITE 600
SAN FRANCISCO, CALIFORNIA 94105

NO CORRECTIONS THIS SHEET
AS BUILT
BT
CORRECTIONS BY 04-133234
CONTRACT NO.
DATE 11/6/97 MET 9/6/94

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

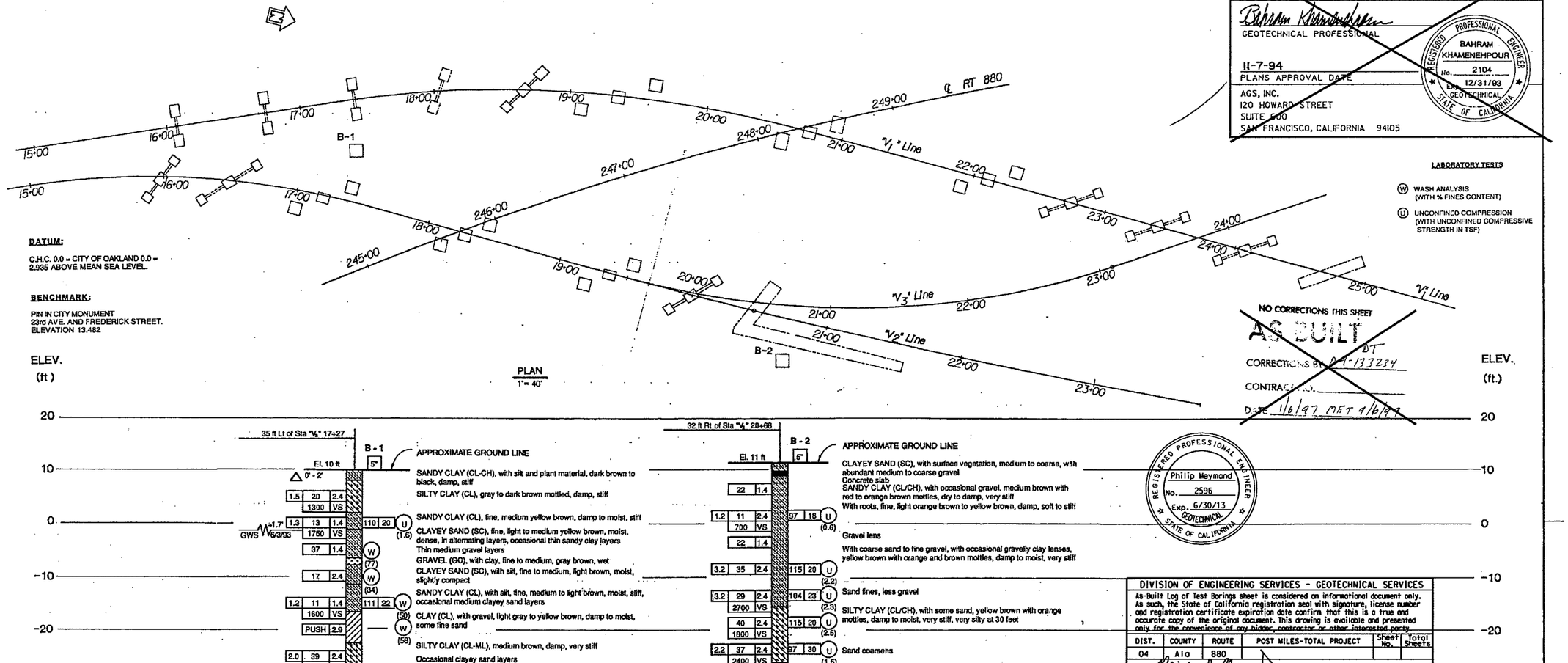
GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

Penetration Index (Blows / Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Firm
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analyses.



PLAN
1" = 40'

DATUM:

C.H.C. 0.0 = CITY OF OAKLAND 0.0 = 2.935 ABOVE MEAN SEA LEVEL.

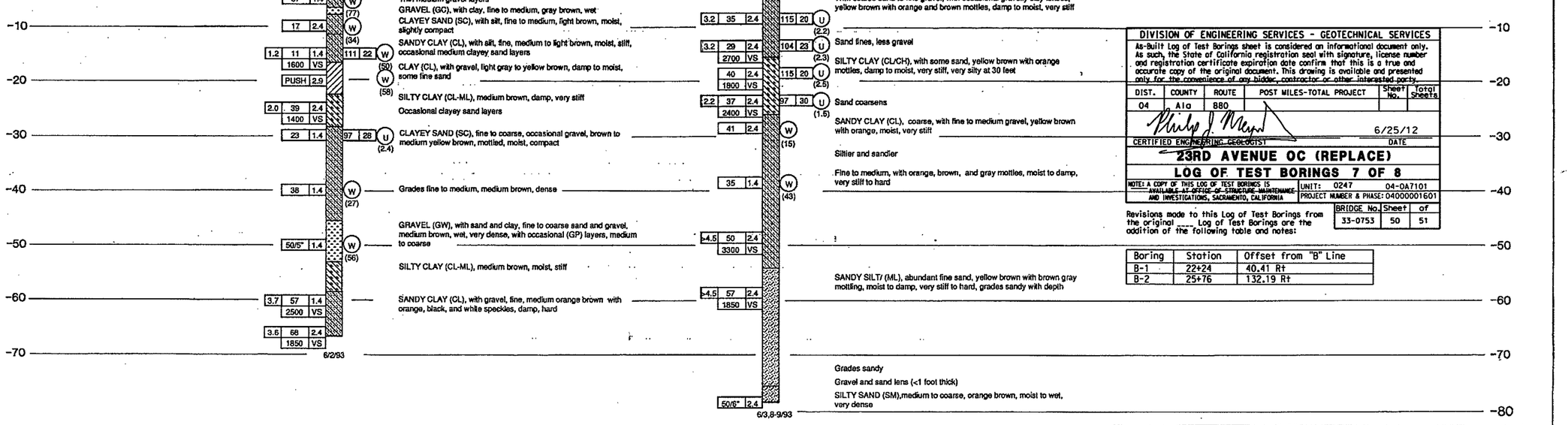
BENCHMARK:

PIN IN CITY MONUMENT
23rd AVE. AND FREDERICK STREET.
ELEVATION 13.482

LABORATORY TESTS

(W) WASH ANALYSIS (WITH % FINES CONTENT)

(U) UNCONFINED COMPRESSION (WITH UNCONFINED COMPRESSIVE STRENGTH IN TSF)



REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Philip J. Meymand — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

23RD AVENUE OC (REPLACE)

LOG OF TEST BORINGS 7 OF 8

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT: 0247 — 04-0A7101
PROJECT NUMBER & PHASE: 0400000601

BRIDGE No.	Sheet	of
33-0753	50	51

Revisions made to this Log of Test Borings from the original ____ Log of Test Borings are the addition of the following table and notes:

Boring	Station	Offset from "B" Line
B-1	22+24	40.41 Rt
B-2	25+76	132.19 Rt

M J Sullen
DESIGN OVERSIGHT
2-21-94
SIGN OFF DATE

DRAWN BY: J. LAPID
CHECKED BY: B. BROWN

C. ANDREWS
FIELD INVESTIGATOR
DATE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

B. KHAMENEHPOUR
PROJECT ENGINEER

BRIDGE NO. 33 - 0149
POST MILE 28.93

EARTHQUAKE RETROFIT PROJECT NO. 83

23RD AVE OVERCROSSING

LOG OF TEST BORINGS (NORTHBOUND)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 133231

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY): 7/7/93, 7/31/93, 10/8/93

SHEET 25 OF 26

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	77,880	0.3, 27.6/29.2	108	108

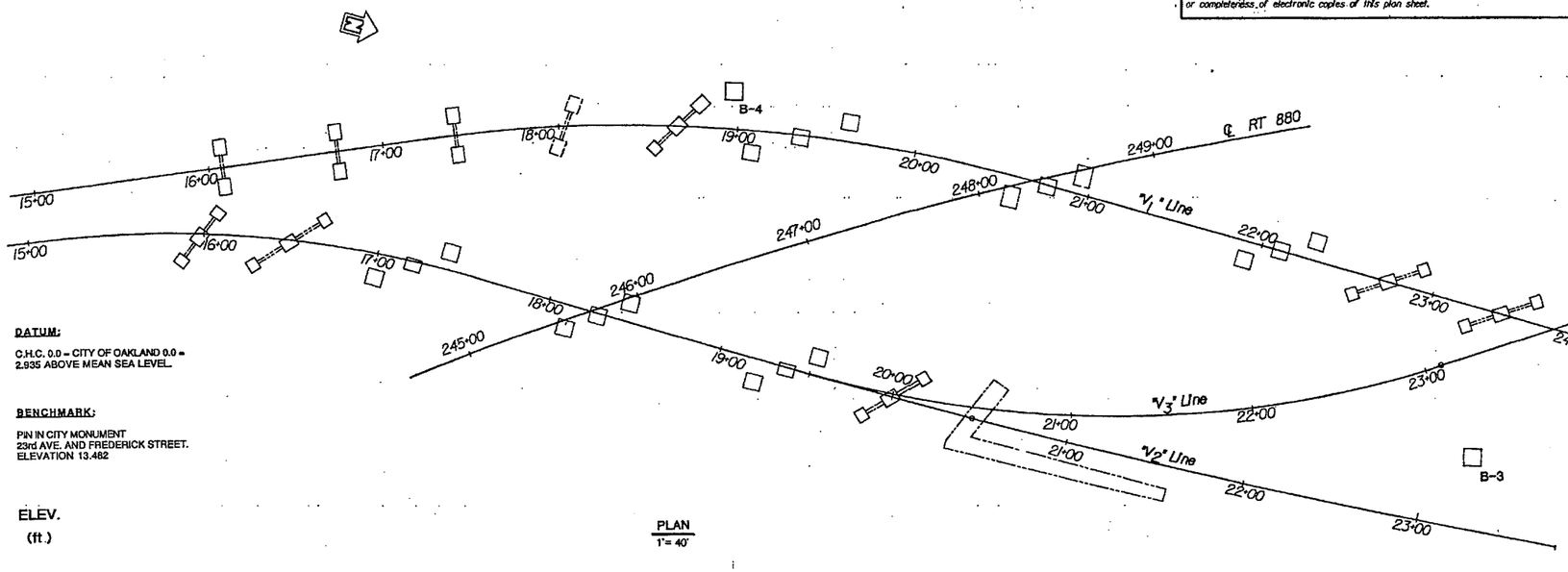
GEOTECHNICAL PROFESSIONAL

BAHRAM KHAMENEHPOUR
No. 2104
Exp. 12/31/93
GEOTECHNICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

11-7-94
PLANS APPROVAL DATE

AGS, INC.
120 HOWARD STREET
SUITE 600
SAN FRANCISCO, CALIFORNIA 94105

NO CORRECTIONS THIS SHEET
AS BUILT
CORRECTIONS BY DT
CONTRACT NO. 04-133234
DATE 4/6/97 MET 9/6/97



DATUM:

C.H.C. 0.0 = CITY OF OAKLAND 0.0 = 2.935 ABOVE MEAN SEA LEVEL.

BENCHMARK:

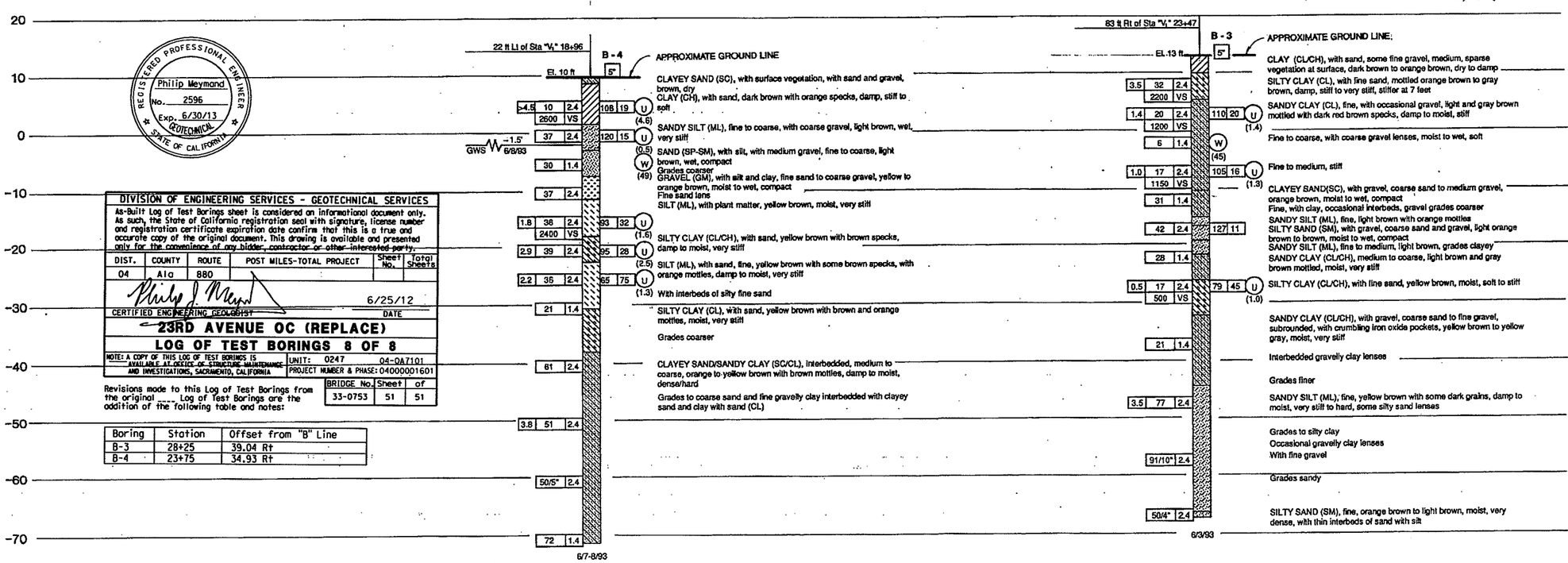
PIN IN CITY MONUMENT
23rd AVE. AND FREDERICK STREET.
ELEVATION 13.462

PLAN
1"= 40'

LABORATORY TESTS

(W) WASH ANALYSIS (WITH % FINES CONTENT)

(U) UNCONFINED COMPRESSION (WITH UNCONFINED COMPRESSIVE STRENGTH IN TSF)



Boring	Station	Offset from "B" Line
B-3	28+25	39.04 Rt
B-4	23+75	34.93 Rt

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Philip J. Meymand 6/25/12
CERTIFIED ENGINEERING GEOLOGIST DATE

23RD AVENUE OC (REPLACE)

LOG OF TEST BORINGS 8 OF 8

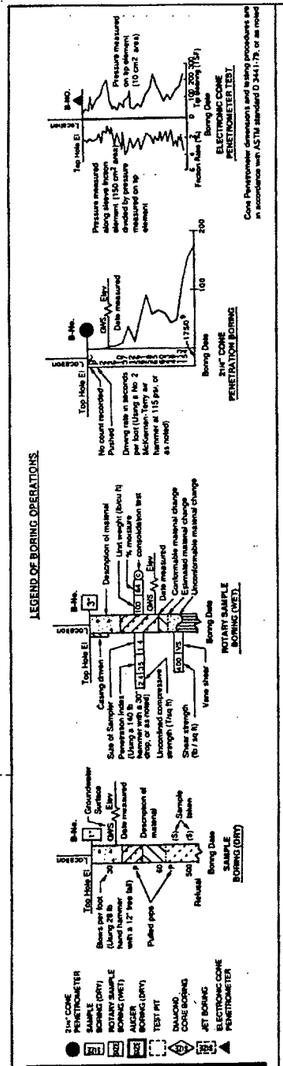
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT DISTRICT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT: 0247 04-0A7101
PROJECT NUMBER & PHASE: 04000001601

BRIDGE No.	Sheet	of
33-0753	51	51

Revisions made to this Log of Test Borings from the original ..... Log of Test Borings are the addition of the following table and notes:

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

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35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

M J Cullen
DESIGN OVERSIGHT
2-21-94
SIGN OFF DATE

DRAWN BY	J. LAPID	C. ANDREWS
CHECKED BY	B. BROWN	FIELD INVESTIGATOR
		DATE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

B. KHAMENEHPOUR
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 133231

BRIDGE NO. 33 - 0139
POST MILE 28.93

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELI) 7/7/93 7/31/93 10/8/93

EARTHQUAKE RETROFIT PROJECT NO. 83

23RD AVE OVERCROSSING

LOG OF TEST BORINGS [illegible]HBOUND)

SHEET	OF
26	26

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Appendix B
Logs of Test Borings from Current Subsurface Investigation

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	880	Alo			

Philip J. Meymand 3/30/12
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
Philip Meymand
No. 2596
Exp. 6/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

CEMENTATION

DESCRIPTION	CRITERIA
WEAK	CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE.
MODERATE	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE.
STRONG	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE.

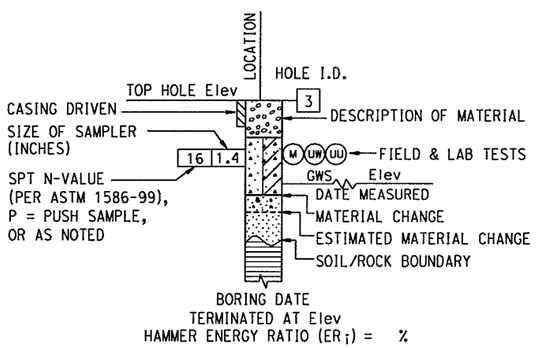
BOREHOLE IDENTIFICATION

SYMBOL	HOLE TYPE	DESCRIPTION
Size	A	AUGER BORING (HOLLOW OR SOLID STEM BUCKET)
Size	R	ROTARY DRILLED BORING (CONVENTIONAL)
	RW	ROTARY DRILLED WITH SELF-CASING WIRE-LINE
	RC	ROTARY CORE WITH CONTINUOUSLY-SAMPLED, SELF-CASING WIRE-LINE
	P	ROTARY PERCUSSION BORING (AIR)
Size	R	ROTARY DRILLED DIAMOND CORE
Size	HD	HAND DRIVEN (1-INCH SOIL TUBE)
	HA	HAND AUGER
●	D	DYNAMIC CONE PENETRATION BORING
▲	CPT	CONE PENETRATION TEST (ASTM D 5778)
⬚	O	OTHER (NOTE ON LOTB)

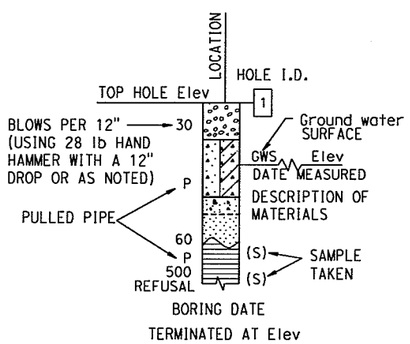
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

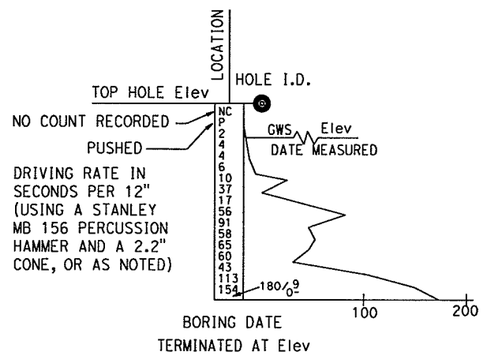
DESCRIPTION	SHEAR STRENGTH (tsf)	POCKET PENETROMETER MEASUREMENT, PP, (tsf)	TORVANE MEASUREMENT, TV, (tsf)	VANE SHEAR MEASUREMENT, VS, (tsf)
VERY SOFT	LESS THAN 0.12	LESS THAN 0.25	LESS THAN 0.12	LESS THAN 0.12
SOFT	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
MEDIUM STIFF	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
STIFF	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
VERY STIFF	1 - 2	2 - 4	1 - 2	1 - 2
HARD	GREATER THAN 2	GREATER THAN 4	GREATER THAN 2	GREATER THAN 2



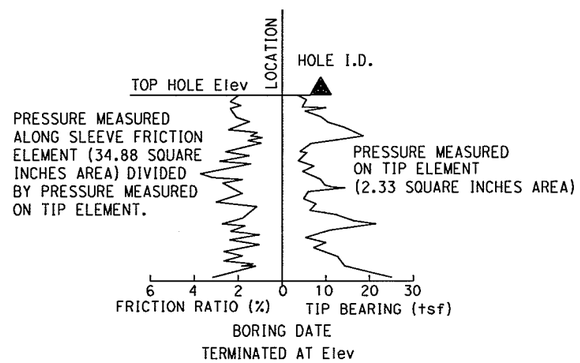
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 1 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
9-5-11	1-10-12	3-30-12	6-25-12	44	51

FILE => 33-0753-z-1tb01.dgn

USERNAME => Lynette_D@DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:28 AM

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

GRAPHIC/SYMBOL	GROUP NAMES	GRAPHIC/SYMBOL	GROUP NAMES
GW	WELL-GRADED GRAVEL WELL-GRADED GRAVEL WITH SAND	CL	LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL SANDY LEAN CLAY SANDY LEAN CLAY WITH GRAVEL GRAVELLY LEAN CLAY GRAVELLY LEAN CLAY WITH SAND
GP	POORLY-GRADED GRAVEL POORLY-GRADED GRAVEL WITH SAND		
GW-GM	WELL-GRADED GRAVEL WITH SILT WELL-GRADED GRAVEL WITH SILT AND SAND	CL-ML	SILTY CLAY SILTY CLAY WITH SAND SILTY CLAY WITH GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY WITH GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY WITH SAND
GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)		
GP-GM	POORLY-GRADED GRAVEL WITH SILT POORLY-GRADED GRAVEL WITH SILT AND SAND	ML	SILT SILT WITH SAND SILT WITH GRAVEL SANDY SILT SANDY SILT WITH GRAVEL GRAVELLY SILT GRAVELLY SILT WITH SAND
GP-GC	POORLY-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) POORLY-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)		
GM	SILTY GRAVEL SILTY GRAVEL WITH SAND	OL	ORGANIC LEAN CLAY ORGANIC LEAN CLAY WITH SAND ORGANIC LEAN CLAY WITH GRAVEL SANDY ORGANIC LEAN CLAY SANDY ORGANIC LEAN CLAY WITH GRAVEL GRAVELLY ORGANIC LEAN CLAY GRAVELLY ORGANIC LEAN CLAY WITH SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND	OL	ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT WITH GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT WITH SAND
SW	WELL-GRADED SAND WELL-GRADED SAND WITH GRAVEL		
SP	POORLY-GRADED SAND POORLY-GRADED SAND WITH GRAVEL	CH	FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL SANDY FAT CLAY SANDY FAT CLAY WITH GRAVEL GRAVELLY FAT CLAY GRAVELLY FAT CLAY WITH SAND
SW-SM	WELL-GRADED SAND WITH SILT WELL-GRADED SAND WITH SILT AND GRAVEL		
SW-SC	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY) WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)	MH	ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL SANDY ELASTIC SILT SANDY ELASTIC SILT WITH GRAVEL GRAVELLY ELASTIC SILT GRAVELLY ELASTIC SILT WITH SAND
SP-SM	POORLY-GRADED SAND WITH SILT POORLY-GRADED SAND WITH SILT AND GRAVEL		
SP-SC	POORLY-GRADED SAND WITH CLAY (OR SILTY CLAY) POORLY-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)	OH	ORGANIC FAT CLAY ORGANIC FAT CLAY WITH SAND ORGANIC FAT CLAY WITH GRAVEL SANDY ORGANIC FAT CLAY SANDY ORGANIC FAT CLAY WITH GRAVEL GRAVELLY ORGANIC FAT CLAY GRAVELLY ORGANIC FAT CLAY WITH SAND
SM	SILTY SAND SILTY SAND WITH GRAVEL		
SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL	OH	ORGANIC ELASTIC SILT ORGANIC ELASTIC SILT WITH SAND ORGANIC ELASTIC SILT WITH GRAVEL SANDY ORGANIC ELASTIC SILT SANDY ORGANIC ELASTIC SILT WITH GRAVEL GRAVELLY ORGANIC ELASTIC SILT GRAVELLY ORGANIC ELASTIC SILT WITH SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND WITH GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL WITH SAND ORGANIC SOIL WITH GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL WITH GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL WITH SAND
	COBBLES COBBLES AND BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) CONSOLIDATION (ASTM D 2435)
- (CL) COLLAPSE POTENTIAL (ASTM D 5333)
- (CP) COMPACTION CURVE (CTM 216)
- (CR) CORROSIVITY TESTING (CTM 643, CTM 422, CTM 417)
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 4767)
- (DS) DIRECT SHEAR (ASTM D 3080)
- (EI) EXPANSION INDEX (ASTM D 4829)
- (M) MOISTURE CONTENT (ASTM D 2216)
- (OC) ORGANIC CONTENT-% (ASTM D 2974)
- (P) PERMEABILITY (CTM 220)
- (PA) PARTICLE SIZE ANALYSIS (ASTM D 422)
- (PI) PLASTICITY INDEX (AASHTO T 90) LIQUID LIMIT (AASHTO T 89)
- (PL) POINT LOAD INDEX (ASTM D 5731)
- (PM) PRESSURE METER
- (R) R-VALUE (CTM 301)
- (SE) SAND EQUIVALENT (CTM 217)
- (SG) SPECIFIC GRAVITY (AASHTO T 100)
- (SL) SHRINKAGE LIMIT (ASTM D 427)
- (SW) SWELL POTENTIAL (ASTM D 4546)
- (UC) UNCONFINED COMPRESSION-SOIL (ASTM D 2166) UNCONFINED COMPRESSION-ROCK (ASTM D 2938)
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 2850)
- (UW) UNIT WEIGHT (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alc			

Philip J. Meymand 3/30/12
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — EXP. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

APPARENT DENSITY OF COHESIONLESS SOILS

DESCRIPTION	SPT N_{60} (BLOWS / 12 INCHES)
VERY LOOSE	0 - 5
LOOSE	5 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	GREATER THAN 50

MOISTURE

DESCRIPTION	CRITERIA
DRY	NO DISCERNABLE MOISTURE
MOIST	MOISTURE PRESENT, BUT NO FREE WATER
WET	VISIBLE FREE WATER

PERCENT OR PROPORTION OF SOILS

DESCRIPTION	CRITERIA
TRACE	PARTICLES ARE PRESENT BUT ESTIMATED TO BE LESS THAN 5%
FEW	5% - 10%
LITTLE	15% - 25%
SOME	30% - 45%
MOSTLY	50% - 100%

PARTICLE SIZE

DESCRIPTION		SIZE
BOULDER		GREATER THAN 12"
COBBLE		3" - 12"
GRAVEL	COARSE	3/4" - 3"
	FINE	1/5" - 3/4"
SAND	COARSE	1/16" - 1/5"
	MEDIUM	1/64" - 1/16"
	FINE	1/300" - 1/64"
SILT AND CLAY		LESS THAN 1/300"

DESIGN OVERSIGHT
SIGN OFF DATE

DRAWN BY: N. HUTTON
CHECKED BY: C. TSAI

S. JANOWSKI
FIELD INVESTIGATION BY:
DATE: 04-25-11 TO 05-04-11

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Jan Hueser
PROJECT ENGINEER

BRIDGE NO. 33-0753
POST MILES 28.95

23RD AVENUE OC (REPLACE)
LOG OF TEST BORINGS 2 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
5-5-11	1-10-12	3-30-12	6-25-12	45	51

FILE => 33-0753-z-1+b02.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:28 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alo			

REGISTERED CIVIL ENGINEER — 3/30/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — EXP. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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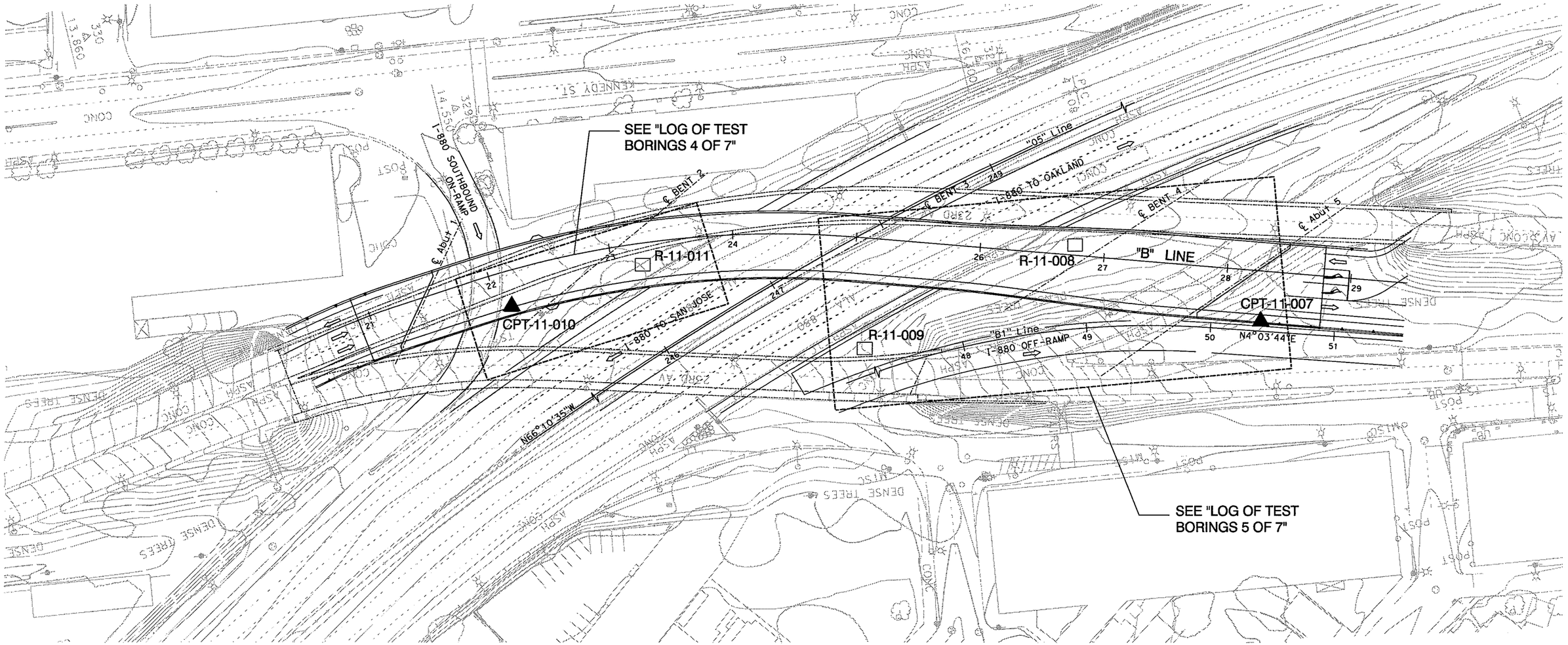
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=40'-0"

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 3 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
5-4-11	1-18-12	3-30-12	6-25-12	46	51

FILE => 33-0753-z-1tb03.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:29 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alo			

Philip J. Meymand 3/30/12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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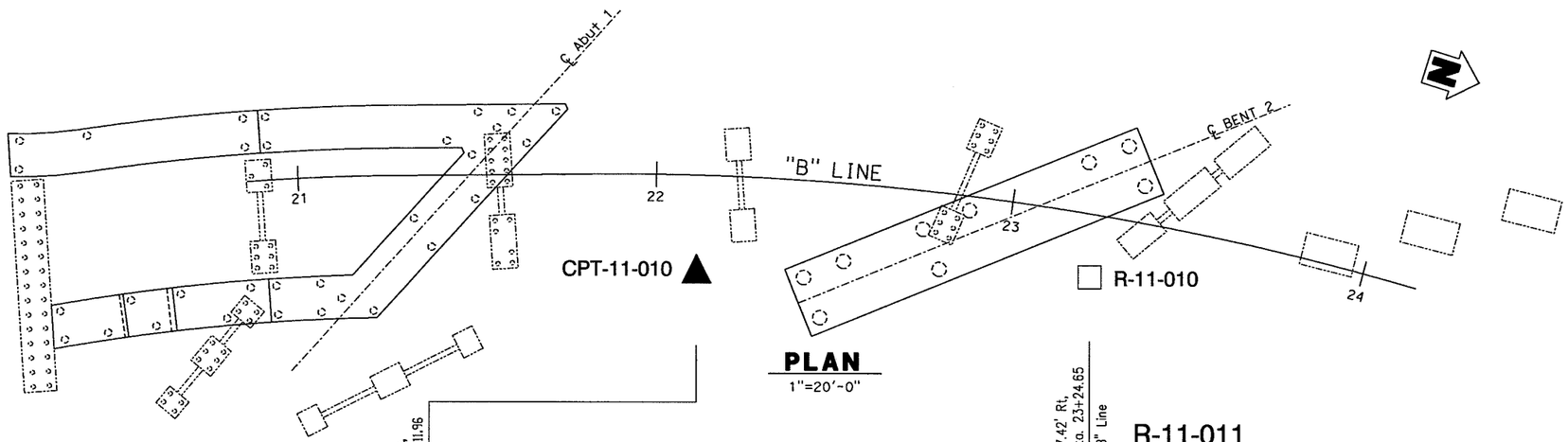
REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

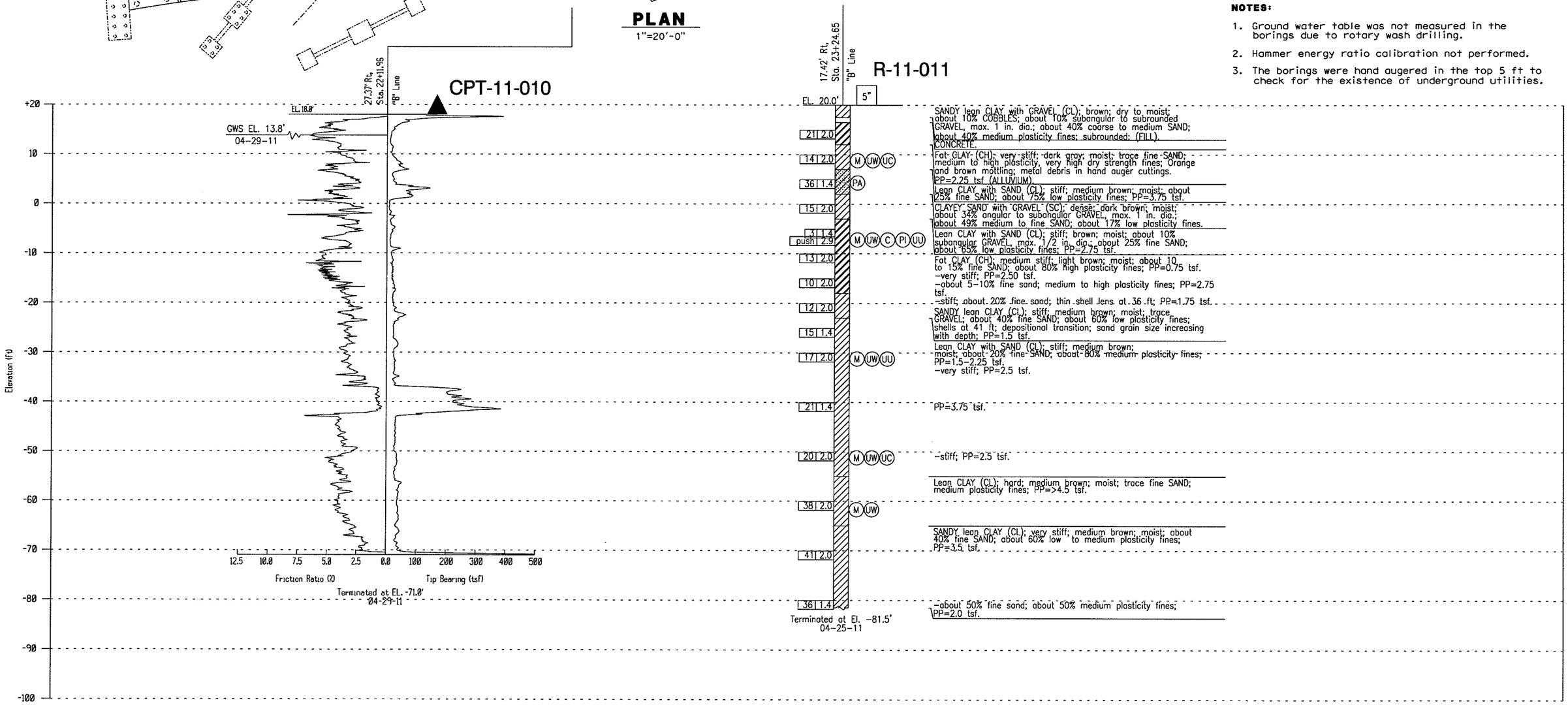
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)	
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 4 OF 8	

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES: 9-6-11 | 1-10-12 | 3-30-12 | 6-25-12 | SHEET 47 | OF 51

FILE => 33-0753-z-1tb04.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:29 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 3/30/12 DATE

PLANS APPROVAL DATE

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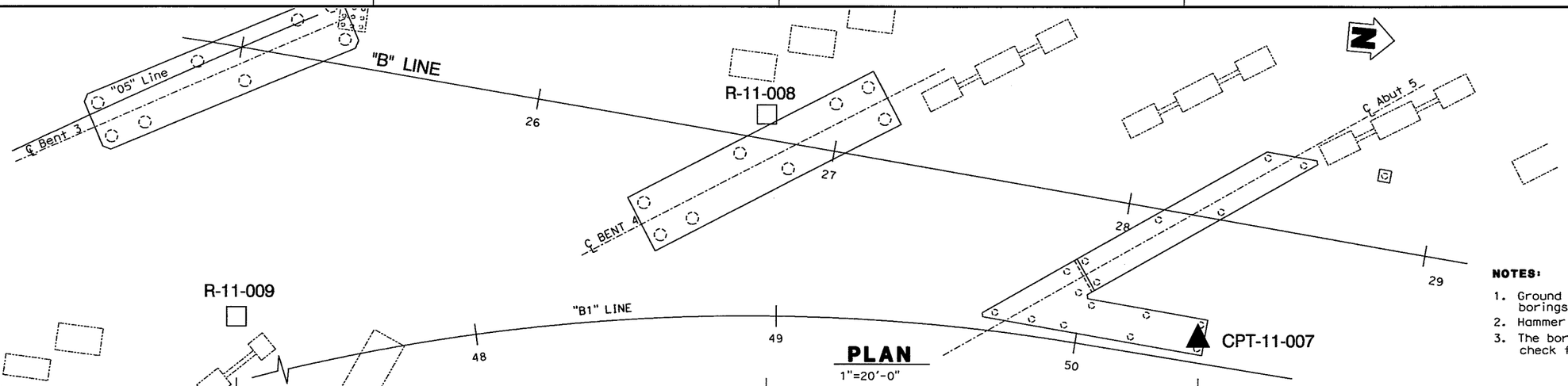
REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



PLAN
1"=20'-0"

R-11-009

88.57' Rt, Sta. 25+14 "B" Line — 5" — EL. 17.0'

16	2.0	M UW UC	Fat CLAY (CH); very stiff; dark gray; dry to moist; about 10% fine SAND; about 90% medium to high plasticity, very high dry strength fines; PP=2.5 tsf (FILL).
22	2.0		SANDY lean CLAY (CL); very stiff; medium to dark brown; dry to moist; about 10% coarse, angular GRAVEL; about 40% medium SAND; about 50% low plasticity fines; PP=3.5 tsf.
18	2.0	M UW UC	SANDY lean CLAY (CL); very stiff; medium brown; moist; about 30% fine SAND; about 70% medium plasticity fines; trace coarse sand; PP=2.75 tsf (ALLUVIUM).
12	2.0		Lean CLAY with SAND (CL); stiff; medium brown; moist; trace coarse GRAVEL; about 20% fine SAND; about 80% medium plasticity fines; sample disturbed; PP=3.0 tsf.
			–very stiff about 15% subrounded gravel up to 1/2 in; black and red mottles; PP=3.25–3.75 tsf.
13	2.0		–no evident gravel; black; mottles very common; stiff; about 15% fine sand; PP=1.75 tsf.
17	2.0		–very stiff; trace angular gravel to 1/2 in; PP=3.5 tsf.
			Lean CLAY (CL); very stiff; medium brown; moist; about 5% fine SAND; about 95% medium plasticity fines; PP=3.0 tsf.
8	2.0	M UW UU	SANDY lean CLAY (CL); medium stiff; brown and gray; moist; about 25% fine SAND; about 75% medium plasticity fines; PP=1.75 tsf.
35	1.4	PA	Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; wet; about 26% subangular GRAVEL, max. 3/4 in. dia.; about 63% coarse to medium SAND; about 11% nonplastic fines.
38	1.4		
15	2.0	M PI	Fat CLAY (CH); very stiff; gray; moist; about 5% fine SAND; about 95% medium to high plasticity, very high dry strength fines; PP=2.0–3.0 tsf.
			Lean CLAY with SAND (CL); hard; greenish gray; dry to moist; about 5% fine, subangular GRAVEL; about 25% fine SAND; about 70% low plasticity fines; PP=>4.5 tsf.
40	2.0	M UW	
27	2.0		–brown; very stiff; about 10% fine sand; medium plasticity fines; PP=3.0 tsf.
			SANDY lean CLAY (CL); very stiff to hard; brown and gray; moist; about 35% fine SAND; about 65% low plasticity fines; PP=>4.5 tsf.
40	2.0	M PI	–very stiff; occasional black mottles; PP=3.0 tsf.
28	1.4		–hard coarse sand lens at 90.5 ft; <1 in thick; PP=4.25 tsf.
38	2.0	M UW UU	–very stiff; about 45% fine sand; about 55% low plasticity fines; PP=3.25 tsf.

Terminated at El. -84.5
04-28-11

R-11-008

8.18' Lt, Sta. 26+75.71 "B" Line — 5" — EL. -19.0'

26	2.0	M UW UC	Fat CLAY (CH); dark gray; dry; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; (FILL).
			–hard; moist; PP=4.25 tsf.
12	2.0	C PI	Lean CLAY with SAND (CL); hard; medium brown; moist; about 5% fine, subangular to subrounded GRAVEL; about 15% fine SAND; about 80% medium plasticity fines; light brown mottles; PP=3.25–4.25 tsf; (ALLUVIUM).
9	1.4		–stiff; PP=1.75 tsf.
			SANDY lean CLAY with GRAVEL (CL); stiff to very stiff; medium brown; moist; about 20% subrounded GRAVEL, max. 1/2 in. dia.; about 40% medium to fine SAND; about 40% medium plasticity fines; PP=1.5–2.0 tsf.
12	2.0	M UW UC	Lean CLAY with SAND (CL); stiff; medium brown; moist; about 5% fine, subangular to subrounded GRAVEL; about 15% fine SAND; about 80% medium plasticity fines; PP=1.75 tsf.
11	2.0	M UW	Lean CLAY (CL); stiff to very stiff; medium brown; moist; about 5% fine SAND; about 95% medium plasticity fines; PP=1.0–2.0 tsf.
19	2.0		PP=3.0 tsf.
			SANDY lean CLAY (CL); very stiff; medium brown; moist; about 40% fine SAND; about 60% low plasticity fines; PP=2.5 tsf.
14	2.0	M PI	Fat CLAY (CH); very stiff; medium brown; moist; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; PP=2.0–2.75 tsf.
32	2.0	PA	SILTY SAND with GRAVEL (SM); medium dense; brown; moist; about 40% subrounded GRAVEL, max. 1 in. dia.; about 43% coarse to medium SAND; about 17% nonplastic fines.
12	1.4		SANDY lean CLAY (CL); stiff; medium brown; moist; about 35% fine SAND; about 65% medium plasticity fines; PP=1.0 tsf.
55	2.0		Poorly graded SAND with SILT (SP-SM); dense; medium brown; moist; trace GRAVEL, max. 1/4 in. dia.; about 90% coarse to medium SAND; about 10% nonplastic fines; PP=>4.5 tsf.
			SANDY lean CLAY (CL); very stiff; medium brown; moist; about 45% fine SAND; about 55% medium plasticity fines.
47	2.0		SILTY SAND (SM); dense; medium brown; moist; about 85% medium SAND; about 15% low plasticity fines.
			SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace subangular GRAVEL, max. 1/3 in. dia.; about 30% fine SAND; about 70% medium plasticity fines; Manganese and iron staining; PP=2.25–2.75 tsf.
14	1.4		
35	2.0	M UW UU	–stiff; sand lens 81 to 81.25 ft; PP=4.5 tsf.
22	1.4		–very stiff; PP=3.5 tsf.
30	1.4		PP=2.25 tsf.

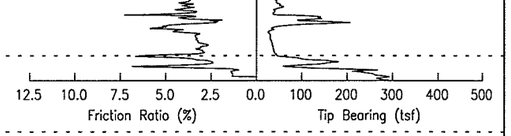
Terminated at El. -82.5'
04-27-11

CPT-11-007

39.31' Rt, Sta. 28+30.1 "B" Line

EL. 25.0'

GWS EL. 10.9'
04-29-11



Terminated at EL. -63.3'
04-29-11

Elevation (ft): +20, 10, 0, -10, -20, -30, -40, -50, -60, -70, -80, -90

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 5 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
9-5-11	1-18-12	3-30-12	6-25-12	48	51

FILE => 33-0753-z-1tb05.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:30 AM

Appendix C
Laboratory Test Results

MOISTURE & DENSITY TEST

Client : URS Project : I-880 @ 23rd and 29th Ave. Job no : 27560836

	Boring #	R-11-002	R-11-003	R-11-003	R-11-004	R-11-004	R-11-008	R-11-008	R-11-009	
	Sample #	3-3	2-3	12-3	8-2	10-3	6-3	8-3	11-2	
	Depth (ft.)	21-21.5	6-6.5	61-61.5	35.5-36	46-46.5	26-26.5	36-36.5	50.5-51	
	Soil type: (visual)	Brown lean clay	Grayish brown lean clay	Grayish brown lean clay	Dark reddish brown fat clay	Mottled grayish brown lean clay	Grayish brown lean clay	Olive gray fat clay	Dark olive gray fat clay	
1.	Date tested:	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	1.
2.	Tested by:	JH	JH	JH	JH	JH	JH	JH	JH	2.
3.	Specimen height (in.)	5.96	3.75			6.01	5.98			3.
4.	Wt. of specimen + tare (gm)	535.6	275.3			588.5	491.7			4.
5.	Tare wt. (gm)	0.00	0.00			0.00	0.00			5.
6.	Diameter (in.)	1.90	1.88			1.93	1.87			6.
7.	Wet wt. of soil + dish wt. (gm)	221.47	229.57	204.55	169.24	230.11	206.74	164.51	168.69	7.
8.	Dry wt. of soil + dish wt. (gm)	183.03	199.36	174.49	142.09	197.38	163.45	136.53	135.88	8.
9.	Wt. of dish (gm)	43.17	51.47	55.50	60.73	42.51	40.61	51.82	51.64	9.
10.	Dish ID									10.
	Wet Density (pcf)	120.7	100.7			127.4	114.0			
	Dry Density (pcf)	94.6	83.6			105.2	84.3			
	Moisture Content (%)	27.5	20.4	25.3	33.4	21.1	35.2	33.0	38.9	
	Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	
	Void Ratio	0.780	1.016			0.602	0.999			
	Saturation (%)	95.1	54.3			94.8	95.2			

Additional data:

Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

MOISTURE & DENSITY TEST

Client : URS Project : I-880 @ 23rd and 29th Ave. Job no : 27560836

	Boring #	R-11-009	R-11-009	R-11-011						
	Sample #	12-3	14-2	15-3						
	Depth (ft.)	61-61.5	80.5-81	81-81.5						
	Soil type: (visual)	Dark olive lean clay	Brown lean clay with sand	Light olive brown lean clay						
1.	Date tested:	05/25/11	05/25/11	05/25/11						1.
2.	Tested by:	JH	JH	JH						2.
3.	Specimen height (in.)	6.00		5.98						3.
4.	Wt. of specimen + tare (gm)	607.1		573.2						4.
5.	Tare wt. (gm)	0.00		0.00						5.
6.	Diameter (in.)	1.93		1.93						6.
7.	Wet wt. of soil + dish wt. (gm)	220.94	140.74	246.05						7.
8.	Dry wt. of soil + dish wt. (gm)	191.82	127.71	205.76						8.
9.	Wt. of dish (gm)	41.71	58.91	43.29						9.
10.	Dish ID									10.
	Wet Density (pcf)	131.7		124.7						
	Dry Density (pcf)	110.3		99.9						
	Moisture Content (%)	19.4	18.9	24.8						
	Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	
	Void Ratio	0.528		0.686						
	Saturation (%)	99.2		97.6						

Additional data:

Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

ASTM D-1140
PERCENT PASSING NO. 200 SIEVE REPORT

Method A
Specimens Soaked Overnight without Deflocculating Agent
Dry Mass Determined Directly

Client Name URS
Project Name I-880 @ 23rd and 29th Ave.
Project Number 27560836

Boring Number	R-11-001	R-11-001	R-11-003	R-11-003	R-11-004
Sample Number	13	14-1	6	9-3	9
Depth (ft)	70-71.5	80-80.75	25-26	41-41.5	40-41.5
Percent of Soil Finer than No. 200 Sieve	10.4	11.2	18.5	27.5	23.4
Visual Classification	Brown poorly graded gravel with sand	Brown poorly graded gravel with silt and sand	Brown clayey sand with gravel	Olive gray clayey sand	Light olive gray clayey sand with gravel
Date	05/17/11	05/17/11	05/17/11	05/25/11	05/17/11
Weight of Dry Soil + Pan (before wash)	768.1	743.7	760.6	188.2	831.0
Weight of Dry Soil + Pan (after wash)	705.7	694.5	650.9	147.5	675.3
Weight of Pan	166.2	303.9	166.4	40.4	166.0

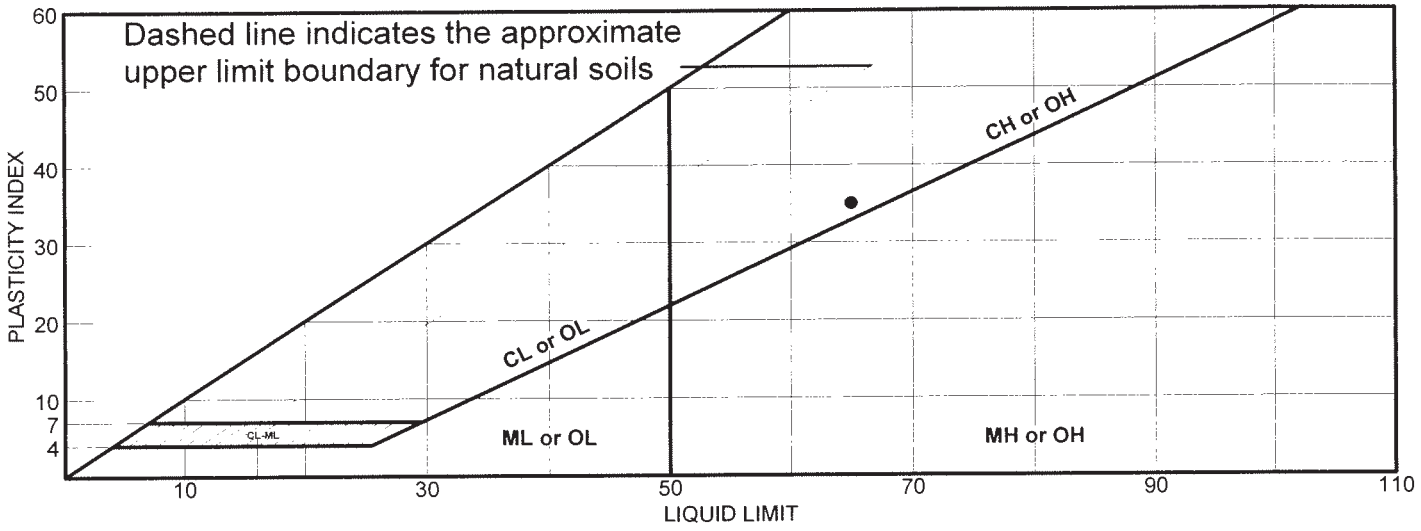
ASTM D-1140
PERCENT PASSING NO. 200 SIEVE REPORT

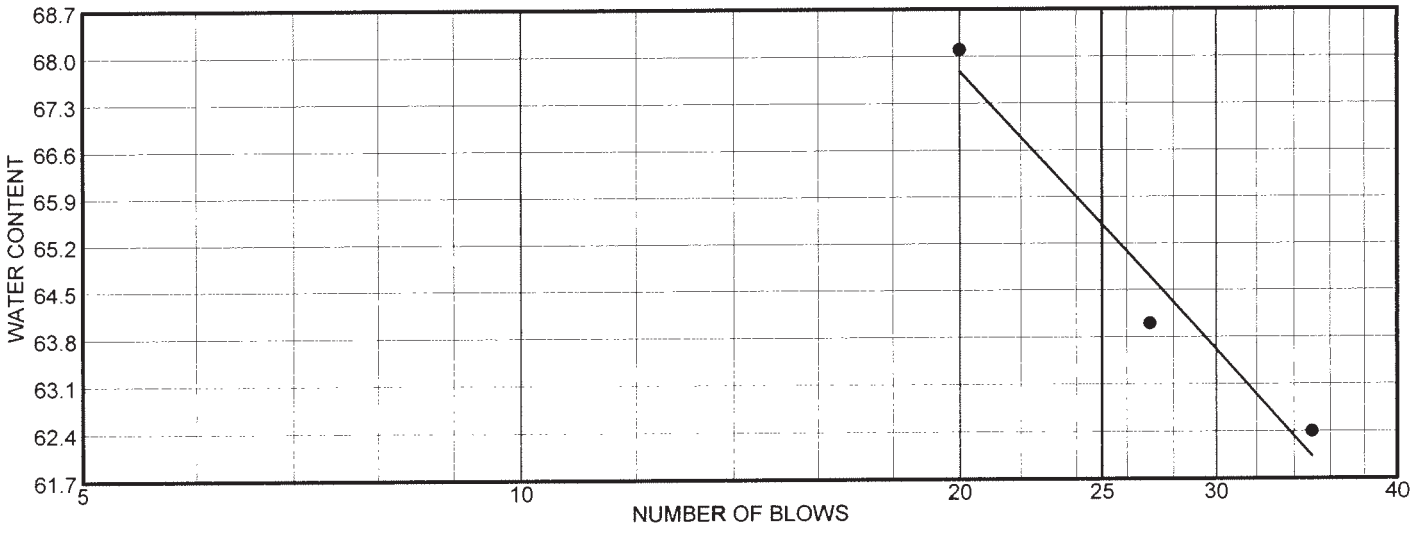
Method A
Specimens Soaked Overnight without Deflocculating Agent
Dry Mass Determined Directly

Client Name URS
Project Name I-880 @ 23rd and 29th Ave.
Project Number 27560836

Boring Number	R-11-004	R-11-005	R-11-008		
Sample Number	12-3	10	9-2		
Depth (ft)	61-61.5	45-46.5	40.5-41		
Percent of Soil Finer than No. 200 Sieve	26.1	13.2	16.6		
Visual Classification	Grayish brown clayey sand	Brown silty gravel with sand	Olive gray clayey sand with gravel		
Date	05/25/11	05/17/11	05/25/11		
Weight of Dry Soil + Pan (before wash)	214.3	762.9	745.7		
Weight of Dry Soil + Pan (after wash)	169.5	684.2	649.3		
Weight of Pan	43.0	167.4	165.4		

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light grayish brown fat clay	65	30	35			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-011 **Sample No.:** 7 **Elev./Depth:** 26.5-29

Remarks:

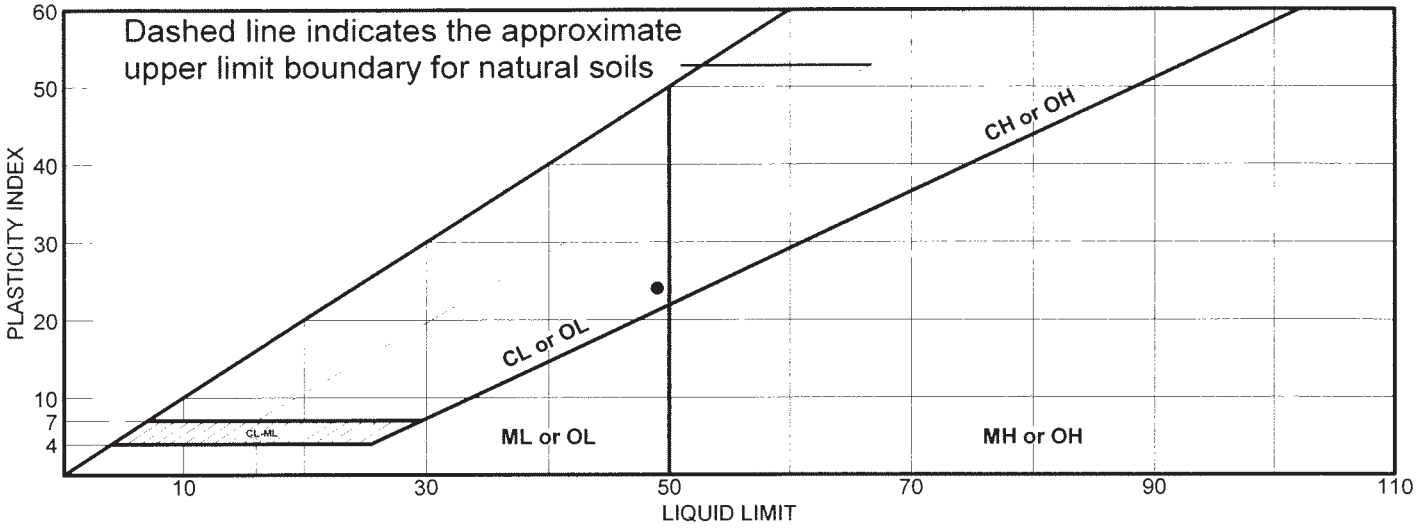
●

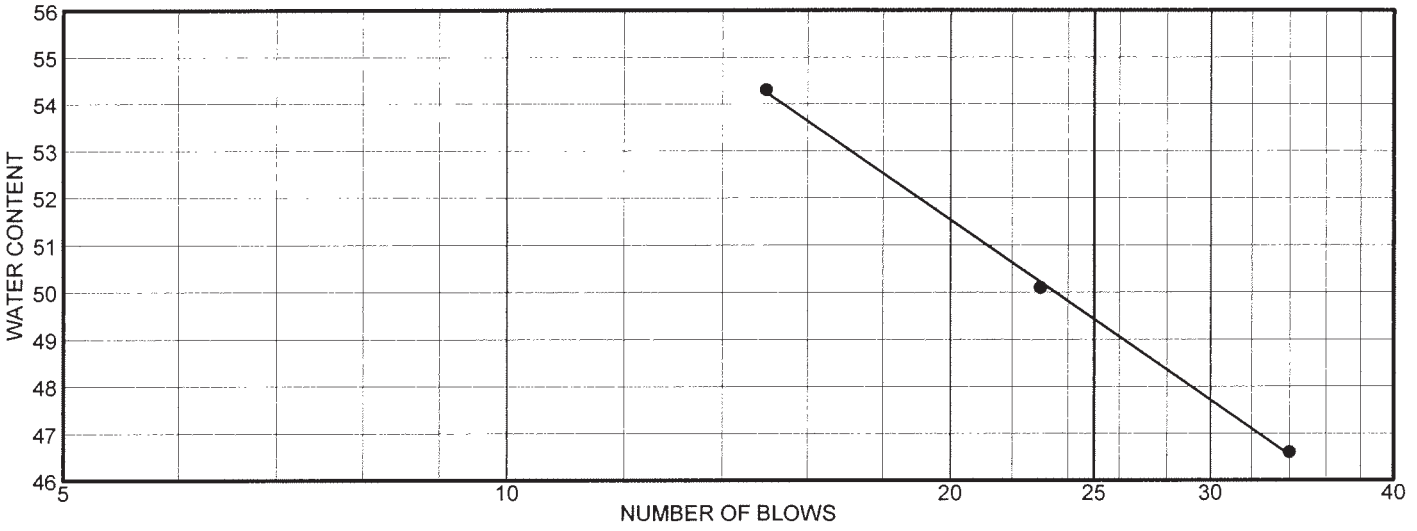
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown lean clay	49	25	24			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-008 **Sample No.:** 3-2 **Elev./Depth:** 10.5-11

Remarks:

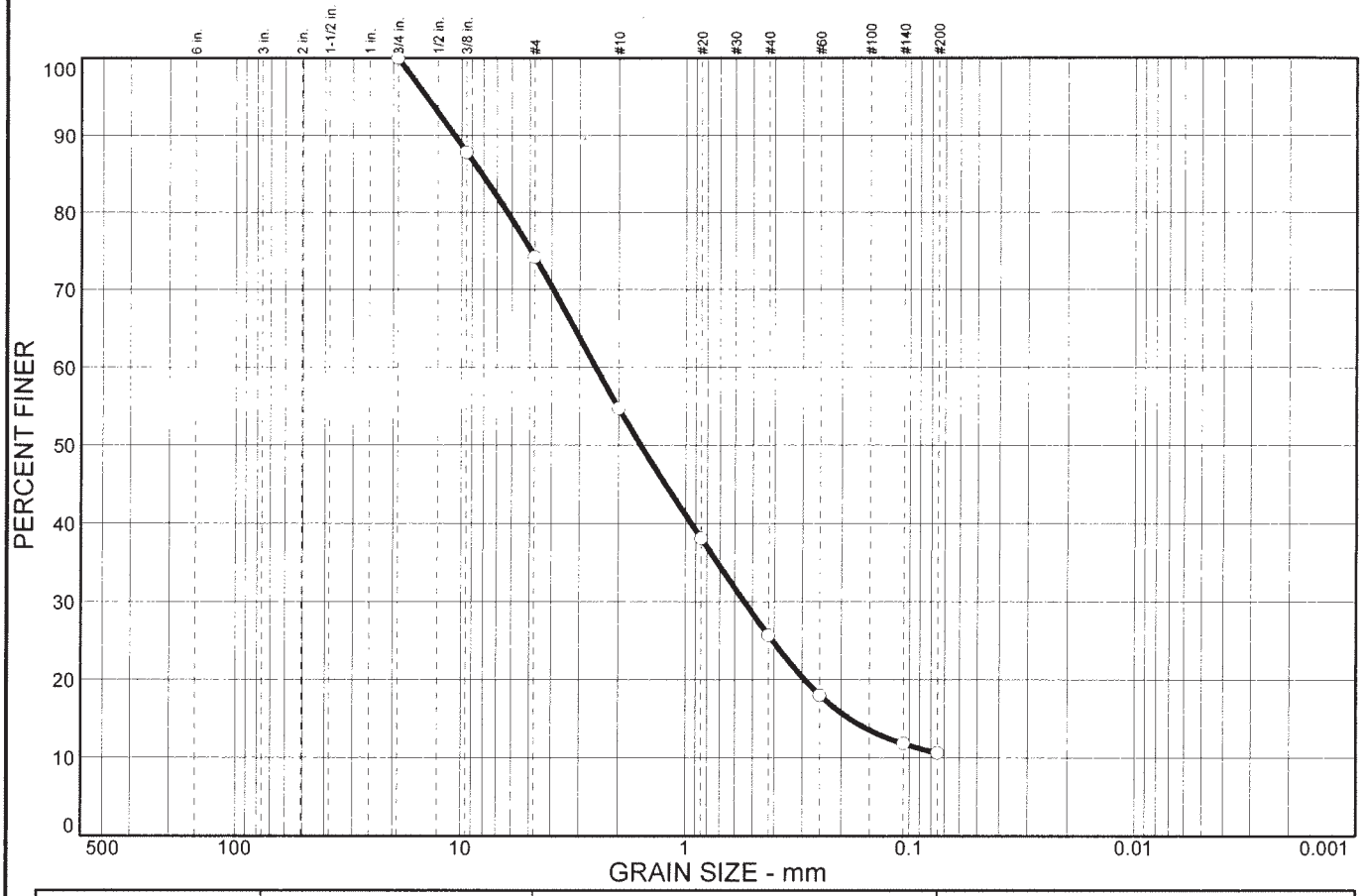
●

LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	25.8	19.5	29.0	15.1	10.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	87.8		
#4	74.2		
#10	54.7		
#20	38.1		
#40	25.7		
#60	18.0		
#140	11.8		
#200	10.6		

* (no specification provided)

Soil Description

Brown Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 8.18 D_{60}= 2.54 D_{50}= 1.59
D_{30}= 0.545 D_{15}= 0.184 D_{10}=
C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

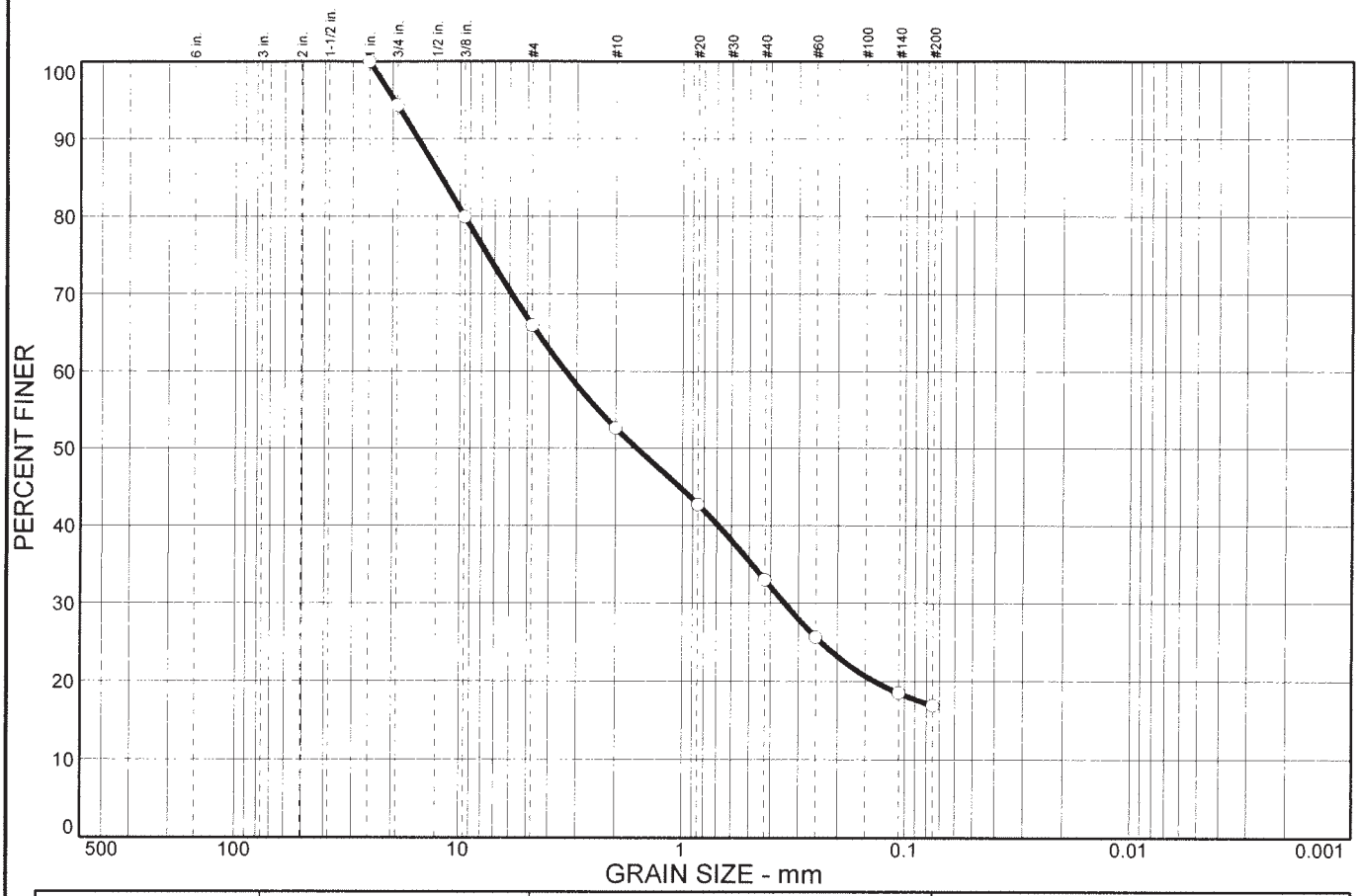
Sample No.: 9 **Source of Sample:** R-11-009 **Date:**
Location: **Elev./Depth:** 40-41.5

SIGNET Testing Labs

Client: URS
Project: I-880 @ 23rd and 29th Ave.

Project No: 27560836 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	5.7	28.4	13.3	19.6	16.1	16.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	94.3		
.375 in.	79.9		
#4	65.9		
#10	52.6		
#20	42.7		
#40	33.0		
#60	25.6		
#140	18.5		
#200	16.9		

* (no specification provided)

Soil Description

Brown clayey sand with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 12.1 D_{60}= 3.37 D_{50}= 1.61
D_{30}= 0.347 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

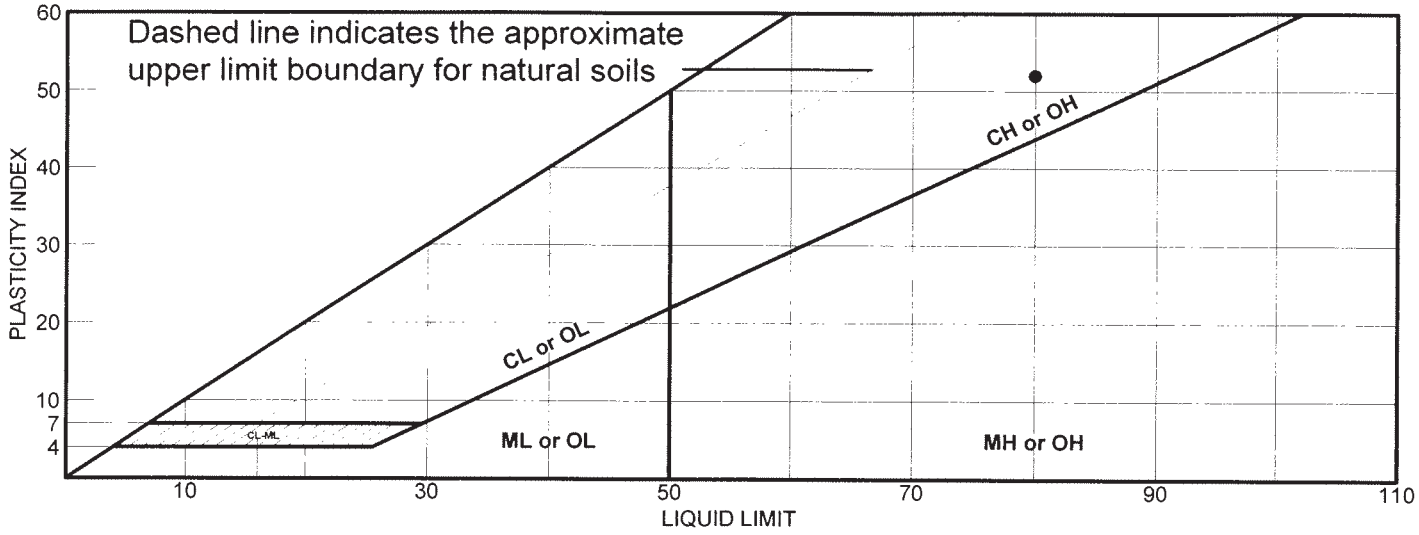
Sample No.: 4 **Source of Sample:** R-11-011 **Date:**
Location: **Elev./Depth:** 15

SIGNET Testing Labs

Client: URS
Project: I-880 @ 23rd and 29th Ave.

Project No: 27560836 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive gray fat clay	80	28	52			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-008 **Sample No.:** 8-3 **Elev./Depth:** 36-36.5

Remarks:

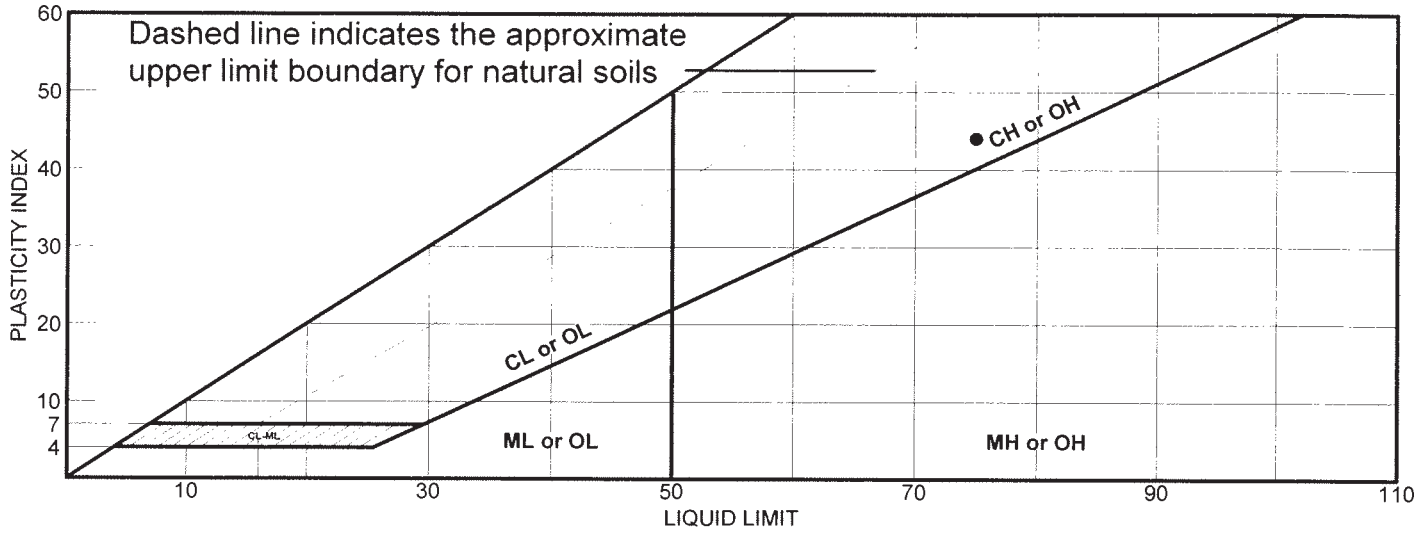
●

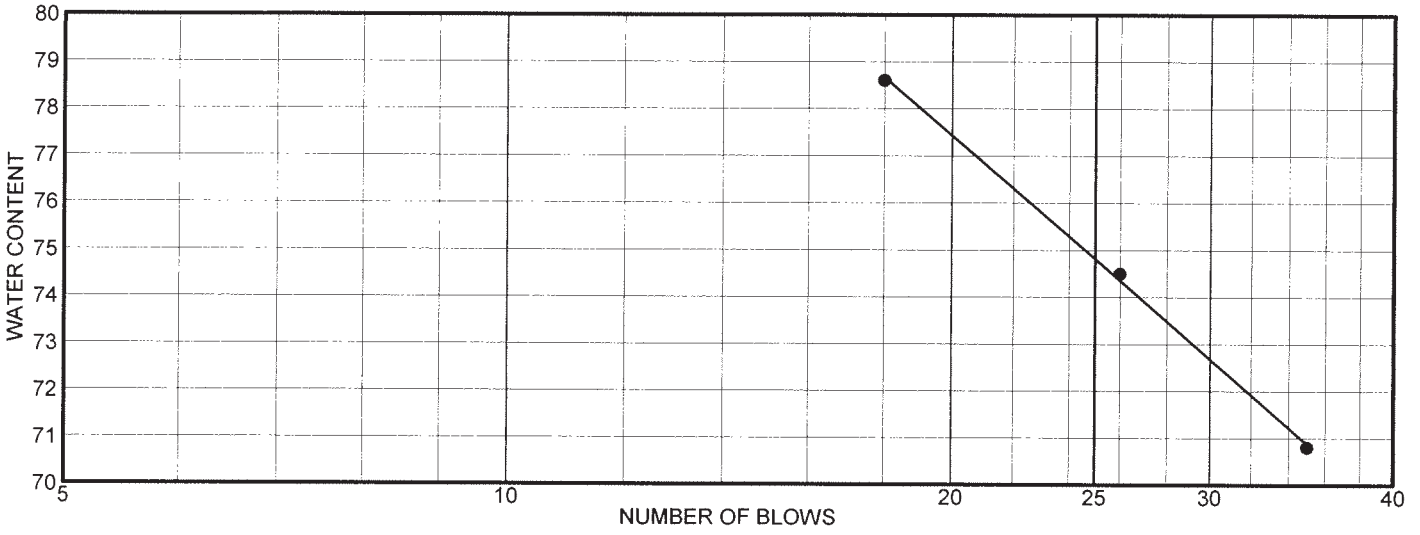
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark olive gray fat clay	75	31	44			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-009 **Sample No.:** 11-2 **Elev./Depth:** 50.5-51

Remarks:

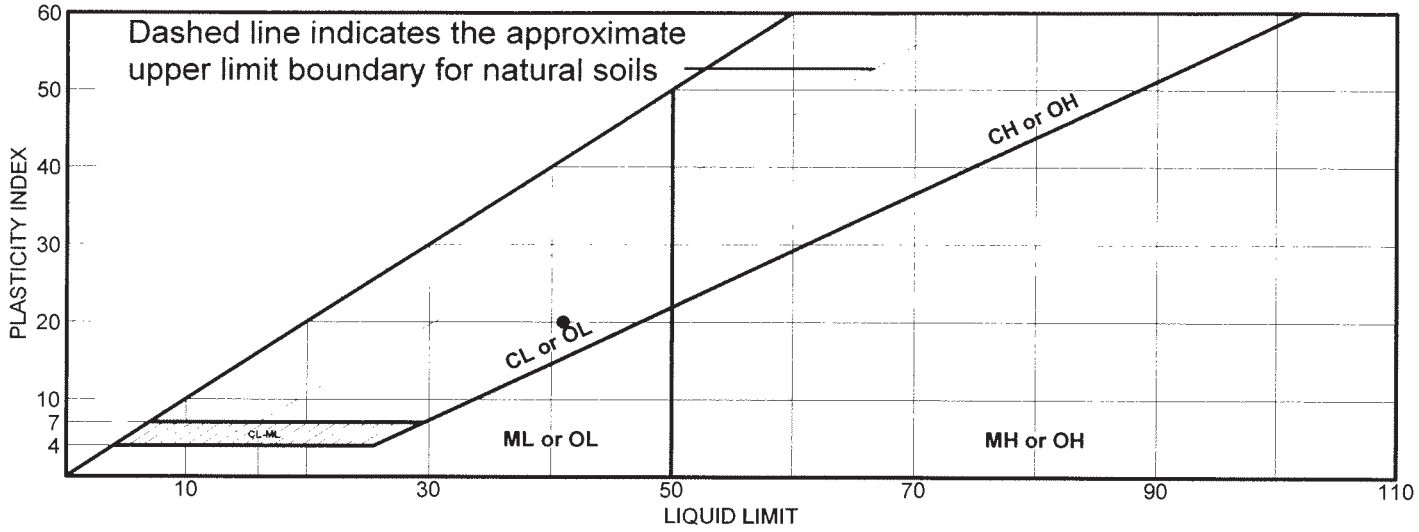
●

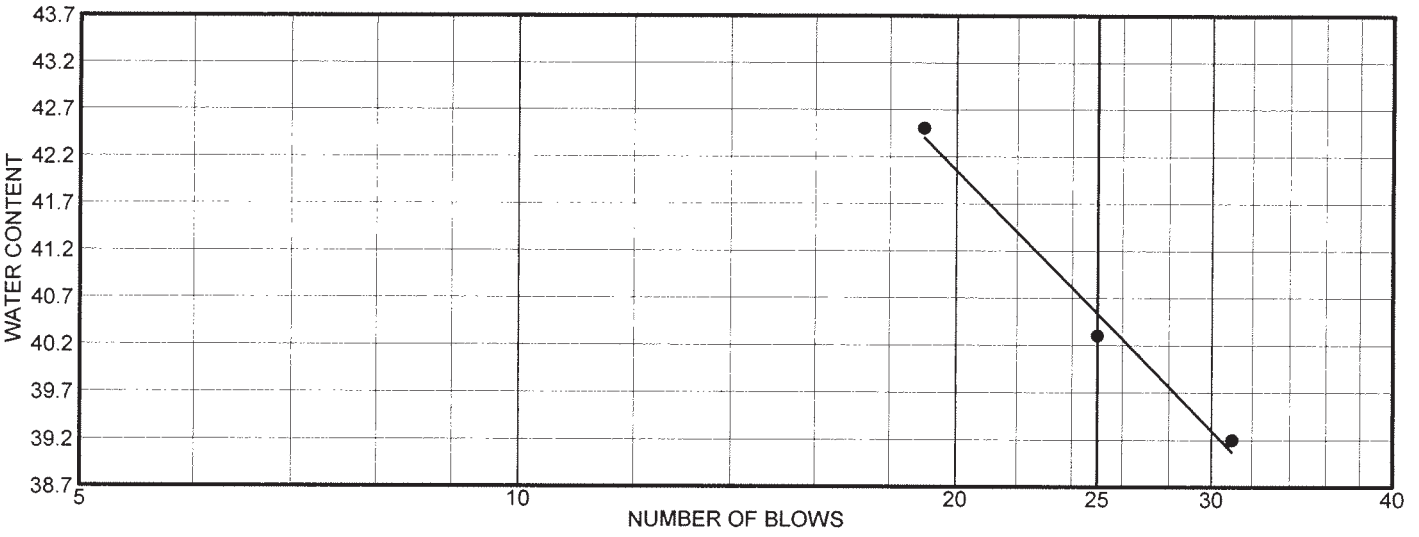
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay with sand	41	21	20			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-009 **Sample No.:** 14-2 **Elev./Depth:** 80.5-81

Remarks:

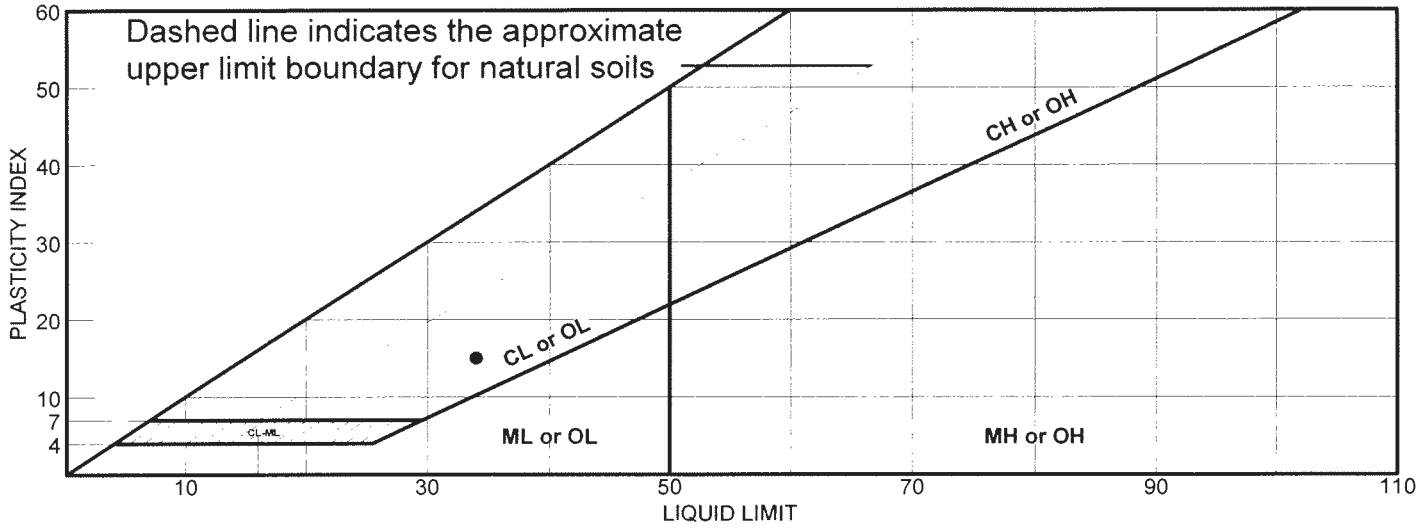
●

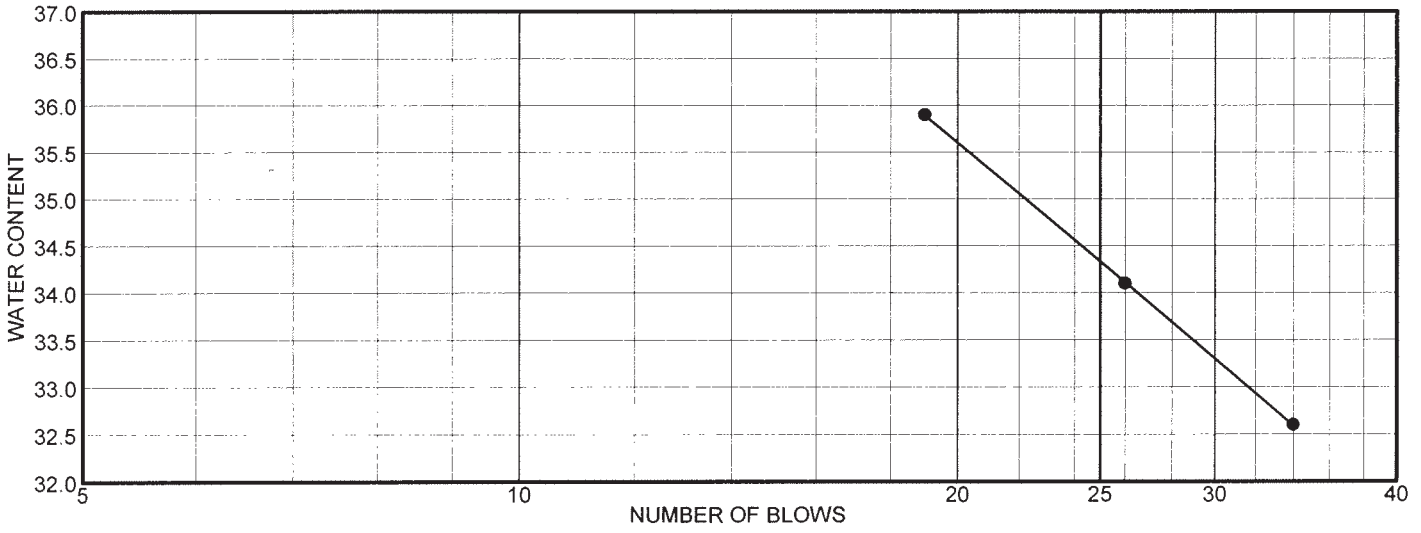
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay	34	19	15			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-011 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

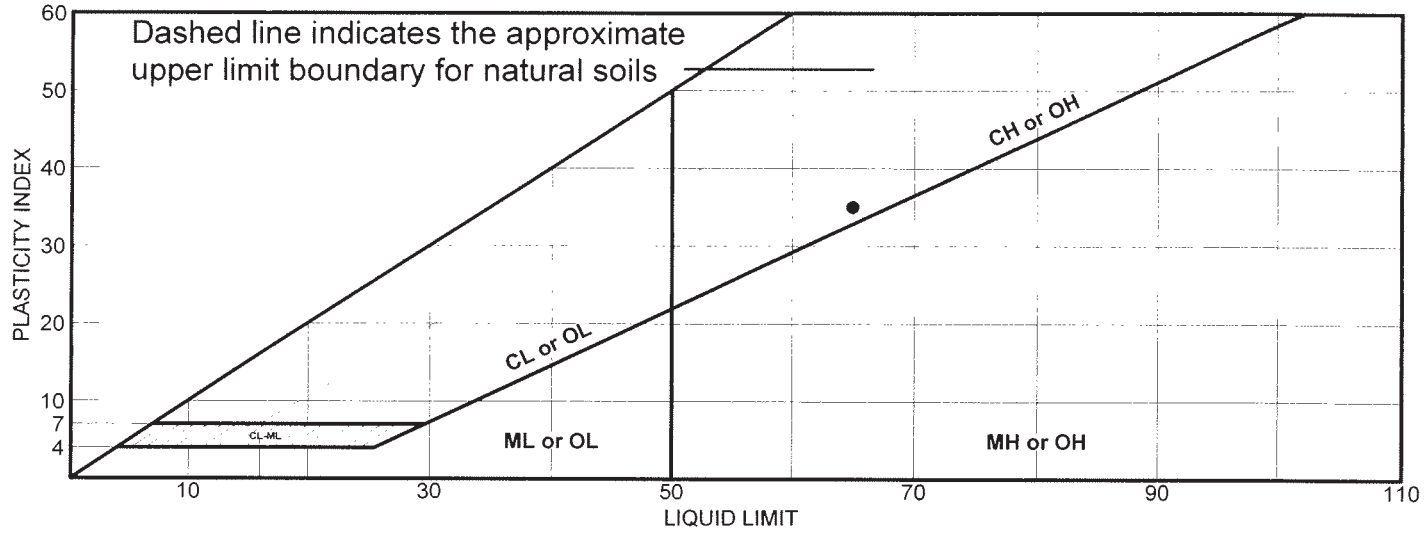
●

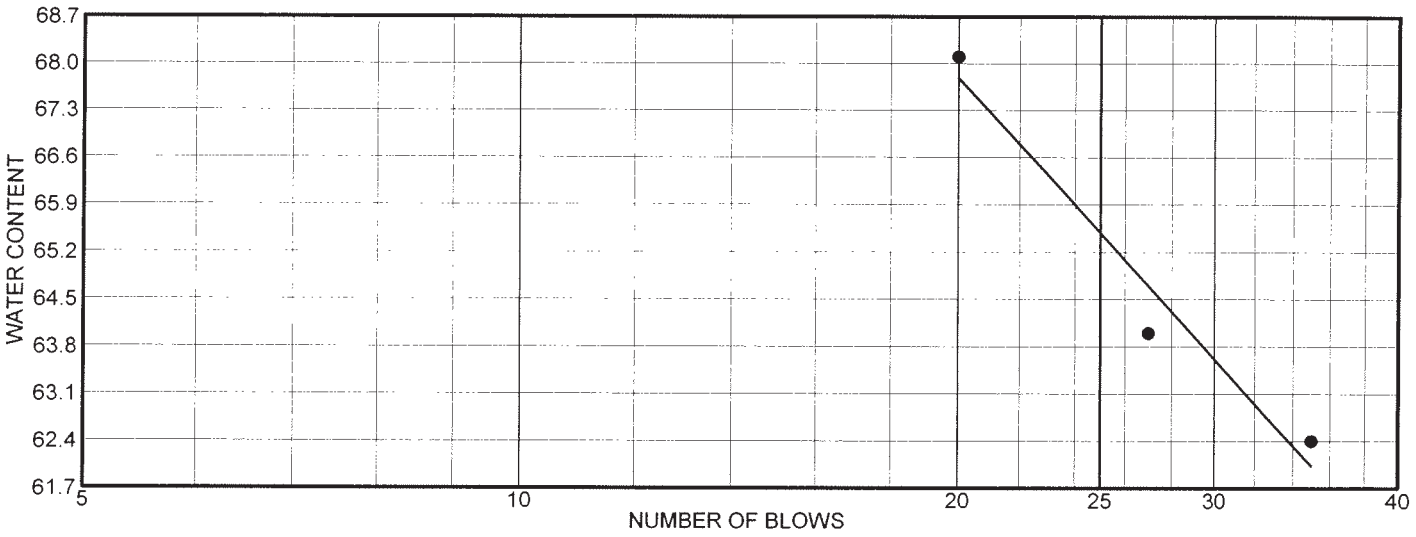
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light grayish brown fat clay	65	30	35			CH

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-011 **Sample No.:** 7 **Elev./Depth:** 26.5-29

Remarks:

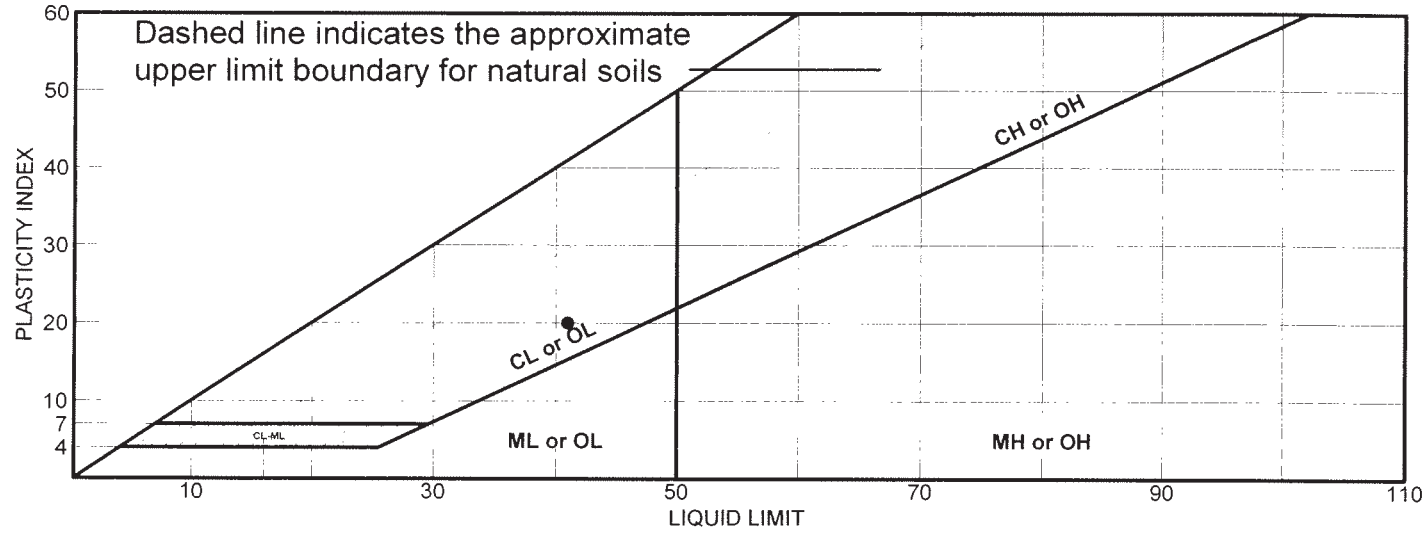
●

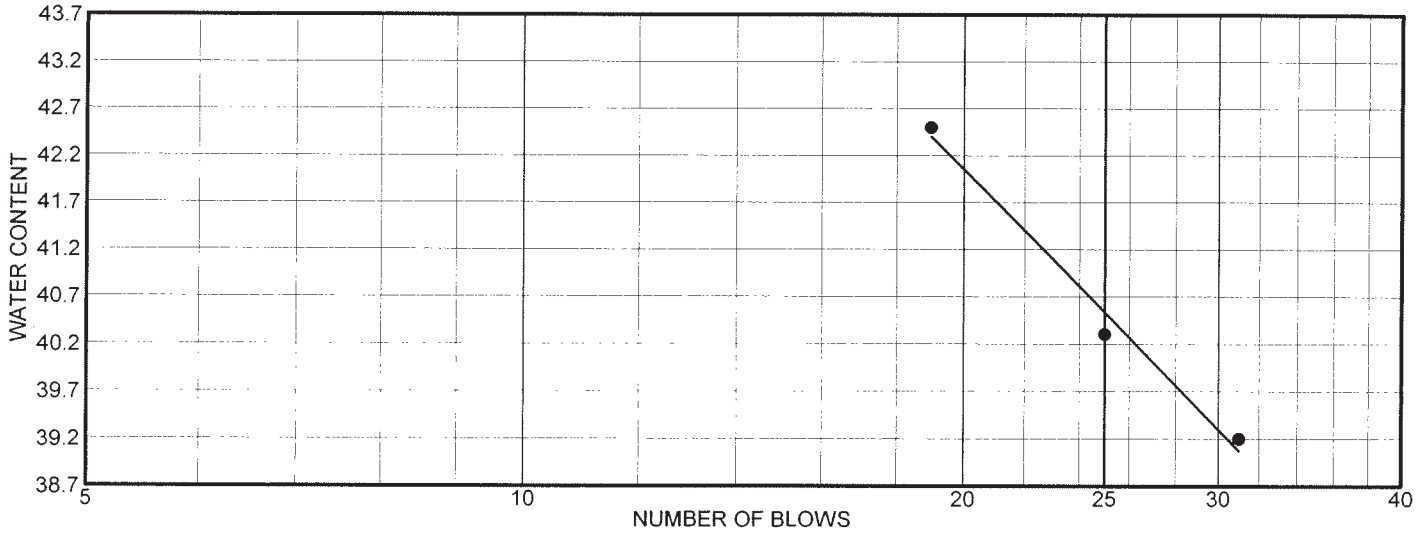
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay with sand	41	21	20			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-009 **Sample No.:** 14-2 **Elev./Depth:** 80.5-81

Remarks:

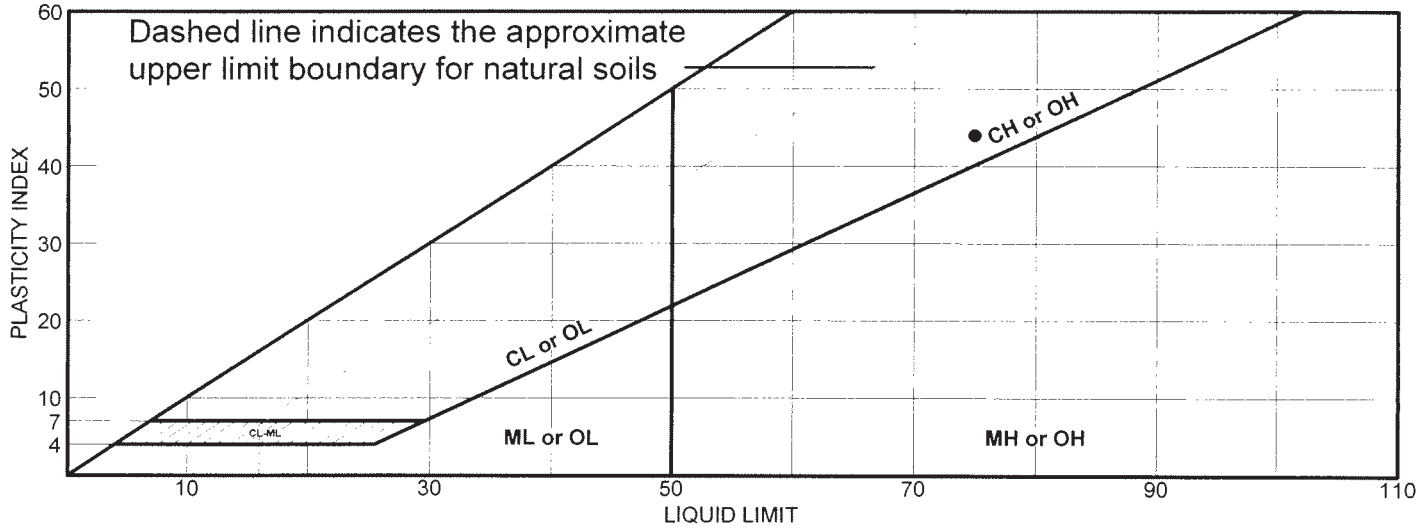
●

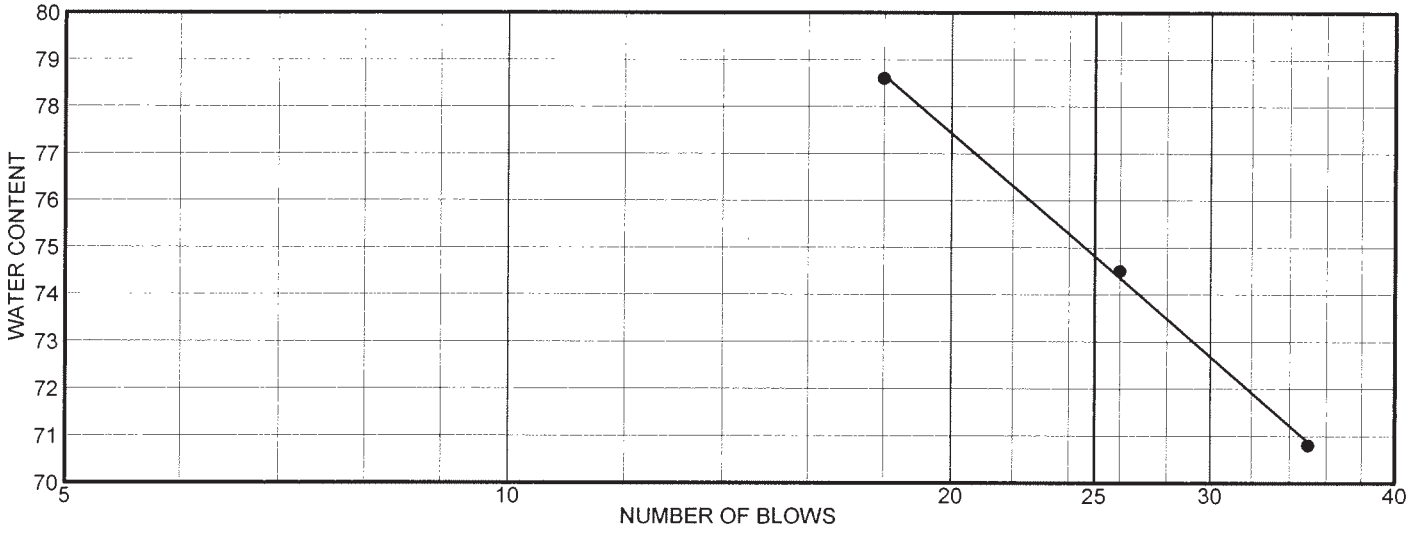
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark olive gray fat clay	75	31	44			CH

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-009 **Sample No.:** 11-2 **Elev./Depth:** 50.5-51

Remarks:

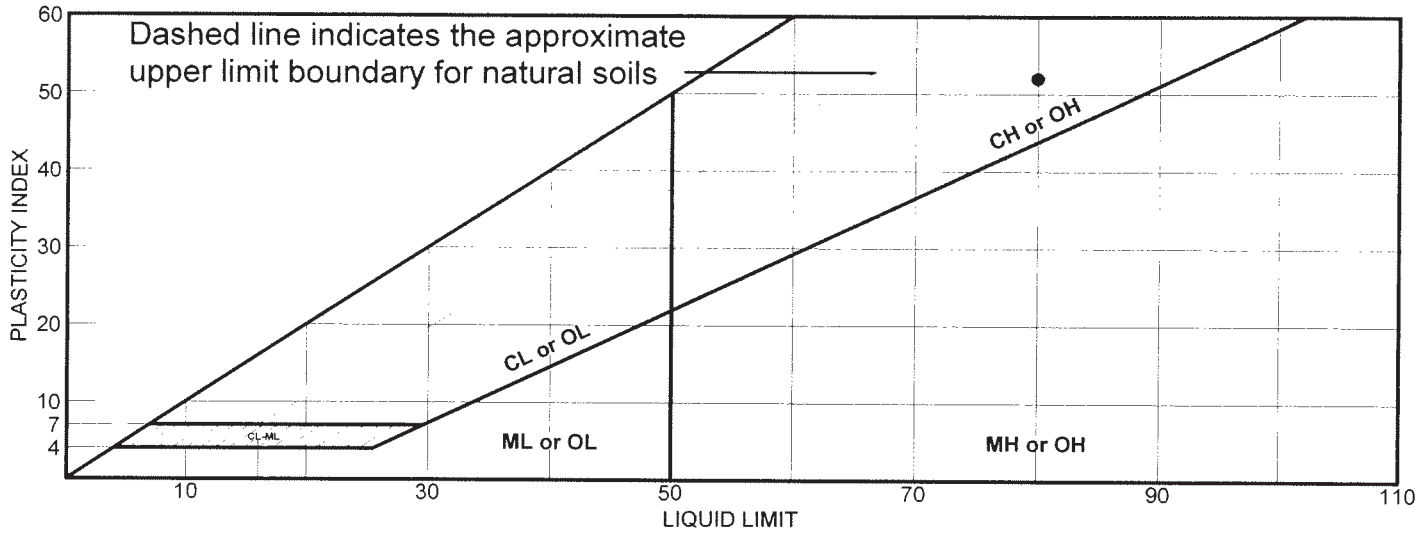
●

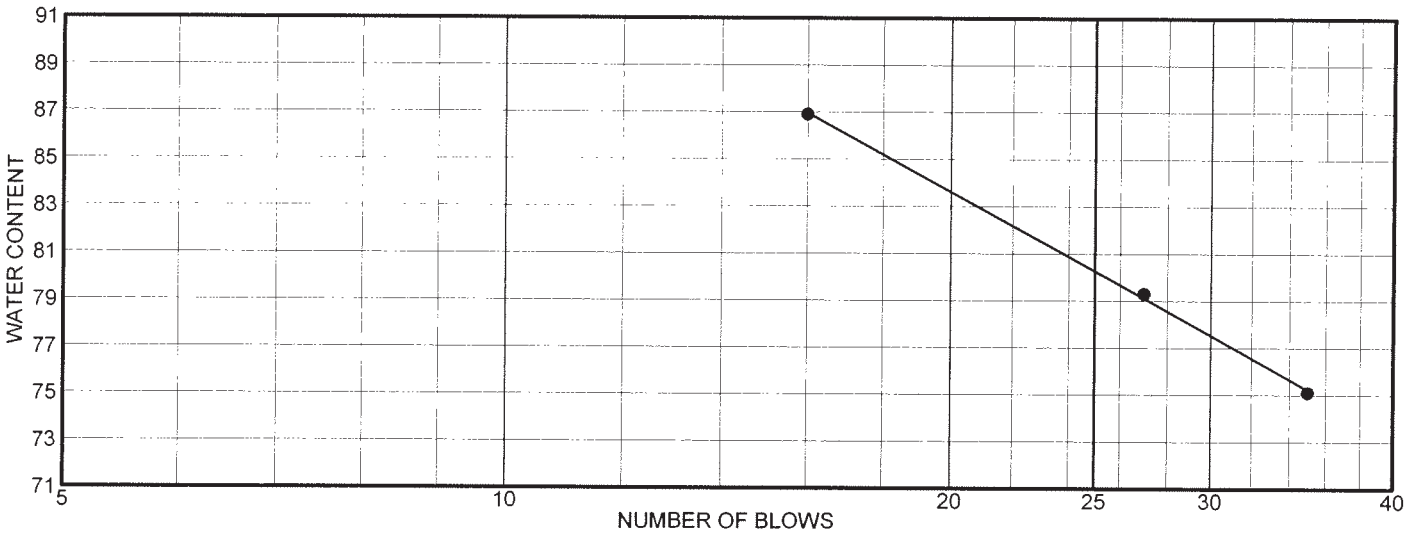
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive gray fat clay	80	28	52			CH

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-008 **Sample No.:** 8-3 **Elev./Depth:** 36-36.5

Remarks:

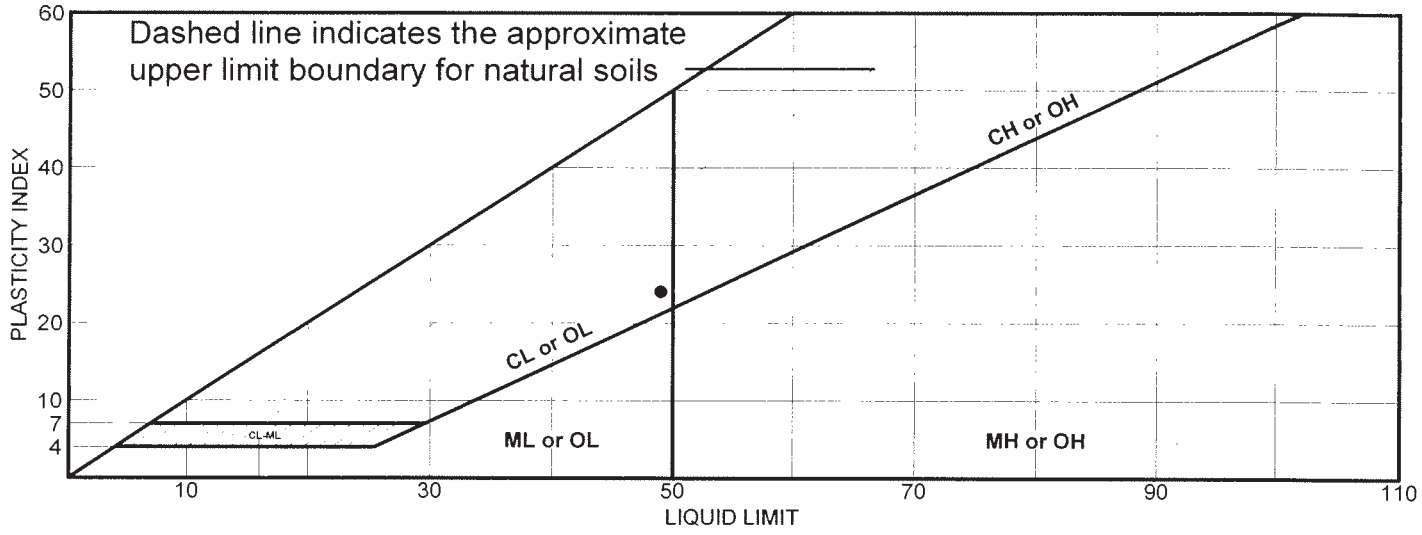
●

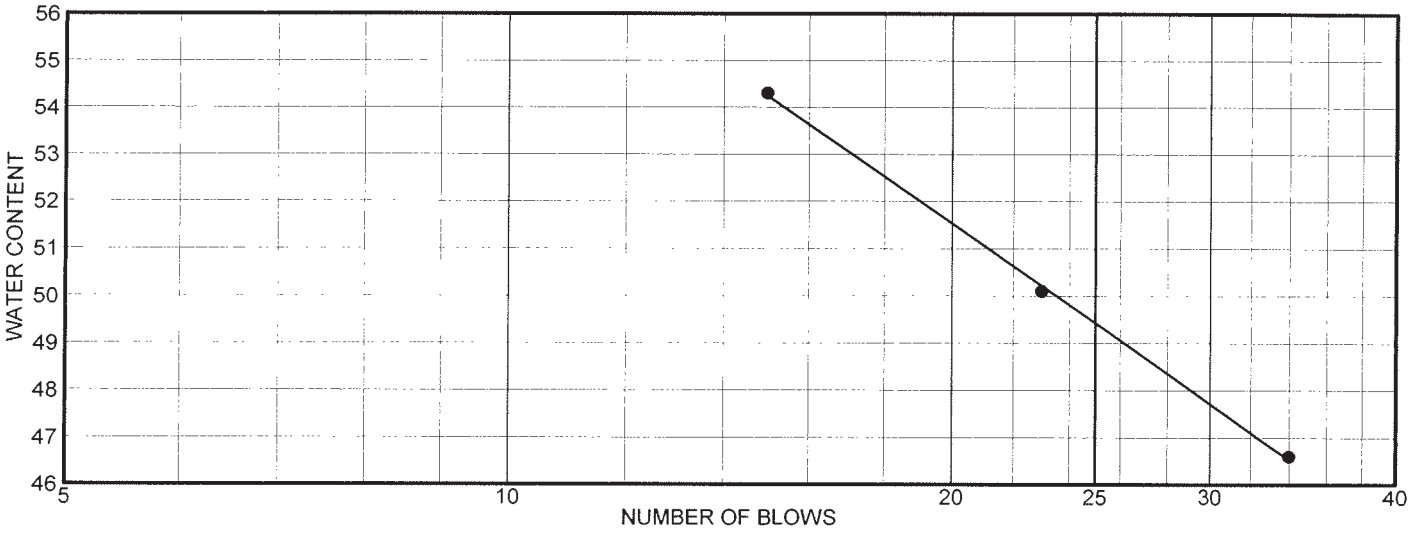
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown lean clay	49	25	24			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-008 **Sample No.:** 3-2 **Elev./Depth:** 10.5-11

Remarks:

●

LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

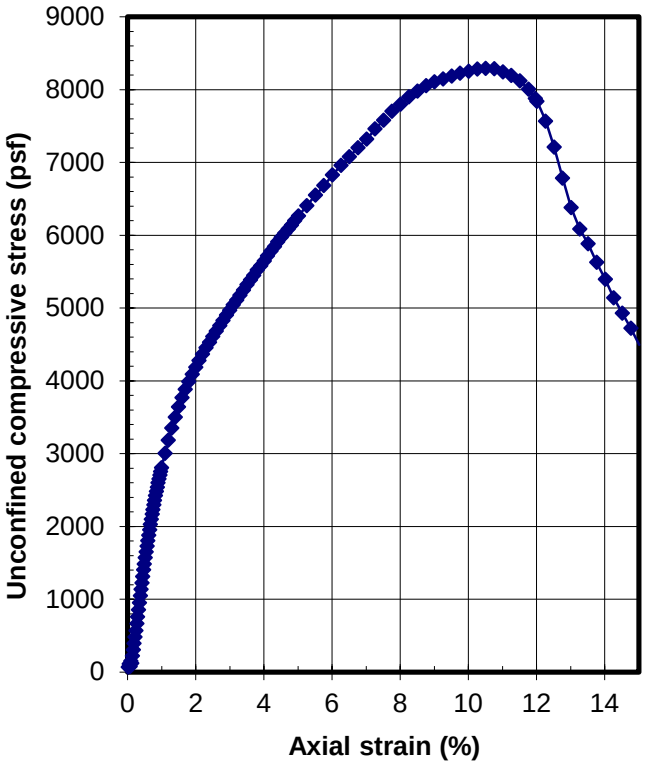
Figure

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-008
Sample No,	2-3
Depth (ft)	6-6.5
Date Tested	05/24/11
Soil Description	Undisturbed brown lean clay with gravel
Total wet weight	435.62 gms
Average Height	4.51 in
Average Diameter	1.89 in
Area	2.81 sq.in
Volume	207.78 c.c.
Void ratio	0.493
Ht/Dia ratio	2.38
Moisture	15.94 %
Wet density	130.89 pcf
Dry density	112.90 pcf
Saturation	87.3 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	8291 psf
Shear strength	4146 psf
Strain @ failure	10.51 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	65.47	1.60	3768.67	7.76	7699.17
0.05	113.21	1.70	3883.08	8.02	7798.06
0.07	77.18	1.80	3989.48	8.26	7898.51
0.09	152.80	1.90	4089.54	8.51	7976.48
0.12	120.83	2.00	4187.07	8.77	8052.83
0.15	222.27	2.10	4276.55	9.01	8104.29
0.17	304.50	2.20	4364.05	9.26	8145.73
0.19	392.71	2.30	4451.91	9.52	8184.32
0.22	481.45	2.40	4529.61	9.76	8223.68
0.25	570.26	2.50	4607.31	10.01	8251.65
0.27	665.69	2.61	4680.51	10.27	8283.32
0.29	755.86	2.70	4756.33	10.51	8291.19
0.32	852.24	2.80	4826.98	10.76	8286.72
0.35	951.13	2.91	4901.84	11.02	8243.70
0.37	1045.07	3.00	4968.91	11.26	8193.72
0.39	1134.45	3.10	5042.91	11.51	8120.58
0.42	1225.04	3.21	5108.82	11.77	8003.73
0.45	1312.26	3.30	5173.50	11.96	7879.19
0.47	1401.15	3.41	5245.13	12.01	7839.32
0.49	1484.15	3.50	5317.76	12.27	7565.38
0.52	1568.72	3.61	5386.44	12.52	7211.17
0.55	1649.15	3.71	5446.47	12.76	6782.05
0.57	1727.42	3.81	5520.00	13.02	6379.89
0.59	1804.33	3.91	5577.79	13.27	6084.82
0.62	1878.84	4.01	5644.20	13.51	5882.68
0.65	1953.21	4.11	5713.14	13.77	5626.63
0.67	2026.01	4.21	5779.27	14.02	5393.61
0.69	2098.67	4.31	5844.29	14.26	5140.95
0.72	2167.78	4.41	5907.99	14.52	4928.27
0.75	2231.18	4.51	5968.05	14.77	4720.39
0.77	2296.14	4.61	6026.46	15.02	4493.38
0.79	2359.04	4.71	6084.49		
0.82	2423.50	4.81	6136.87		
0.85	2481.46	4.91	6199.20		
0.87	2538.84	5.01	6263.51		
0.89	2596.49	5.26	6406.33		
0.92	2649.87	5.51	6549.19		
0.95	2702.57	5.76	6681.18		
0.97	2754.49	6.01	6824.47		
0.99	2807.20	6.26	6958.88		
1.10	3003.43	6.51	7078.01		
1.20	3181.36	6.76	7201.08		
1.30	3348.96	7.01	7317.55		
1.40	3500.61	7.26	7457.92		
1.50	3642.08	7.51	7578.40		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

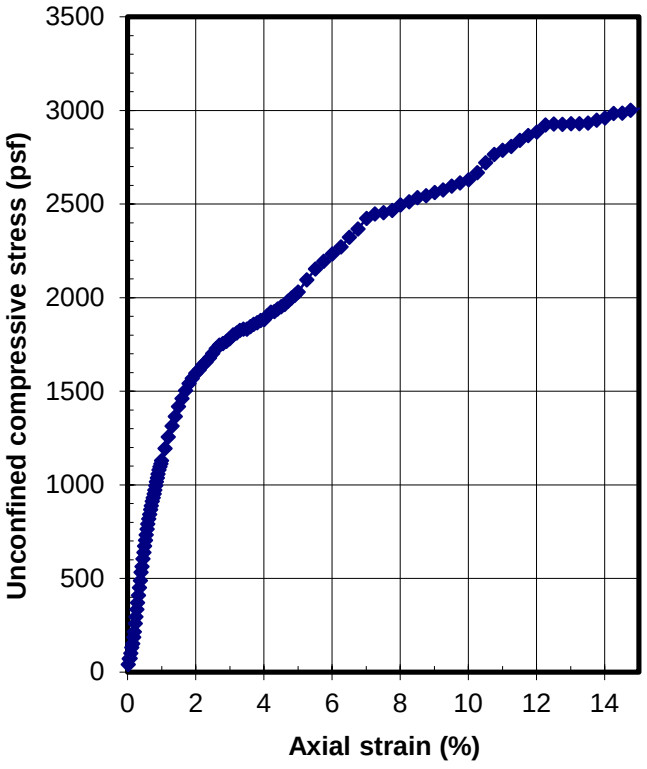
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-008
Sample No,	5-2
Depth (ft)	20.5-21
Date Tested	05/25/11
Soil Description	Undisturbed brown lean clay
Total wet weight	460.69 gms
Average Height	4.80 in
Average Diameter	1.93 in
Area	2.93 sq.in
Volume	230.00 c.c.
Void ratio	0.684
Ht/Dia ratio	2.49
Moisture	24.96 %
Wet density	125.05 pcf
Dry density	100.07 pcf
Saturation	98.5 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	3009 psf
Shear strength	1504 psf
Strain @ failure	15.02 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	40.34	1.60	1459.88	7.76	2465.22
0.05	70.30	1.70	1502.74	8.01	2494.79
0.08	72.51	1.80	1540.67	8.26	2511.26
0.10	100.30	1.90	1568.41	8.51	2534.25
0.12	130.49	2.00	1594.54	8.76	2544.45
0.15	150.73	2.10	1613.90	9.01	2561.04
0.18	185.11	2.20	1638.33	9.27	2575.25
0.20	213.61	2.30	1655.17	9.51	2594.14
0.22	257.73	2.40	1678.02	9.76	2611.34
0.25	293.87	2.50	1700.42	10.02	2628.91
0.28	333.50	2.60	1726.24	10.26	2667.07
0.30	370.20	2.70	1745.30	10.51	2720.61
0.33	409.60	2.80	1754.73	10.77	2764.14
0.35	450.49	2.91	1766.19	11.01	2787.21
0.38	487.28	3.00	1780.09	11.26	2807.23
0.40	531.93	3.10	1800.76	11.52	2839.90
0.42	563.30	3.21	1810.33	11.76	2864.98
0.45	603.62	3.30	1823.87	12.01	2884.60
0.48	638.39	3.41	1830.42	12.27	2920.82
0.50	671.86	3.50	1830.29	12.51	2926.90
0.53	702.67	3.61	1845.38	12.77	2925.05
0.55	731.48	3.71	1855.93	13.02	2928.59
0.58	762.60	3.81	1865.27	13.26	2928.05
0.60	789.62	3.91	1877.74	13.52	2932.09
0.63	817.85	4.01	1882.86	13.77	2946.46
0.65	842.09	4.11	1902.09	14.01	2959.69
0.68	867.11	4.21	1921.79	14.27	2982.61
0.70	888.00	4.31	1925.74	14.52	2985.12
0.73	912.20	4.41	1939.39	14.76	3000.78
0.75	930.57	4.51	1951.12	15.02	3008.69
0.78	950.92	4.61	1962.55		
0.80	971.69	4.71	1978.99		
0.83	995.32	4.81	1997.25		
0.85	1016.50	4.91	2012.47		
0.88	1036.17	5.01	2029.40		
0.90	1057.25	5.26	2094.50		
0.93	1078.84	5.51	2151.49		
0.95	1095.63	5.76	2193.11		
0.98	1111.17	6.01	2232.40		
1.00	1128.96	6.26	2270.50		
1.10	1193.70	6.51	2321.40		
1.20	1255.03	6.76	2366.51		
1.30	1312.38	7.01	2423.12		
1.40	1364.48	7.26	2447.11		
1.50	1417.36	7.51	2453.91		



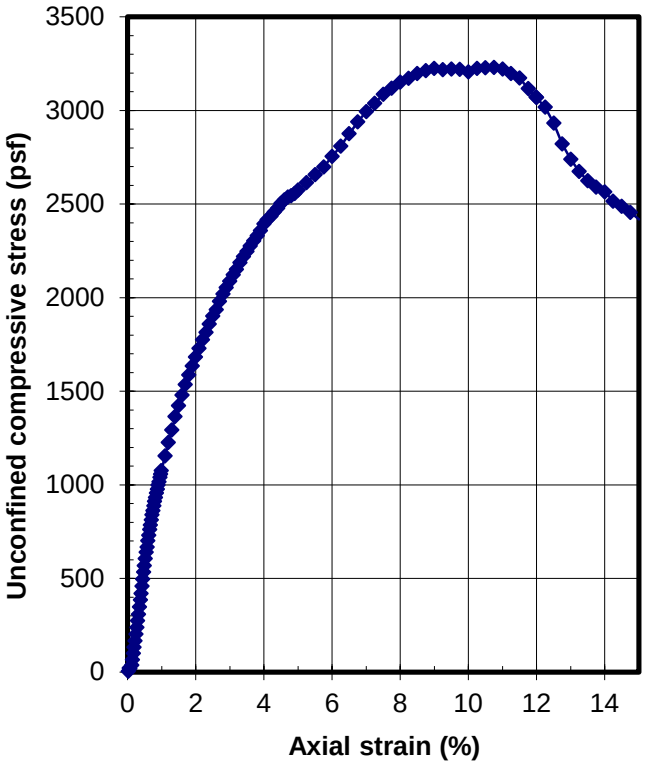
See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-009
Sample No,	4-2
Depth (ft)	15.5-16
Date Tested	05/25/11
Soil Description	Undisturbed brown lean clay
Total wet weight	467.67 gms
Average Height	4.69 in
Average Diameter	1.92 in
Area	2.89 sq.in
Volume	221.94 c.c.
Void ratio	0.525
Ht/Dia ratio	2.45
Moisture	18.99 %
Wet density	131.55 pcf
Dry density	110.56 pcf
Saturation	97.7 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	3229 psf
Shear strength	1614 psf
Strain @ failure	10.75 %



Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	4.29	1.60	1478.46	7.75	3117.15
0.05	20.94	1.70	1535.11	8.01	3150.92
0.07	18.34	1.80	1585.85	8.25	3170.21
0.10	-11.48	1.90	1634.34	8.50	3196.13
0.12	35.62	2.00	1682.61	8.76	3212.35
0.15	66.06	2.10	1729.28	9.00	3223.81
0.17	99.70	2.20	1773.83	9.25	3216.93
0.19	131.38	2.30	1814.02	9.51	3221.06
0.22	166.51	2.40	1859.06	9.75	3218.92
0.25	202.19	2.50	1900.86	10.00	3205.81
0.27	238.05	2.60	1935.04	10.26	3224.07
0.29	273.18	2.70	1979.78	10.50	3227.59
0.32	308.51	2.80	2018.35	10.75	3228.88
0.35	347.06	2.90	2052.60	11.01	3221.08
0.37	384.52	3.00	2087.27	11.25	3197.10
0.39	419.55	3.10	2121.70	11.50	3173.37
0.42	458.35	3.20	2150.86	11.76	3116.20
0.45	495.79	3.30	2186.76	11.98	3071.83
0.47	533.75	3.40	2219.53	12.00	3067.90
0.49	567.49	3.50	2246.57	12.25	3016.62
0.52	605.30	3.60	2275.18	12.51	2931.23
0.55	639.73	3.70	2302.35	12.75	2820.98
0.57	667.44	3.80	2330.41	13.00	2738.05
0.59	700.70	3.90	2357.95	13.26	2672.85
0.62	730.97	4.00	2392.58	13.50	2623.23
0.65	760.62	4.10	2416.35	13.75	2590.24
0.67	785.83	4.20	2433.80	14.01	2564.74
0.69	812.91	4.30	2455.71	14.25	2515.11
0.72	838.97	4.41	2476.49	14.50	2487.89
0.75	862.47	4.50	2503.08	14.76	2455.60
0.77	886.76	4.60	2521.54	15.00	2418.60
0.79	910.71	4.70	2536.94		
0.82	931.18	4.80	2543.39		
0.85	955.35	4.90	2556.38		
0.87	977.01	5.00	2573.65		
0.89	998.98	5.25	2613.13		
0.92	1016.44	5.50	2657.26		
0.95	1039.54	5.76	2697.98		
0.97	1057.47	6.00	2753.75		
0.99	1076.07	6.25	2809.14		
1.10	1153.89	6.51	2874.65		
1.20	1226.38	6.75	2937.69		
1.30	1292.24	7.00	2993.30		
1.40	1365.16	7.26	3038.06		
1.49	1423.13	7.50	3085.57		

See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

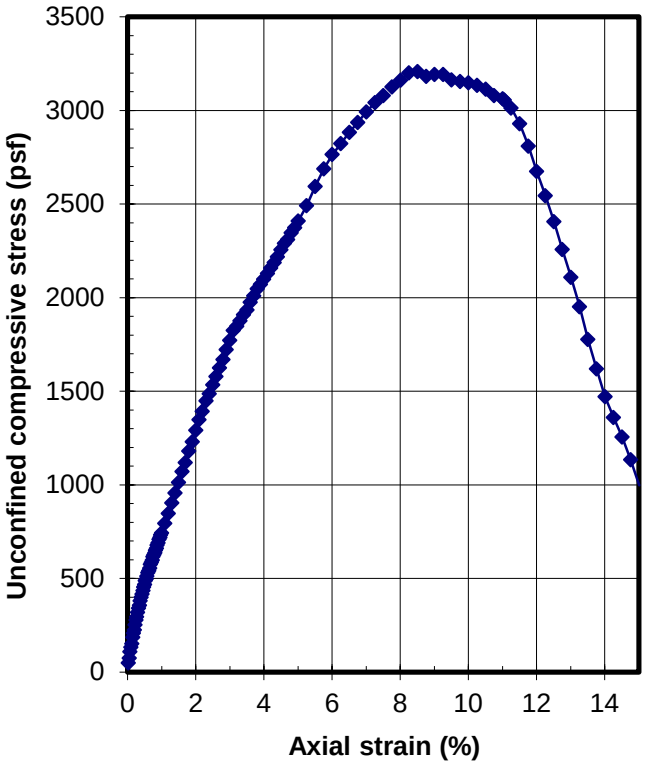
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-011
Sample No,	3-2
Depth (ft)	10.5-11
Date Tested	05/25/11
Soil Description	Undisturbed grayish brown lean clay
Total wet weight	465.76 gms
Average Height	4.63 in
Average Diameter	1.92 in
Area	2.90 sq.in
Volume	219.55 c.c.
Void ratio	0.490
Ht/Dia ratio	2.41
Moisture	17.10 %
Wet density	132.44 pcf
Dry density	113.09 pcf
Saturation	94.2 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	3206 psf
Shear strength	1603 psf
Strain @ failure	8.51 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	48.29	1.60	1071.25	7.76	3124.17
0.05	74.51	1.69	1118.15	8.01	3160.48
0.07	107.98	1.80	1180.30	8.25	3200.42
0.10	132.54	1.90	1230.11	8.51	3206.04
0.12	151.43	2.00	1290.32	8.76	3181.82
0.15	184.47	2.10	1346.84	9.00	3191.61
0.17	206.90	2.20	1390.91	9.26	3191.91
0.20	223.77	2.30	1448.25	9.51	3162.19
0.22	251.43	2.40	1485.45	9.76	3154.70
0.25	278.20	2.50	1533.34	10.01	3147.36
0.27	294.49	2.60	1577.84	10.26	3133.73
0.30	318.18	2.70	1624.79	10.51	3112.57
0.32	340.30	2.80	1669.21	10.76	3077.88
0.35	355.59	2.90	1721.07	11.01	3061.16
0.37	380.38	3.00	1771.86	11.06	3054.96
0.40	398.66	3.10	1824.14	11.26	3012.16
0.42	416.06	3.20	1847.22	11.51	2927.87
0.45	435.27	3.30	1874.59	11.76	2808.64
0.47	453.44	3.40	1908.28	12.01	2673.46
0.50	466.43	3.50	1933.19	12.26	2544.02
0.52	487.74	3.60	1974.85	12.51	2404.77
0.55	496.73	3.70	2008.47	12.76	2255.97
0.57	511.68	3.80	2045.53	13.01	2108.00
0.60	530.95	3.90	2070.92	13.26	1951.12
0.62	541.32	4.00	2097.47	13.51	1775.86
0.65	553.93	4.10	2128.85	13.76	1618.57
0.67	575.34	4.20	2157.48	14.01	1470.71
0.70	584.94	4.30	2186.69	14.26	1359.71
0.72	596.73	4.40	2217.52	14.51	1254.61
0.75	615.54	4.50	2254.53	14.76	1133.66
0.77	625.31	4.60	2288.33	15.01	997.08
0.80	636.51	4.70	2310.32		
0.82	650.24	4.81	2345.63		
0.85	660.07	4.90	2372.59		
0.87	677.40	5.01	2408.62		
0.90	690.09	5.25	2491.04		
0.92	707.28	5.51	2593.25		
0.95	718.79	5.76	2686.58		
0.97	731.47	6.00	2764.08		
1.00	742.01	6.26	2821.67		
1.09	792.68	6.51	2882.13		
1.20	845.90	6.75	2935.10		
1.30	903.29	7.01	2991.85		
1.39	956.35	7.26	3040.30		
1.50	1012.54	7.50	3078.57		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

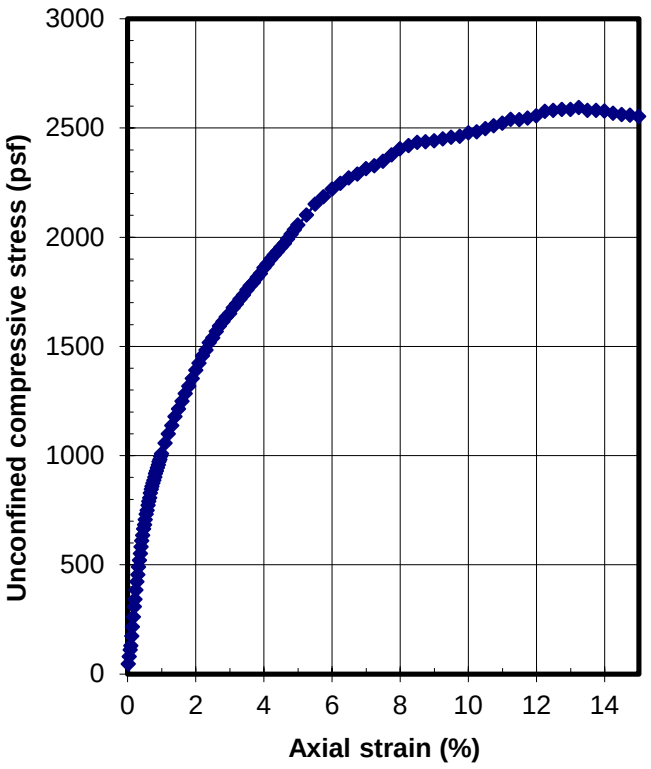
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-011
Sample No,	14-2
Depth (ft)	70.5-71
Date Tested	05/23/11
Soil Description	Undisturbed brown lean clay
Total wet weight	458.35 gms
Average Height	4.63 in
Average Diameter	1.93 in
Area	2.93 sq.in
Volume	222.09 c.c.
Void ratio	0.577
Ht/Dia ratio	2.40
Moisture	20.57 %
Wet density	128.85 pcf
Dry density	106.86 pcf
Saturation	96.2 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	2594 psf
Shear strength	1297 psf
Strain @ failure	13.24 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	46.28	1.60	1249.25	7.75	2376.06
0.05	80.17	1.70	1283.85	8.00	2404.53
0.07	109.73	1.80	1318.11	8.25	2419.00
0.10	129.20	1.90	1353.01	8.50	2434.37
0.12	173.74	2.00	1390.01	8.74	2436.67
0.15	215.42	2.10	1423.39	9.00	2440.53
0.17	260.81	2.20	1456.04	9.25	2449.32
0.20	307.35	2.30	1483.14	9.49	2457.35
0.22	341.43	2.40	1517.35	9.75	2460.97
0.25	383.70	2.50	1538.93	10.00	2477.24
0.27	422.67	2.60	1567.30	10.24	2482.43
0.30	454.07	2.70	1592.19	10.50	2497.01
0.32	489.72	2.80	1612.83	10.75	2510.24
0.35	519.76	2.90	1634.42	10.99	2522.31
0.37	551.42	3.00	1649.70	11.25	2538.75
0.40	581.67	3.10	1676.34	11.50	2538.51
0.42	609.76	3.20	1693.40	11.74	2545.25
0.45	635.31	3.30	1715.28	12.00	2555.65
0.47	663.78	3.40	1735.44	12.25	2575.54
0.50	683.47	3.50	1758.13	12.49	2580.81
0.52	706.66	3.60	1777.03	12.75	2584.20
0.55	731.70	3.70	1792.46	13.00	2583.97
0.57	748.99	3.80	1815.08	13.24	2593.61
0.60	772.39	3.90	1832.73	13.50	2580.45
0.62	790.69	4.00	1858.95	13.75	2580.63
0.65	805.80	4.10	1876.51	13.99	2576.67
0.67	827.97	4.20	1898.37	14.24	2567.04
0.70	845.92	4.30	1917.68	14.50	2560.53
0.72	858.37	4.40	1934.81	14.74	2558.18
0.75	874.24	4.50	1953.07	14.99	2553.06
0.77	886.46	4.60	1970.98	15.00	2558.89
0.80	902.10	4.70	1991.21		
0.82	917.37	4.80	2013.34		
0.85	929.75	4.90	2033.19		
0.87	944.46	5.00	2055.11		
0.90	956.80	5.25	2100.52		
0.92	971.74	5.50	2151.54		
0.95	981.96	5.75	2184.31		
0.97	996.72	6.00	2220.26		
1.00	1008.69	6.25	2246.46		
1.10	1057.37	6.50	2271.84		
1.19	1099.82	6.75	2288.87		
1.30	1137.80	7.00	2313.22		
1.40	1177.81	7.25	2327.45		
1.49	1213.74	7.50	2347.57		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

Signet Testing Labs, Inc.

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

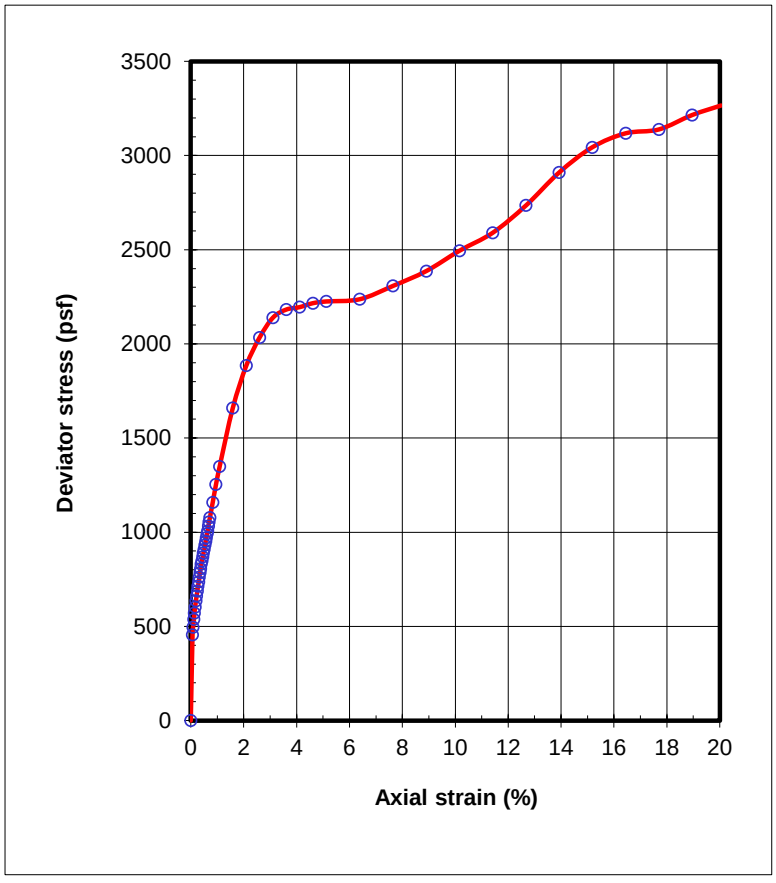
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-008
Sample # : 14-3
Depth (ft) : 81-81.5
Date tested : 05/23/11
Soil : Yellowish brown sandy lean clay

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 453.0 gms
Ht. = 4.530 in
Ave dia. = 1.930 in
Area = 2.927 sq.in
Volume = 217.3 c.c.
Shearing rate = 0.05 inch/min
Shearing rate = 1 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.540
Ht/Dia ratio = 2.35
Moisture = 18.9 %
Total density = 130.1 pcf
Dry density = 109.4 pcf
Saturation = 94.6 %
Chamber pressure = 5300 psf
Max. deviator stress = 3044 psf
Strain @ failure = 15.20 %



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	9.3	0.07	455.5
0.002	10.1	0.09	495.9
0.004	10.9	0.12	537.5
0.005	11.6	0.14	570.0
0.006	12.3	0.16	602.8
0.007	13.0	0.20	635.9
0.008	13.5	0.22	661.5
0.010	14.0	0.25	687.4
0.011	14.5	0.27	713.1
0.012	15.0	0.30	736.8
0.013	15.5	0.32	761.8
0.014	16.0	0.35	785.6
0.015	16.5	0.37	806.4
0.016	16.9	0.40	830.6
0.017	17.3	0.42	848.1
0.019	17.8	0.46	869.8
0.020	18.2	0.48	889.3
0.021	18.6	0.51	908.2
0.022	19.0	0.53	931.4
0.024	19.4	0.56	951.1
0.025	19.8	0.58	970.4
0.026	20.3	0.62	992.4
0.027	20.6	0.64	1006.8
0.029	21.1	0.67	1033.3
0.030	21.6	0.69	1054.1
0.031	22.1	0.72	1077.8
0.036	23.7	0.83	1158.3
0.041	25.7	0.95	1253.0
0.048	27.7	1.09	1349.1
0.070	34.3	1.59	1660.1
0.093	39.1	2.10	1884.9
0.116	42.4	2.60	2033.2
0.139	44.9	3.11	2139.6
0.162	46.0	3.61	2182.0
0.185	46.5	4.12	2195.0
0.207	47.2	4.62	2216.0
0.230	47.7	5.13	2225.2
0.287	48.6	6.39	2236.9
0.345	50.8	7.65	2307.7
0.402	53.2	8.90	2386.6
0.458	56.4	10.16	2494.3
0.515	59.4	11.42	2589.9
0.572	63.7	12.67	2735.1
0.629	68.7	13.93	2909.9
0.686	72.9	15.18	3043.6
0.743	75.8	16.44	3118.0
0.800	77.5	17.70	3138.4
0.857	80.6	18.95	3214.9

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

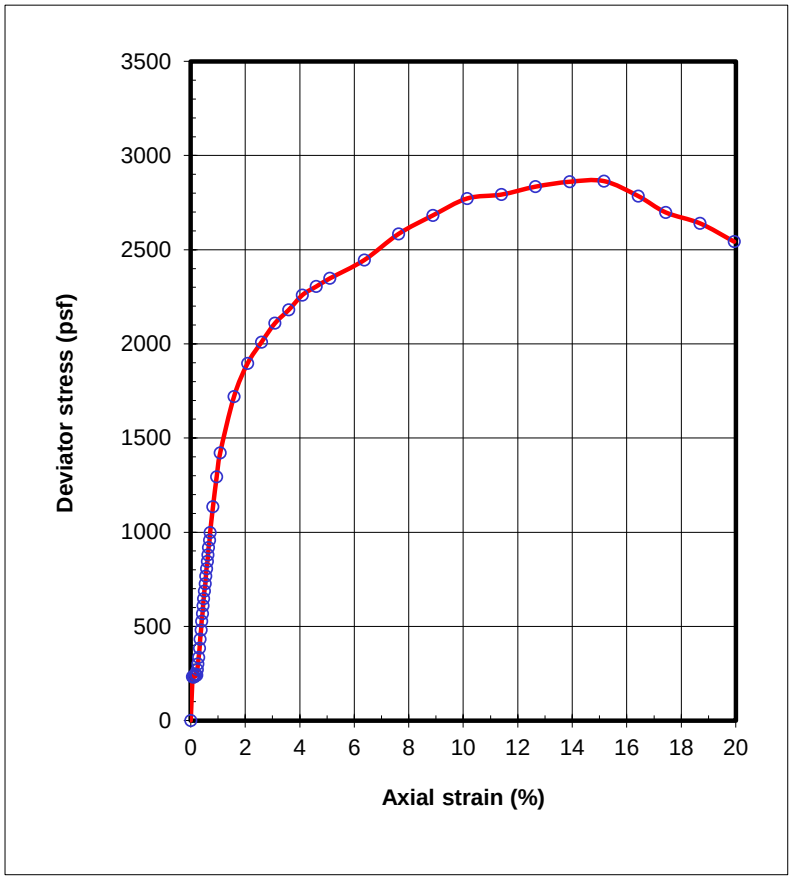
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-009
Sample # : 8-2
Depth (ft) : 35.5-36
Date tested : 05/23/11
Soil : Olive lean clay

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 390.7 gms
Ht. = 4.540 in
Ave dia. = 1.910 in
Area = 2.866 sq.in
Volume = 213.2 c.c.
Shearing rate = 0.05 inch/min
Shearing rate = 1 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 1.037
Ht/Dia ratio = 2.38
Moisture = 38.2 %
Total density = 114.3 pcf
Dry density = 82.7 pcf
Saturation = 99.5 %
Chamber pressure = 2700 psf
Max. deviator stress = 2864 psf
Strain @ failure = 15.20 %



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	4.6	0.07	232.6
0.002	4.6	0.09	231.3
0.003	4.7	0.11	234.3
0.005	4.6	0.14	232.8
0.006	4.9	0.16	246.7
0.007	4.8	0.20	241.6
0.008	4.8	0.22	240.8
0.009	5.4	0.24	269.5
0.010	6.0	0.26	300.8
0.011	6.7	0.29	335.3
0.013	7.7	0.32	384.8
0.014	8.6	0.35	432.3
0.015	9.6	0.38	481.4
0.016	10.5	0.40	527.3
0.018	11.4	0.43	568.3
0.019	12.2	0.45	609.8
0.020	12.9	0.47	647.3
0.021	13.8	0.50	687.4
0.023	14.5	0.53	726.2
0.023	15.4	0.56	767.1
0.024	16.1	0.58	806.4
0.026	16.9	0.61	845.6
0.027	17.6	0.63	880.2
0.028	18.4	0.65	918.2
0.030	19.2	0.69	957.9
0.031	20.0	0.71	997.7
0.035	22.8	0.82	1135.4
0.041	26.0	0.95	1294.1
0.047	28.6	1.08	1421.1
0.070	34.8	1.59	1720.2
0.093	38.5	2.08	1895.9
0.116	41.0	2.59	2008.6
0.139	43.3	3.09	2109.5
0.162	45.0	3.60	2180.9
0.184	46.9	4.10	2259.2
0.207	48.1	4.61	2304.6
0.230	49.2	5.10	2347.7
0.287	52.0	6.37	2444.8
0.344	55.7	7.63	2583.9
0.402	58.6	8.88	2681.9
0.459	61.4	10.14	2771.9
0.516	62.7	11.40	2792.6
0.573	64.6	12.65	2834.8
0.629	66.1	13.90	2860.6
0.687	67.2	15.16	2864.2
0.744	66.3	16.42	2785.0
0.789	65.0	17.43	2698.1
0.847	64.6	18.69	2640.0

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-009
Sample # : 16-3
Depth (ft) : 101-101.5
Date tested : 05/23/11
Soil : Grayish brown lean clay

Data Reduction:

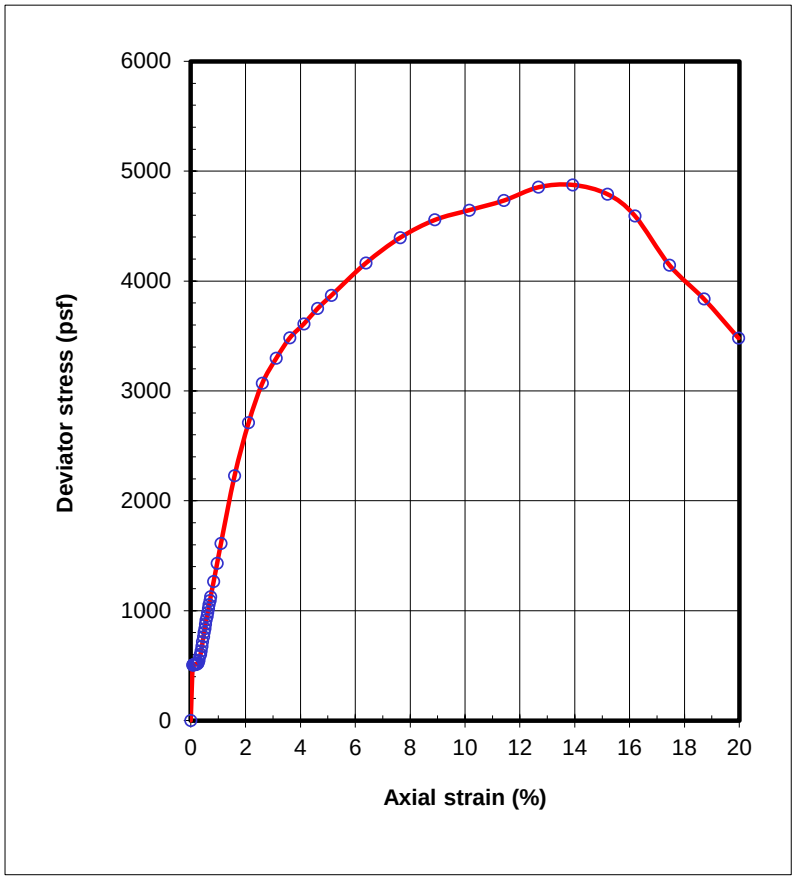
Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:

Total wt. =	411.3	gms
Ht. =	4.430	in
Ave dia. =	1.930	in
Area =	2.927	sq.in
Volume =	212.5	c.c.
Shearing rate =	0.04	inch/min
Shearing rate =	1	%/min
Gs (assumed) =	2.70	

Test Report:

Void ratio =	0.813	
Ht/Dia ratio =	2.30	
Moisture =	30.0	%
Total density =	120.8	pcf
Dry density =	92.9	pcf
Saturation =	99.6	%
Chamber pressure =	6400	psf
Max. deviator stress =	4876	psf
Strain @ failure =	13.93	%



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	10.3	0.07	504.6
0.002	10.3	0.09	506.6
0.003	10.3	0.11	506.0
0.005	10.4	0.14	509.6
0.006	10.4	0.17	511.6
0.007	10.4	0.20	509.8
0.008	10.6	0.22	519.2
0.009	10.5	0.25	517.7
0.010	10.7	0.27	524.9
0.012	11.2	0.30	547.6
0.013	12.0	0.33	586.3
0.014	12.3	0.36	604.4
0.015	13.0	0.38	634.8
0.016	13.8	0.41	676.1
0.017	14.7	0.43	718.6
0.019	15.6	0.47	762.9
0.020	16.4	0.49	801.2
0.021	17.1	0.52	835.8
0.022	17.9	0.54	877.7
0.023	18.7	0.56	913.3
0.025	19.4	0.60	949.6
0.026	20.1	0.62	982.8
0.027	20.9	0.65	1021.1
0.028	21.6	0.67	1053.9
0.029	22.4	0.70	1092.0
0.030	23.1	0.72	1126.0
0.035	25.9	0.84	1266.0
0.041	29.4	0.96	1431.9
0.047	33.1	1.10	1612.0
0.069	46.0	1.60	2228.1
0.092	56.3	2.11	2710.1
0.114	64.0	2.61	3068.9
0.136	69.2	3.12	3296.9
0.158	73.5	3.61	3483.7
0.181	76.5	4.13	3610.9
0.203	79.9	4.62	3750.1
0.226	82.9	5.13	3870.4
0.281	90.4	6.39	4164.3
0.337	96.7	7.64	4395.7
0.393	101.7	8.90	4556.9
0.448	105.1	10.16	4645.9
0.504	108.6	11.42	4733.1
0.560	113.0	12.68	4854.0
0.615	115.1	13.93	4875.5
0.671	114.8	15.19	4791.4
0.716	111.4	16.19	4593.8
0.771	102.1	17.45	4145.1
0.827	95.9	18.71	3836.5

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-011
Sample # : 7
Depth (ft) : 26.5-29
Date tested : 05/19/11
Soil : Light grayish brown fat clay

Data Reduction:

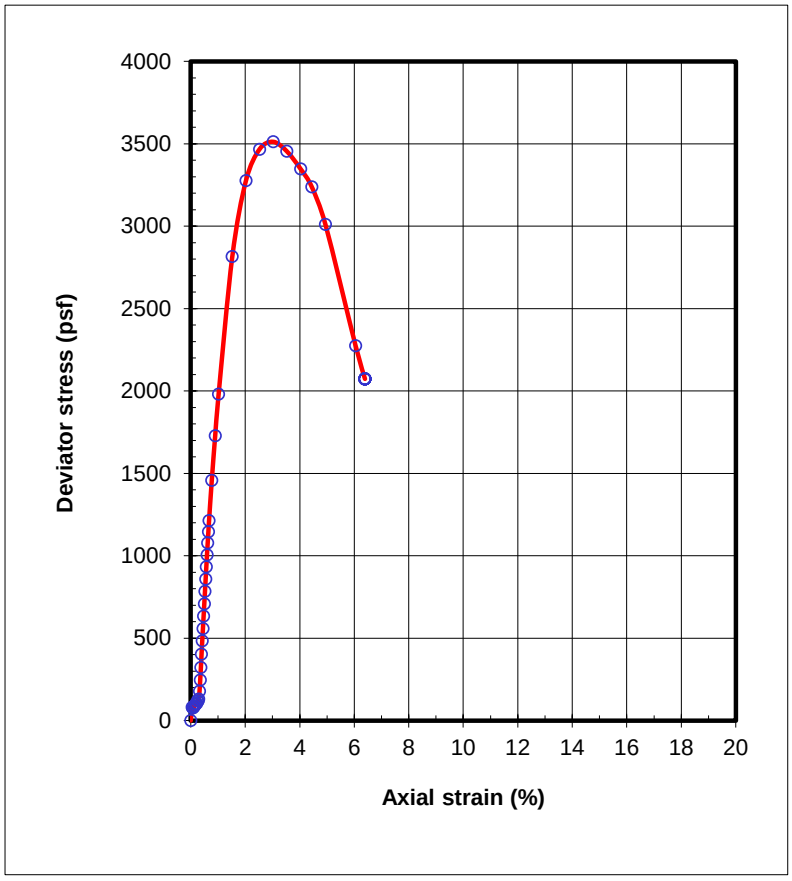
Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:

Total wt. =	1232.5	gms
Ht. =	5.960	in
Ave dia. =	2.867	in
Area =	6.457	sq.in
Volume =	630.6	c.c.
Shearing rate =	0.04	inch/min
Shearing rate =	0.75	%/min
Gs (assumed) =	2.70	

Test Report:

Void ratio =	0.794	
Ht/Dia ratio =	2.08	
Moisture =	29.9	%
Total density =	122.0	pcf
Dry density =	93.9	pcf
Saturation =	101.6	%
Chamber pressure =	2150	psf
Max. deviator stress =	3512	psf
Strain @ failure =	3.03	%



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.001		0.00	0.0
0.002	3.6	0.05	81.2
0.003	3.4	0.07	76.8
0.005	3.5	0.10	79.0
0.006	3.9	0.12	87.5
0.007	4.0	0.15	89.4
0.009	4.4	0.17	98.2
0.010	4.6	0.20	102.8
0.012	4.7	0.22	104.6
0.013	5.4	0.25	119.5
0.015	5.4	0.27	119.3
0.016	5.9	0.30	131.2
0.018	8.0	0.32	178.4
0.019	11.1	0.35	245.8
0.021	14.5	0.37	322.0
0.022	18.1	0.40	402.9
0.024	21.8	0.42	483.9
0.025	25.1	0.45	557.7
0.027	28.5	0.47	633.2
0.028	31.9	0.50	708.3
0.030	35.3	0.52	783.6
0.031	38.7	0.55	858.7
0.033	42.1	0.57	932.8
0.034	45.4	0.60	1005.4
0.036	48.6	0.62	1077.9
0.037	51.7	0.65	1144.9
0.039	54.8	0.67	1213.1
0.045	65.8	0.77	1457.0
0.052	78.2	0.90	1727.5
0.060	89.7	1.02	1979.9
0.090	128.2	1.52	2815.3
0.119	150.0	2.03	3276.9
0.149	159.5	2.52	3466.7
0.179	162.4	3.03	3511.8
0.209	160.5	3.53	3454.0
0.239	156.4	4.03	3347.3
0.263	152.0	4.44	3238.5
0.293	142.0	4.94	3010.2
0.359	108.6	6.05	2275.0
0.380	99.3	6.39	2073.2

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-011
Sample # : 12-2
Depth (ft) : 50.5-51
Date tested : 05/23/11
Soil : Grayish brown lean clay

Data Reduction:

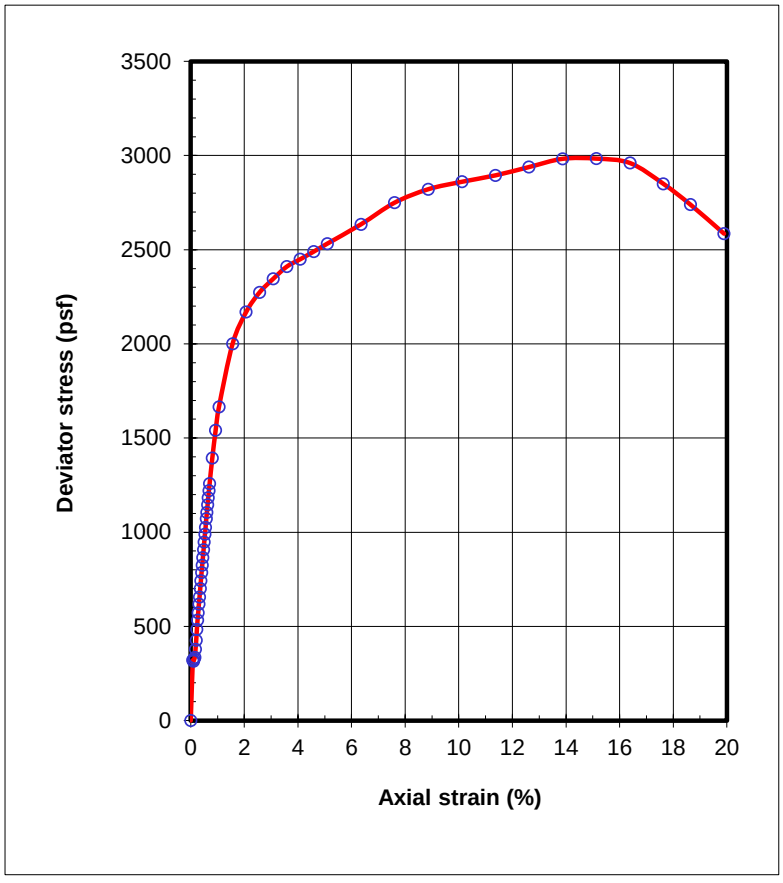
Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:

Total wt. =	344.2	gms	
Ht. =	3.860	in	
Ave dia. =	1.910	in	
Area =	2.866	sq.in	
Volume =	181.3	c.c.	
Shearing rate =	0.03	inch/min	
Shearing rate =	0.75	%/min	
Gs (assumed) =	2.70		

Test Report:

Void ratio =	0.859	
Ht/Dia ratio =	2.02	
Moisture =	30.7	%
Total density =	118.5	pcf
Dry density =	90.6	pcf
Saturation =	96.6	%
Chamber pressure =	4100	psf
Max. deviator stress =	2984	psf
Strain @ failure =	15.10	%

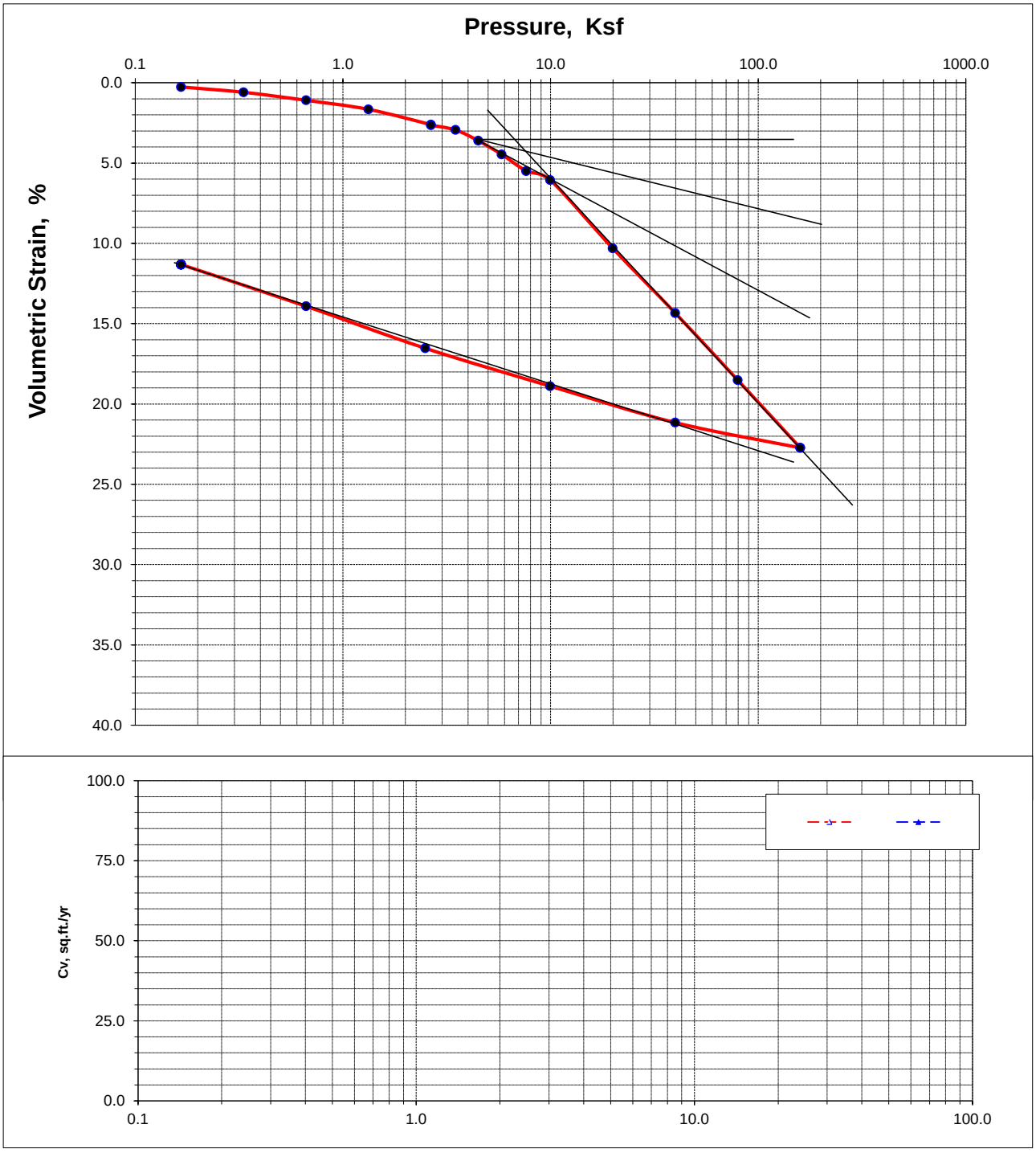


Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	6.4	0.08	320.7
0.002	6.3	0.10	315.5
0.003	6.5	0.13	325.8
0.004	6.7	0.15	335.9
0.005	7.5	0.18	378.5
0.006	8.5	0.20	425.7
0.007	9.6	0.23	483.2
0.008	10.6	0.25	533.2
0.009	11.4	0.28	572.6
0.010	12.3	0.30	618.1
0.011	13.1	0.33	656.1
0.011	14.0	0.35	700.5
0.012	14.8	0.38	741.9
0.013	15.7	0.40	786.3
0.014	16.5	0.43	824.1
0.015	17.3	0.45	865.5
0.016	18.1	0.48	906.5
0.017	19.0	0.50	947.9
0.018	19.8	0.53	988.8
0.019	20.5	0.55	1025.3
0.020	21.4	0.58	1071.0
0.021	22.1	0.60	1104.4
0.022	22.9	0.63	1145.2
0.023	23.7	0.65	1182.8
0.024	24.5	0.68	1220.4
0.025	25.2	0.70	1257.5
0.029	28.0	0.80	1393.2
0.034	31.0	0.93	1541.1
0.039	33.5	1.05	1666.0
0.058	40.5	1.56	2000.7
0.078	44.1	2.07	2169.0
0.097	46.4	2.57	2273.1
0.117	48.2	3.08	2345.8
0.136	49.8	3.58	2409.9
0.155	50.8	4.08	2449.3
0.175	51.9	4.59	2489.7
0.194	53.1	5.09	2532.1
0.243	56.0	6.35	2634.9
0.291	59.2	7.61	2749.7
0.340	61.6	8.86	2821.2
0.388	63.4	10.12	2860.7
0.437	65.0	11.37	2894.6
0.485	66.9	12.62	2938.9
0.533	68.9	13.88	2982.7
0.582	70.0	15.13	2983.6
0.630	70.5	16.39	2960.0
0.678	68.9	17.63	2849.8
0.718	67.0	18.64	2739.0

CONSOLIDATION TEST

Boring Number	R-11-008	Sample Number	3-2	Depth (ft)	10.5-11	
Soil Description	Dark brown lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	23.0	124.1	0.671	92.6	0.70	1.880	(assumed) 2.70		
Final	17.4	134.8	0.468	100.4	0.615				

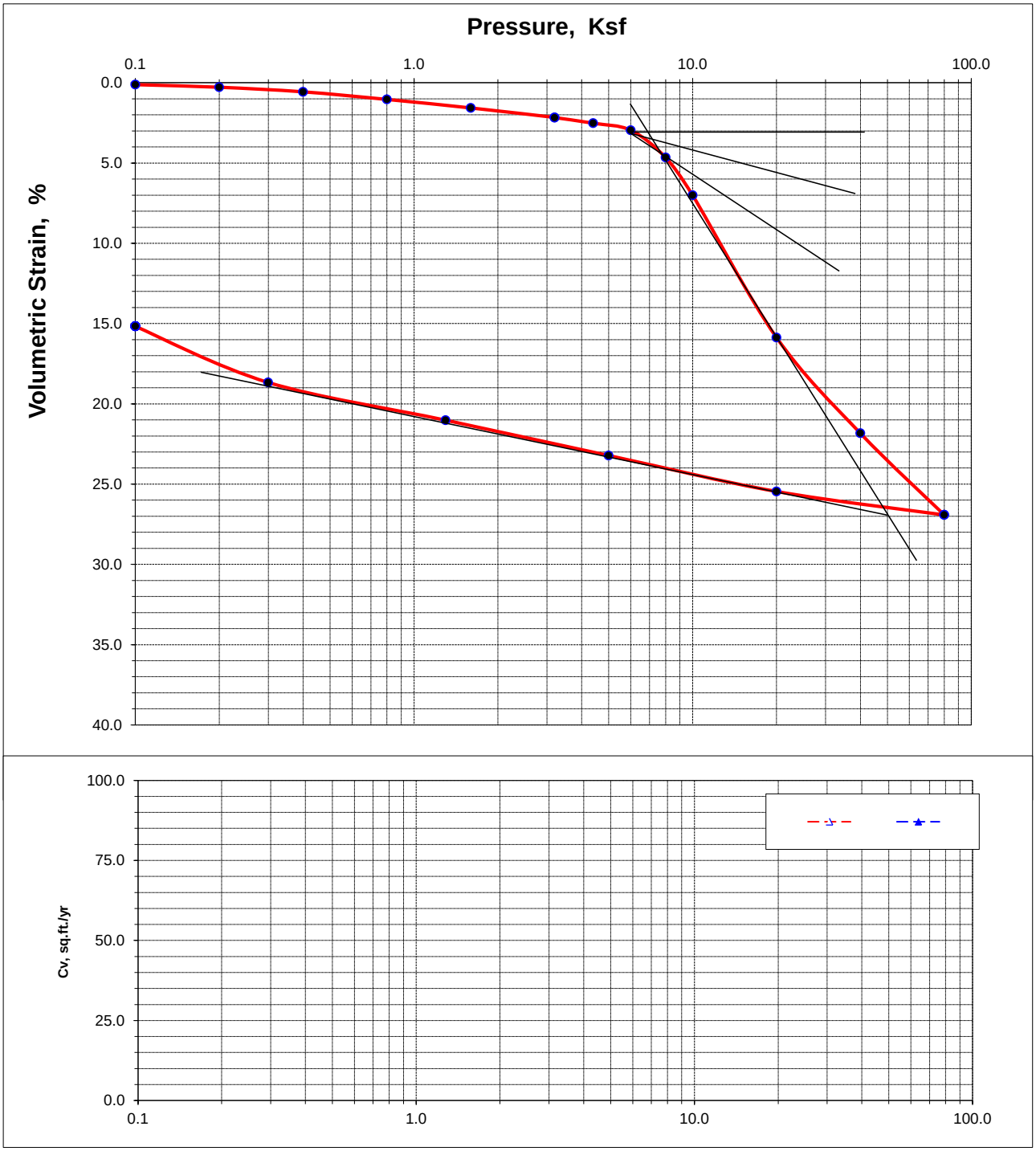


27560836

CONSOLIDATION TEST

Boring Number	R-11-011	Sample Number	7	Depth (ft)	26.5-29	
Soil Description	Light grayish brown fat clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	35.6	114.5	0.996	96.4	1.00	2.420	(assumed) 2.70		
Final	25.9	125.3	0.694	100.8	0.848				



27560836

Appendix D

Analysis and Calculations

URS CALCULATION SHEET		Sheet No. 1 of 3	
		Project No. 27560836.60203	
Project Title: ACMMA I-880 23rd & 29th Subject/Feature: Caltrans ARS.		Calc By CCT	Date 10/28/2010
		Checked By EN	Date 12/6/2010

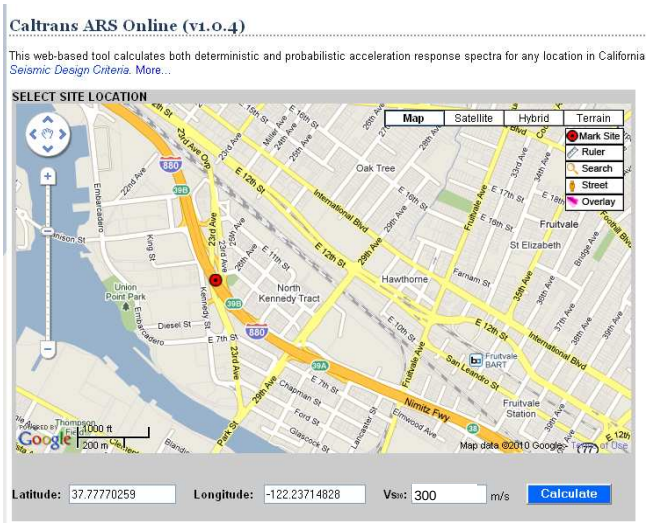
Rev: 2

Introduction

Caltrans ARS curve was calculated following the Caltran's procedure (seismic design criteria, Caltrans 2009).

Approach

-Site location coordinate is (37.778, -122.237)
-Use Caltrans ARS online tool



- Vs30 of is estimated using
  1. Vs measurement of 3 S-CPTs (X:\x_geo\ACCMA 23rd and 29th Ave\04 Analysis\01 seismic criteria\Vs30_rev2)

Elevation	Vs, 30 (m/sec)
B-6	251
B-7	255
B-10	236

2. Empirical correlation by $V_s = 132\ N^{0.271}$ (Pitilakis, 1999) for clay which is mostly encountered at the project site .

Elevation	N60*	Vs (m/sec)	d/vs (t)
20	10	246	
10	10	246	0.040591
0	10	246	0.040591
-10	10	246	0.040591
-20	10	246	0.040591
-30	12.85714	264	0.039209
-40	15.71429	278	0.036887
-50	18.57143	291	0.035098
-60	21.42857	303	0.033656
-70	24.28571	313	0.032456
-80	27.14286	323	0.031434
-90	30	332	0.030548
		Vs30	249

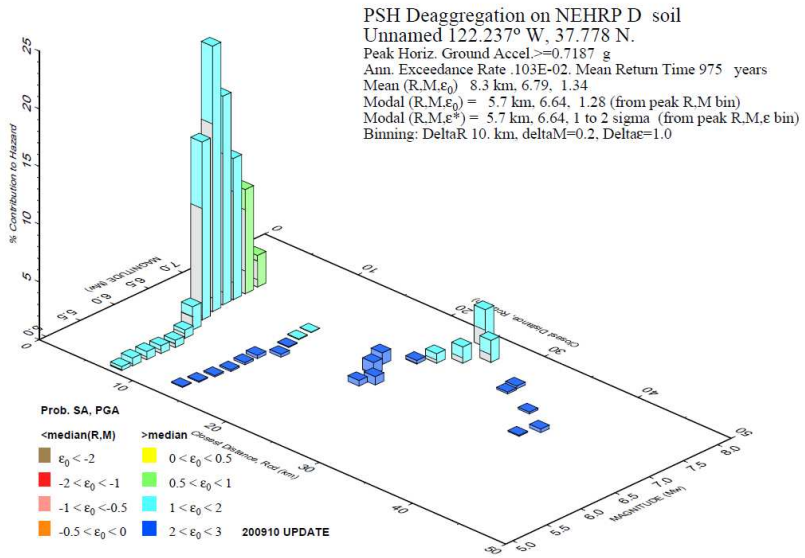
*The represented N60 profile is shown in attached figure

3. Vs estimated by empirical correlation and the filed measurement are consistent. Vs=250m/s is selected for design

- Since Vs30 =250 is less than 300m/s, additional USGS deaggregation analysis was performed to get 5%-50yr PSHA and compared with those by ARS online. The comparison is performed using attached spreadsheet provided by Caltrans. The envelope will be the design ARS

- R=5.7km is selected for perform PSHA based on USGS deaggregation tool

URS *CALCULATION SHEET*		Sheet No. 3 of 3	
		Project No. 27560836.60203	
Project Title: ACMMA I-880 23rd & 29th Subject/Feature: Caltrans ARS.		Calc By CCT	Date 10/28/2010
		Checked By EN	Date 12/6/2010

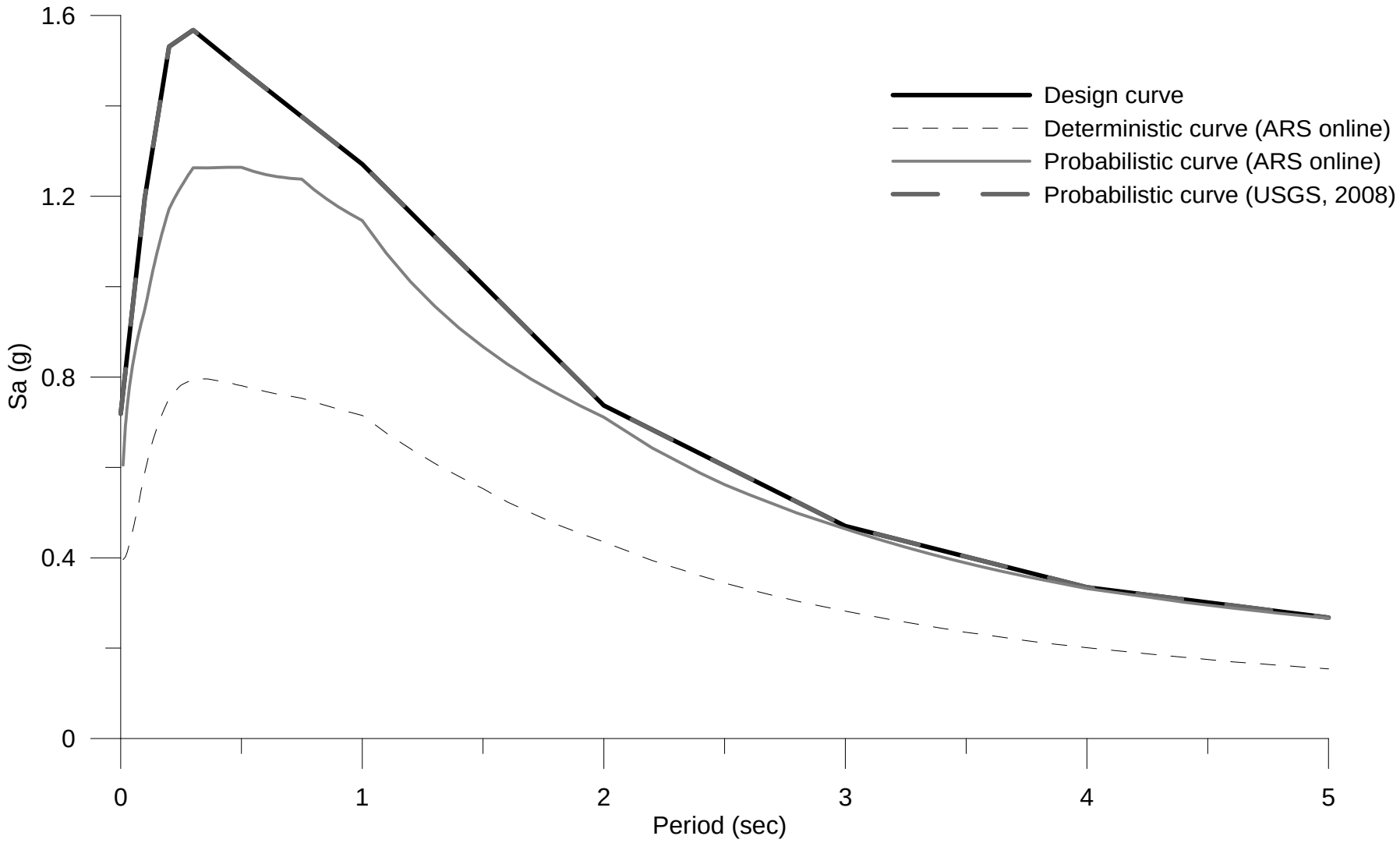


-Near fault effect is applied automatically by ARS online since R <25km

- No basin effect is considered

Results

See attached



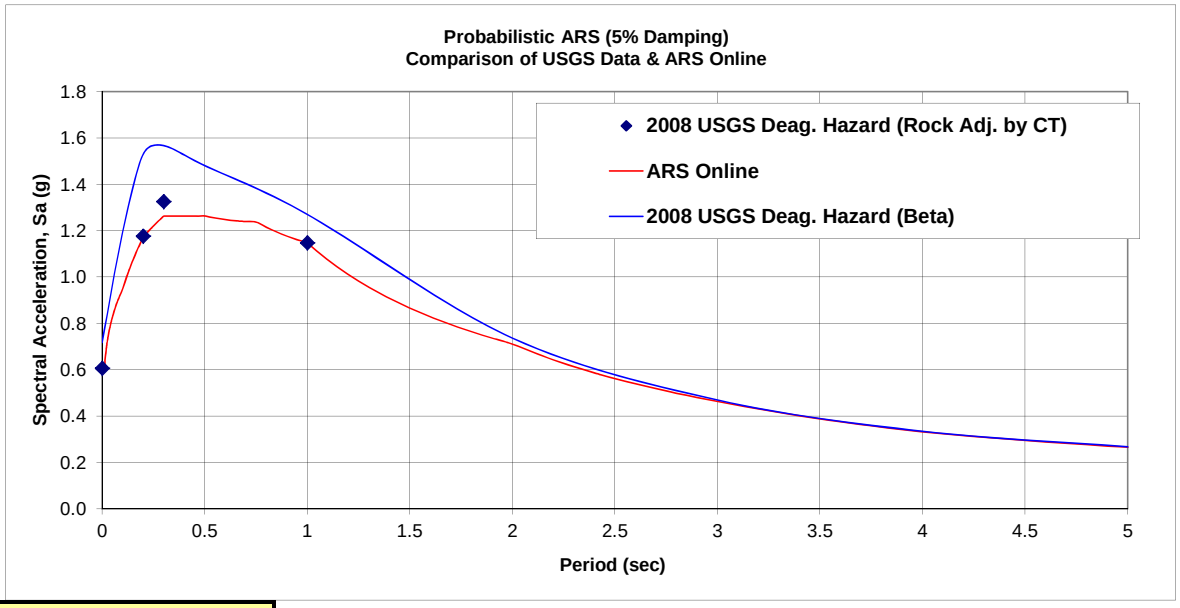
Note: 1. 5% damping spectrum
2. Near fault effects are included

URS	ACMMA I-880 23rd and 29th Project # 27560836	ARS Curve $V_{s,30}$=250 m/sec	Figure 9

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
37.7778	-122.2371
V_{S30} (m/s) =	250
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.7
$Z_{1.0}$ (m) =	309
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.605	1	1	0.605
0.02	0.693	1	1	0.693
0.022	0.706	1	1	0.706
0.025	0.723	1	1	0.723
0.029	0.745	1	1	0.745
0.03	0.75	1	1	0.75
0.032	0.759	1	1	0.759
0.035	0.773	1	1	0.773
0.036	0.777	1	1	0.777
0.04	0.793	1	1	0.793
0.042	0.801	1	1	0.801
0.044	0.808	1	1	0.808
0.045	0.812	1	1	0.812
0.046	0.815	1	1	0.815
0.048	0.822	1	1	0.822
0.05	0.828	1	1	0.828
0.055	0.844	1	1	0.844
0.06	0.858	1	1	0.858
0.065	0.872	1	1	0.872
0.067	0.877	1	1	0.877
0.07	0.885	1	1	0.885
0.075	0.897	1	1	0.897
0.08	0.908	1	1	0.908
0.085	0.919	1	1	0.919
0.09	0.929	1	1	0.929
0.095	0.939	1	1	0.939
0.1	0.949	1	1	0.949
0.11	0.977	1	1	0.977
0.12	1.003	1	1	1.003
0.13	1.028	1	1	1.028
0.133	1.035	1	1	1.035
0.14	1.051	1	1	1.051
0.15	1.074	1	1	1.074
0.16	1.095	1	1	1.095
0.17	1.116	1	1	1.116
0.18	1.135	1	1	1.135
0.19	1.154	1	1	1.154
0.2	1.172	1	1	1.172
0.22	1.193	1	1	1.193
0.24	1.212	1	1	1.212
0.25	1.221	1	1	1.221

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.747	1.000	0.812	1.000	0.606	0.605	0.2%
0.2	1.876	1.000	0.628	1.000	1.178	1.172	0.5%
0.3	1.572	1.000	0.843	1.000	1.326	1.263	4.8%
1	0.590	1.200	1.620	1.000	1.148	1.146	0.1%

Max % Difference = 4.8%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.7187	1.000	1.000	0.719	0.605	*15.8%*
0.1	1.196	1.000	1.000	1.196	0.949	*20.7%*
0.2	1.531	1.000	1.000	1.531	1.172	*23.4%*
0.3	1.5677	1.000	1.000	1.568	1.263	*19.4%*
0.5	1.481	1.000	1.000	1.481	1.264	14.7%
1	1.0591	1.200	1.000	1.271	1.146	9.8%
2	0.614	1.200	1.000	0.737	0.711	3.5%
3	0.3917	1.200	1.000	0.470	0.464	1.3%
4	0.279	1.200	1.000	0.335	0.332	0.8%
5	0.2231	1.200	1.000	0.268	0.266	0.6%

Max % Difference = 14.7%

SITE DATA

Shear Wave Velocity, Vs_{30}:	250 m/s
Latitude:	37.777777
Longitude:	-122.237105
Depth to Vs = 1.0 km/s:	332 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Hayward fault zone (Northern section)

Fault ID:	353
Maximum Magnitude (MMax):	7.3
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	12.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.61 km
Rjb:	4.61 km
Rx:	4.61 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.396	1.000	1.000	0.396
0.02	0.402	1.000	1.000	0.402
0.022	0.405	1.000	1.000	0.405
0.025	0.410	1.000	1.000	0.410
0.029	0.416	1.000	1.000	0.416
0.03	0.418	1.000	1.000	0.418
0.032	0.422	1.000	1.000	0.422
0.035	0.429	1.000	1.000	0.429
0.036	0.431	1.000	1.000	0.431
0.04	0.439	1.000	1.000	0.439
0.042	0.443	1.000	1.000	0.443
0.044	0.448	1.000	1.000	0.448
0.045	0.450	1.000	1.000	0.450
0.046	0.452	1.000	1.000	0.452
0.048	0.457	1.000	1.000	0.457
0.05	0.461	1.000	1.000	0.461
0.055	0.473	1.000	1.000	0.473
0.06	0.485	1.000	1.000	0.485
0.065	0.497	1.000	1.000	0.497
0.067	0.502	1.000	1.000	0.502

0.07	0.510	1.000	1.000	0.510
0.075	0.522	1.000	1.000	0.522
0.08	0.536	1.000	1.000	0.536
0.085	0.550	1.000	1.000	0.550
0.09	0.563	1.000	1.000	0.563
0.095	0.576	1.000	1.000	0.576
0.1	0.589	1.000	1.000	0.589
0.11	0.613	1.000	1.000	0.613
0.12	0.634	1.000	1.000	0.634
0.13	0.654	1.000	1.000	0.654
0.133	0.660	1.000	1.000	0.660
0.14	0.671	1.000	1.000	0.671
0.15	0.687	1.000	1.000	0.687
0.16	0.702	1.000	1.000	0.702
0.17	0.716	1.000	1.000	0.716
0.18	0.729	1.000	1.000	0.729
0.19	0.741	1.000	1.000	0.741
0.2	0.752	1.000	1.000	0.752
0.22	0.765	1.000	1.000	0.765
0.24	0.777	1.000	1.000	0.777
0.25	0.782	1.000	1.000	0.782
0.26	0.785	1.000	1.000	0.785
0.28	0.790	1.000	1.000	0.790
0.29	0.792	1.000	1.000	0.792
0.3	0.794	1.000	1.000	0.794
0.32	0.796	1.000	1.000	0.796
0.34	0.796	1.000	1.000	0.796
0.35	0.796	1.000	1.000	0.796
0.36	0.796	1.000	1.000	0.796
0.38	0.794	1.000	1.000	0.794
0.4	0.792	1.000	1.000	0.792
0.42	0.790	1.000	1.000	0.790
0.44	0.788	1.000	1.000	0.788
0.45	0.787	1.000	1.000	0.787
0.46	0.786	1.000	1.000	0.786
0.48	0.783	1.000	1.000	0.783
0.5	0.781	1.000	1.000	0.781
0.55	0.758	1.000	1.020	0.774
0.6	0.738	1.000	1.040	0.768
0.65	0.719	1.000	1.060	0.762
0.667	0.713	1.000	1.067	0.761
0.7	0.701	1.000	1.080	0.758
0.75	0.685	1.000	1.100	0.753
0.8	0.665	1.000	1.120	0.745
0.85	0.646	1.000	1.140	0.737
0.9	0.629	1.000	1.160	0.729
0.95	0.612	1.000	1.180	0.722
1	0.596	1.000	1.200	0.715
1.1	0.564	1.000	1.200	0.676
1.2	0.534	1.000	1.200	0.641
1.3	0.508	1.000	1.200	0.609

1.4	0.483	1.000	1.200	0.580
1.5	0.461	1.000	1.200	0.553
1.6	0.437	1.000	1.200	0.524
1.7	0.415	1.000	1.200	0.499
1.8	0.396	1.000	1.200	0.475
1.9	0.378	1.000	1.200	0.454
2	0.362	1.000	1.200	0.435
2.2	0.329	1.000	1.200	0.394
2.4	0.300	1.000	1.200	0.360
2.5	0.287	1.000	1.200	0.344
2.6	0.275	1.000	1.200	0.330
2.8	0.254	1.000	1.200	0.304
3	0.235	1.000	1.200	0.282
3.2	0.218	1.000	1.200	0.262
3.4	0.203	1.000	1.200	0.244
3.5	0.196	1.000	1.200	0.235
3.6	0.190	1.000	1.200	0.228
3.8	0.178	1.000	1.200	0.213
4	0.167	1.000	1.200	0.201
4.2	0.158	1.000	1.200	0.190
4.4	0.150	1.000	1.200	0.180
4.6	0.142	1.000	1.200	0.170
4.8	0.135	1.000	1.200	0.162
5	0.128	1.000	1.200	0.154

To use above data in Excel, copy/paste:

```
0.01    0.396    1.000    1.000    0.396
0.02    0.402    1.000    1.000    0.402
```

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.605	1.000	1.000	0.605
0.02	0.693	1.000	1.000	0.693
0.022	0.706	1.000	1.000	0.706
0.025	0.723	1.000	1.000	0.723
0.029	0.745	1.000	1.000	0.745
0.03	0.750	1.000	1.000	0.750
0.032	0.759	1.000	1.000	0.759
0.035	0.773	1.000	1.000	0.773
0.036	0.777	1.000	1.000	0.777
0.04	0.793	1.000	1.000	0.793
0.042	0.801	1.000	1.000	0.801
0.044	0.808	1.000	1.000	0.808
0.045	0.812	1.000	1.000	0.812
0.046	0.815	1.000	1.000	0.815
0.048	0.822	1.000	1.000	0.822
0.05	0.828	1.000	1.000	0.828

0.055	0.844	1.000	1.000	0.844
0.06	0.858	1.000	1.000	0.858
0.065	0.872	1.000	1.000	0.872
0.067	0.877	1.000	1.000	0.877
0.07	0.885	1.000	1.000	0.885
0.075	0.897	1.000	1.000	0.897
0.08	0.908	1.000	1.000	0.908
0.085	0.919	1.000	1.000	0.919
0.09	0.929	1.000	1.000	0.929
0.095	0.939	1.000	1.000	0.939
0.1	0.949	1.000	1.000	0.949
0.11	0.977	1.000	1.000	0.977
0.12	1.003	1.000	1.000	1.003
0.13	1.028	1.000	1.000	1.028
0.133	1.035	1.000	1.000	1.035
0.14	1.051	1.000	1.000	1.051
0.15	1.074	1.000	1.000	1.074
0.16	1.095	1.000	1.000	1.095
0.17	1.116	1.000	1.000	1.116
0.18	1.135	1.000	1.000	1.135
0.19	1.154	1.000	1.000	1.154
0.2	1.172	1.000	1.000	1.172
0.22	1.193	1.000	1.000	1.193
0.24	1.212	1.000	1.000	1.212
0.25	1.221	1.000	1.000	1.221
0.26	1.230	1.000	1.000	1.230
0.28	1.247	1.000	1.000	1.247
0.29	1.255	1.000	1.000	1.255
0.3	1.263	1.000	1.000	1.263
0.32	1.263	1.000	1.000	1.263
0.34	1.263	1.000	1.000	1.263
0.35	1.263	1.000	1.000	1.263
0.36	1.263	1.000	1.000	1.263
0.38	1.263	1.000	1.000	1.263
0.4	1.263	1.000	1.000	1.263
0.42	1.264	1.000	1.000	1.264
0.44	1.264	1.000	1.000	1.264
0.45	1.264	1.000	1.000	1.264
0.46	1.264	1.000	1.000	1.264
0.48	1.264	1.000	1.000	1.264
0.5	1.264	1.000	1.000	1.264
0.55	1.230	1.000	1.020	1.255
0.6	1.200	1.000	1.040	1.248
0.65	1.173	1.000	1.060	1.243
0.667	1.164	1.000	1.067	1.242
0.7	1.148	1.000	1.080	1.240
0.75	1.125	1.000	1.100	1.238
0.8	1.085	1.000	1.120	1.215
0.85	1.048	1.000	1.140	1.195
0.9	1.014	1.000	1.160	1.177
0.95	0.984	1.000	1.180	1.161

1	0.955	1.000	1.200		1.146
1.1	0.895	1.000	1.200		1.074
1.2	0.843	1.000	1.200		1.011
1.3	0.797	1.000	1.200		0.957
1.4	0.758	1.000	1.200		0.909
1.5	0.723	1.000	1.200		0.867
1.6	0.691	1.000	1.200		0.829
1.7	0.663	1.000	1.200		0.795
1.8	0.637	1.000	1.200		0.765
1.9	0.614	1.000	1.200		0.737
2	0.593	1.000	1.200		0.711
2.2	0.536	1.000	1.200		0.643
2.4	0.489	1.000	1.200		0.587
2.5	0.469	1.000	1.200		0.562
2.6	0.450	1.000	1.200		0.540
2.8	0.416	1.000	1.200		0.499
3	0.387	1.000	1.200		0.464
3.2	0.359	1.000	1.200		0.431
3.4	0.335	1.000	1.200		0.402
3.5	0.324	1.000	1.200		0.388
3.6	0.313	1.000	1.200		0.376
3.8	0.294	1.000	1.200		0.353
4	0.277	1.000	1.200		0.332
4.2	0.264	1.000	1.200		0.317
4.4	0.252	1.000	1.200		0.302
4.6	0.241	1.000	1.200		0.289
4.8	0.231	1.000	1.200		0.277
5	0.222	1.000	1.200		0.266

To use above data in Excel, copy/paste:

```
0.01    0.605    1.000    1.000    0.605
0.02    0.693    1.000    1.000    0.693
```

Envelope Data

Period	SA
0.01	0.605
0.02	0.693
0.022	0.706
0.025	0.723
0.029	0.745
0.03	0.750
0.032	0.759
0.035	0.773
0.036	0.777
0.04	0.793
0.042	0.801
0.044	0.808
0.045	0.812
0.046	0.815
0.048	0.822

0.05	0.828
0.055	0.844
0.06	0.858
0.065	0.872
0.067	0.877
0.07	0.885
0.075	0.897
0.08	0.908
0.085	0.919
0.09	0.929
0.095	0.939
0.1	0.949
0.11	0.977
0.12	1.003
0.13	1.028
0.133	1.035
0.14	1.051
0.15	1.074
0.16	1.095
0.17	1.116
0.18	1.135
0.19	1.154
0.2	1.172
0.22	1.193
0.24	1.212
0.25	1.221
0.26	1.230
0.28	1.247
0.29	1.255
0.3	1.263
0.32	1.263
0.34	1.263
0.35	1.263
0.36	1.263
0.38	1.263
0.4	1.263
0.42	1.264
0.44	1.264
0.45	1.264
0.46	1.264
0.48	1.264
0.5	1.264
0.55	1.255
0.6	1.248
0.65	1.243
0.667	1.242
0.7	1.240
0.75	1.238
0.8	1.215
0.85	1.195

0.9	1.177
0.95	1.161
1	1.146
1.1	1.074
1.2	1.011
1.3	0.957
1.4	0.909
1.5	0.867
1.6	0.829
1.7	0.795
1.8	0.765
1.9	0.737
2	0.711
2.2	0.643
2.4	0.587
2.5	0.562
2.6	0.540
2.8	0.499
3	0.464
3.2	0.431
3.4	0.402
3.5	0.388
3.6	0.376
3.8	0.353
4	0.332
4.2	0.317
4.4	0.302
4.6	0.289
4.8	0.277
5	0.266

To use above data in Excel, copy/paste:

```
0.01    0.605
0.02    0.693
```

I-880 at 23rd and 29th Ave.
Liquefaction Evaluation
Seed et al. (2003) Procedure

Earthquake Magnitude M = 7.30 (MCE)
Peak Ground Acceleration: 0.71 (g) MSF (Seed et, al., 2003) = 1.10
Vs,40 = 695 (fps) (S-CPT measurements)

Boring ID	USCS class from boring log	Depth to Sample (ft)	Layer Thickness (ft)	GS Elev	γ_m (pcf)	Blows foot, N	Sampler code	% finer than No200	USCS class lab	PI	GWT Elev. Ft	Assigned Class.	Sample Elev. (ft)	σ_v, psf	σ_v', psf	Sampler Correction	Rod Length, m	CR	FC, %	C_N	ER	$N_{1,60}$	Capped FC	C_{Fines}	$(N_1)_{60cs}$	f	Kσ	CRR	Rd	CSR	CSR*	FS_L	FS_L < 1	P_L	Liquefaction Susceptibility	Below GWT	Assessment		FS_L	P_L		Lookup Num	Vol. Strain (%)	Settlement (inches)	PI	Final Enginering Judgment	Liquefied Layer Thickness (ft)
URS-1	CL	2.0		14.3	120	NA	NA		CL		5	CL	12	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-1	CL	5.0		14.3	120	14	MC		CL		5	CL	9	600	600	0.8	3.0	0.80	0	1.70	75	19	5	1.03	20	0.70	1.00	0.214	0.99	0.460	0.418	0.5	Yes	1.00	No	No	No		-	-						No	0
URS-1	CL	10.0		14.3	120	8	SPT		CL		5	CL	4	1200	1156	1.0	4.6	0.85	0	1.32	75	11	5	1.04	12	0.66	1.00	0.098	0.99	0.473	0.430	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	15.0		14.3	120	9	MC		CL		5	CL	-1	1800	1444	0.8	6.1	0.95	0	1.18	75	10	5	1.04	11	0.65	1.00	0.084	0.97	0.560	0.509	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	20.0		14.3	120	8	MC		CL		5	CL	-6	2400	1732	0.8	7.6	0.95	0	1.07	75	8	5	1.05	9	0.64	1.00	0.069	0.95	0.608	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	25.0		14.3	120	12	MC		CL		5	CL	-11	3000	2020	0.8	9.1	0.95	0	0.99	75	11	5	1.04	12	0.66	1.00	0.085	0.92	0.630	0.573	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	30.0		14.3	120	18	MC		CL		5	CL	-16	3600	2308	0.8	10.7	1.00	0	0.93	75	17	5	1.03	17	0.69	0.97	0.124	0.87	0.632	0.590	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	35.0		14.3	120	20	MC		CL		5	CL	-21	4200	2596	0.8	12.2	1.00	0	0.88	75	18	5	1.03	18	0.69	0.94	0.127	0.82	0.617	0.598	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	40.0		14.3	120	12	MC		CL		5	CL	-26	4800	2884	0.8	13.7	1.00	0	0.83	75	10	5	1.05	10	0.65	0.90	0.069	0.77	0.593	0.601	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	SP-SM/CL	45.0	2.50	14.3	120	25	MC	10	SP-SM/CL		5	SP-SM/CL	-31	5400	3172	0.8	15.2	1.00	10	0.79	75	20	10	1.07	21	0.71	0.89	0.151	0.72	0.568	0.581	0.3	Yes	1.00	Yes	Yes	Yes		0.3	1.0		2158	2.32	0.7		Yes	2.5
URS-1	CL	50.0		14.3	120	19	MC		CL		5	CL	-36	6000	3460	0.8	16.8	1.00	0	0.76	75	14	5	1.04	15	0.67	0.85	0.093	0.68	0.545	0.582	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	60.0		14.3	120	21	MC		CL		5	CL	-46	7200	4036	0.8	19.8	1.00	0	0.70	75	15	5	1.04	15	0.68	0.81	0.091	0.63	0.519	0.581	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	SP-SM	70.0	15.00	14.3	120	41	SPT	10.4	SP-SM		5	SP-SM	-56	8400	4612	1.0	22.9	1.00	10	0.66	75	34	10	1.06	36	0.78	0.84	0.404	0.61	0.518	0.560	0.8	Yes	0.58	Yes	Yes	Yes		0.8	0.6		3656	0.75	0.0		No	0
URS-1	SP	80.0	5.00	14.3	120	38	SPT	11.2	SP-SM		5	SP-SM	-66	9600	5188	1.0	25.9	1.00	11	0.62	75	29	11	1.06	31	0.76	0.80	0.283	0.61	0.526	0.595	0.5	Yes	0.98	Yes	Yes	Yes		0.5	1.0		3160	1.30	0.0		No	0
URS-1	SP	90.0	5.00	14.3	120	70	SPT	5	SP		5	SP	-76	10800	5764	1.0	29.0	1.00	5	0.59	75	52	5	1.02	53	0.80	0.82	0.600	0.61	0.533	0.592	1.1		0.00	Yes	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.7		Total=	2.5
URS-2	CL	10.0		18.1	120	18	MC		CL		5	CL	8.1	1200	1200	0.8	4.6	0.85	0	1.29	75	20	5	1.03	20	0.70	1.00	0.187	0.99	0.456	0.415	0.4	Yes	1.00	No	No	No		-	-						No	0
URS-2	CL	15.0		18.1	120	15	MC	59.8	CL		5	CL	3.1	1800	1681	0.8	6.1	0.95	60	1.09	75	16	35	1.25	19	0.70	1.00	0.158	0.97	0.481	0.437	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	20.0		18.1	120	8	MC		CL		5	CL	-1.9	2400	1969	0.8	7.6	0.95	0	1.01	75	8	5	1.05	8	0.64	1.00	0.064	0.95	0.535	0.487	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	25.0		18.1	120	11	MC		CL		5	CL	-6.9	3000	2257	0.8	9.1	0.95	0	0.94	75	10	5	1.05	10	0.65	0.98	0.073	0.92	0.564	0.525	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	30.0		18.1	120	8	MC		CL		5	CL	-11.9	3600	2545	0.8	10.7	1.00	0	0.89	75	7	5	1.06	7	0.64	0.94	0.057	0.87	0.573	0.557	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	32.0		18.1	120		Shelby		CL		5	CL	-13.9	3840	2661	1.0	11.3	1.00	0	0.87	75	0	5	0.00	0	0.60	0.91	0.033	0.86	0.571	0.569	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	35.0		18.1	120	15	MC		CL		5	CL	-16.9	4200	2833	0.8	12.2	1.00	0	0.84	75	13	5	1.04	13	0.67	0.91	0.085	0.82	0.565	0.567	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	40.0		18.1	120	16	MC		CL		5	CL	-21.9	4800	3121	0.8	13.7	1.00	0	0.80	75	13	5	1.04	13	0.67	0.88	0.084	0.77	0.548	0.568	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	GC	45.0	5.00	18.1	120	28	MC	30	GC		5	GC	-26.9	5400	3409	0.8	15.2	1.00	30	0.77	75	21	30	1.19	26	0.73	0.88	0.205	0.72	0.528	0.547	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2655	1.72	1.0		Yes	5
URS-2	CL	50.0		18.1	120	15	MC		CL		5	CL	-31.9	6000	3697	0.8	16.8	1.00	0	0.74	75	11	5	1.04	12	0.66	0.83	0.070	0.68	0.510	0.562	0.1	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.0		Total=	5.0
URS-3	CH	2.0		17.9	120	NA	NA		CH		5	CH	15.9	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-3	CL	5.0		17.9	120	5	MC		CL		5	CL	12.9	600	600	0.8	3.0	0.80	0	1.70	75	7	5	1.06	7	0.64	1.00	0.084	0.99	0.460	0.418	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-3	GP-GM	10.0		17.9	120	29	MC	10	GP-GM		5	GP-GM	7.9	1200	1200	0.8	4.6	0.85	10	1.29	75	32	10	1.06	34	0.77	1.00	0.502	0.99	0.456	0.415	1.1		0.06	Yes	No	No		-	-						No	0
URS-3	CL	15.0		17.9	120	7	MC		CL		5	CL	2.9	1800	1669	0.8	6.1	0.95	0	1.09	75	7	5	1.05	8	0.64	1.00	0.065	0.97	0.485	0.441	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	20.0		17.9	120	27	SPT		CL		5	CL	-2.1	2400	1957	1.0	7.6	0.95	0	1.01	75	32	5	1.03	33	0.77	1.00	0.429	0.95	0.539	0.490	0.8	Yes	0.66	No	Yes	No		-	-						No	0
URS-3	SP-SM/CL	25.0	3.00	17.9	120	16	SPT	18.5	SC/CL		5	SC/CL	-7.1	3000	2245	1.0	9.1	0.95	19	0.94	75	18	19	1.13	20	0.70	0.98	0.154	0.92	0.567	0.525	0.3	Yes	1.00	Yes	Yes	Yes		0.3	1.0		2052	2.35	0.8		Yes	3
URS-3	CL	30.0		17.9	120	21	MC		CL		5	CL	-12.1	3600	2533	0.8	10.7	1.00	0	0.89	75	19	5	1.03	19	0.70	0.95	0.139	0.87	0.576	0.553	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	35.0		17.9	120	16	MC		CL		5	CL	-17.1	4200	2821	0.8	12.2	1.00	0	0.84	75	13	5	1.04	14	0.67	0.91	0.091	0.82	0.568	0.568	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SM	40.0	5.00	17.9	120	29	MC	27.5	SC		5	SC	-22.1	4800	3109	0.8	13.7	1.00	28	0.80	75	23	28	1.17	27	0.74	0.90	0.239	0.77	0.551	0.554	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2755	1.62	1.0		Yes	5
URS-3	CL	45.0		17.9	120	15	SPT		CL		5	CL	-27.1	5400	3397	1.0	15.2	1.00	0	0.77	75	14	5	1.04	15	0.67	0.86	0.093	0.72	0.530	0.562	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	50.0		17.9	120	23	MC		CL		5	CL	-32.1	6000	3685	0.8	16.8	1.00	0	0.74	75	17	5	1.03	18	0.69	0.84	0.110	0.68	0.512	0.554	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	60.0		17.9	120	21	MC		CL		5	CL	-42.1	7200	4261	0.8	19.8	1.00	0	0.69	75	14	5	1.04	15	0.67	0.80	0.087	0.63	0.491	0.561	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SP-SM	70.0		17.9	120	49	SPT	10	SP-SM		5	SP-SM	-52.1	8400	4837	1.0	22.9	1.00	10	0.64	75	39	10	1.05	41	0.80	0.85	0.600	0.61	0.494	0.530	1.2		0.02	Yes	Yes	No		-	-						No	0
URS-3	CL	80.0		17.9	120	13	SPT		CL		5	CL	-62.1	9600	5413	1.0	25.9	1.00	0	0.61	75	10	5	1.05	10	0.65	0.72	0.058	0.61	0.504	0.636	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	90.0		17.9	120	23	MC		CL		5	CL	-72.1	10800	5989	0.8	29.0	1.00	0	0.58	75	13	5	1.04	14	0.67	0.71	0.073	0.61	0.513	0.658	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SM	100.0		17.9	120	100	MC	45	SM		5	SM	-82.1	12000	6565	0.8	32.0	1.00	45	0.55	75	55	35	1.17	65	0.80	0.80	0.600	0.61	0.520	0.593	1.2		0.00	Yes	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.8		Total=	8.0
URS-4	CL	2.0		21.5	120		NA		CL		5	CL	19.5	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-4	CL	5.0		21.5	120	23	MC		CL		5	CL	16.5	600	600	0.8	3.0	0.80	0	1.70	75	31	5	1.03	32	0.76	1.00	0.547	0.99	0.460	0.418	1.2		0.06	No	No	No		-	-						No	0
URS-4	CL	10.0		21.5	120	12	MC		CL		5	CL	11.5	1200	1200	0.8	4.6	0.85	0	1.29	75	13	5	1.04	14	0.67	1.00	0.113	0.99	0.456	0.415	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-4	CL	15.0		21.5	120	11	MC		CL		5	CL	6.5	1800	1800	0.8	6.1	0.95	0	1.05	75	11	5	1.04	11	0.66	1.00	0.085	0.97	0.449	0.408	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-4	CL	20.0		21.5	120	13	MC		CL		5	CL	1.5	2400	2182	0.8	7.6	0.95	0	0.96	75	12	5	1.04	12	0.66	0.99	0.086	0.95	0.483	0.444	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	25.0		21.5	120	19	MC		CL		5	CL	-3.5	3000	2470	0.8	9.1	0.95	0	0.90	75	16	5	1.04	17	0.68	0.95	0.117	0.92	0.516	0.492	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	30.0		21.5	120	26	MC		CL		5	CL	-8.5	3600	2758	0.8	10.7	1.00	0	0.85	75	22	5	1.03	23	0.71	0.93	0.178	0.87	0.529	0.518	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CH	35.0		21.5	120	18	MC		CH		5	CH	-13.5	4200	3046	0.8	12.2	1.00	0	0.81	75	15	5	1.04	15	0.68	0.89	0.097	0.82	0.526	0.538	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	SM	40.0	5.00	21.5	120	22	SPT	23.4	SC		5	SC	-18.5	4800	3334	1.0	13.7	1.00	23	0.77	75	21	23	1.15	24	0.72	0.88	0.191	0.77	0.513	0.530	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2453	1.88	1.1		Yes	5
URS-4	CL	45.0		21.5	120	28	MC		CL		5	CL	-23.5	5400	3622	0.8	15.2	1.00	0	0.74	75	21	5	1.03	21	0.71	0.85	0.149	0.72	0.497	0.529	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	50.0		21.5	120	28	MC		CL		5	CL	-28.5	6000	3910	0.8	16.8	1.00	0	0.72	75	20	5	1.03	21	0.70	0.83	0.137	0.68	0.483	0.526	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	SM	60.0	5.00	21.5	120	38	MC	26.1	SC		5	SC	-38.5	7200	4486	0.8	19.8	1.00	26	0.67	75	25	26	1.16	29	0.75	0.83	0.253	0.63	0.467	0.513	0.5	Yes	0.98	Yes	Yes	Yes		0.5	1.0		2951	1.34	0.0		No	0
URS-4	SP-SM	70.0		21.5	120	50	SPT	12	SP-SM		5	SP-SM	-48.5	8400	5062	1.0	22.9	1.00	12	0.63	75	39	12	1.06	42	0.80	0.84	0.600	0.61	0.472	0.511	1.3		0.01	Yes	Yes	No		-	-						No	0
URS-4	CL	80.0		21.5	120	12	SPT		CL		5	CL	-58.5	9600	5638	1.0	25.9	1.00	0	0.60	75	9	5	1.05	9	0.65	0.71	0.053	0.61	0.484	0.622	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	90.0		21.5	120	18	MC		CL		5	CL	-68.5	10800	6214	0.8	29.0	1.00	0	0.57	75	10	5	1.04	11	0.65	0.69	0.057	0.61	0.494	0.653	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	100.0		21.5	120	27	MC		CL		5	CL	-78.5	12000	6790	0.8	32.0	1.00	0	0.54	75	15	5	1.04	15	0.68	0.69	0.078	0.61	0.503	0.667	0.2	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.1		Total=	5.0
URS-5	CL	1.0		16.5	120	NA	bag		CL		5	CL	15.5	120	120	Check	1.8	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-5	CL	5.0		16.5	120	18	MC		CL		5	CL	11.5	600	600	0.8	3.0	0.80	0	1.70	75	24	5	1.03	25	0.73	1.00	0.325	0.99	0.460	0.418	0.7	Yes	0.83	No	No	No		-	-						No	0
URS-5	GC	10.0		16.5	120	25	MC	45	GC		5	GC	6.5	1200	1200	0.8	4.6	0.85	45	1.29	75	27	35	1.20	33	0.77	1.00	0.481	0.99	0.456	0.415	1.1		0.03	Yes	No	No		-	-						No	0
URS-5	CL	15.0		16.5	120	3	SPT		CL		5	CL	1.5	1800	1582	1.0	6.1	0.95	0	1.12	75	4	5	1.08	4	0.62	1.00	0.052	0.97	0.511	0.465	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	20.0		16.5	120	7	SPT		CL		5	CL	-3.5	2400	1870	1.0	7.6	0.95	0	1.03	75	9	5	1.05	9	0.65	1.00	0.070	0.95	0.564	0.513	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	25.0		16.5	120	15	MC		CL		5	CL	-8.5	3000	2158	0.8	9.1	0.95	0	0.96	75	14	5	1.04	14	0.67	0.99	0.100	0.92	0.590	0.540	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	30.0		16.5	120	19	MC		CL		5	CL	-13.5	3600	2446	0.8	10.7	1.00	0	0.90	75	17	5	1.03	18	0.69	0.96	0.126	0.87	0.596	0.567	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	SP/CL	35.0	2.50	16.5	120	20	MC	5	SP/CL		5	SP/CL	-18.5	4200	2734	0.8	12.2	1.00	5	0.86	75	17	5	1.03	18	0.69	0.92	0.121	0.82	0.586	0.577	0.2	Yes	1.00	Yes	Yes	Yes		0.2	1.0		1858	2.68	0.8		Yes	2.5
URS-5	CL	40.0		16.5	120	25	MC		CL		5	CL	-23.5	4800	3022	0.8	13.7	1.00	0	0.81	75	20	5	1.03	21	0.70	0.90	0.151	0.77	0.566	0.572	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	SP	45.0	5.00	16.5	120	32	SPT	13.2	SM		5	SM	-28.5	5400	3310	1.0	15.2	1.00	13	0.78	75	31	13	1.07	33	0.77	0.90	0.373	0.72	0.544	0.549	0.7	Yes	0.79	Yes	Yes	Yes		0.7	0.8		3355	1.00	0.0		no	0
URS-5	CL	50.0		16.5	120	14	MC		CL		5	CL	-33.5	6000	3598	0.8	16.8	1.00	0	0.75	75	10	5	1.04	11	0.65	0.83	0.067	0.68	0.525	0.573	0.1	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.8		Total=	2.5
URS-8	CH	2.0		19.9	120	NA	NA		CH		5	CH	17.9	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-8	CL	5.0		19.9	120	26	MC		CL		5	CL	14.9	600	600	0.8	3.0	0.80	0	1.70	75	35	5	1.03	36	0.78	1.00	0.600	0.99	0.460	0.418	1.3		0.00	No	No	No		-	-						No	0
URS-8	CL	10.0		19.9	120	12	MC		CL		5	CL	9.9	1200	1200	0.8	4.6	0.85	0	1.29	75	13	5	1.04	14	0.67	1.00	0.113	0.99	0.456	0.415	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-8	CL	15.0		19.9	120	9	SPT		CL		5	CL	4.9	1800	1794	1.0	6.1	0.95	0	1.06	75	11	5	1.04	12	0.66	1.00	0.087	0.97	0.451	0.410	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	20.0		19.9	120	12	MC		CL		5	CL	-0.1	2400	2082	0.8	7.6	0.95	0	0.98	75	11	5	1.04	12	0.66	1.00	0.083	0.95	0.506	0.460	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	25.0		19.9	120	11	MC		CL		5	CL	-5.1	3000	2370	0.8	9.1	0.95	0	0.92	75	10	5	1.05	10	0.65	0.96	0.071	0.92	0.537	0.508	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	30.0		19.9	120	19	MC		CL		5	CL	-10.1	3600	2658	0.8	10.7	1.00	0	0.87	75	16	5	1.04	17	0.69	0.93	0.116	0.87	0.548	0.536	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CH	35.0		19.9	120	14	MC		CH		5	CH	-15.1	4200	2946	0.8	12.2	1.00	0	0.82	75	12	5	1.04	12	0.66	0.89	0.077	0.82	0.544	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	SP	40.0	5.00	19.9	120	32	MC	16.6	SC		5	SC	-20.1	4800	3234	0.8	13.7	1.00	17	0.79	75	25	17	1.10	28	0.74	0.89	0.244	0.77	0.529	0.538	0.5	Yes	1.00	Yes	Yes	Yes		0.5	1.0		2854	1.51	0.9		Yes	5
URS-8	CL	45.0		19.9	120	12	SPT		CL		5	CL	-25.1	5400	3522	1.0	15.2	1.00	0	0.75	75	11	5	1.04	12	0.66	0.84	0.072	0.72	0.511	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	50.0		19.9	120	55	MC		CL		5	CL	-30.1	6000	3810	0.8	16.8	1.00	0	0.72	75	40	5	1.03	41	0.80	0.89	0.600	0.68	0.495	0.507	1.2		0.03	No	Yes	No		-	-						No	0
URS-8	CL/SP	60.0		19.9	120	47	MC	15	CL/SP		5	CL/SP	-40.1	7200	4386	0.8	19.8	1.00	15	0.68	75	32	15	1.08	34	0.77	0.85	0.372	0.63	0.477	0.512	0.8	Yes	0.58	No	Yes	No		-	-						No	0
URS-8	CL	70.0		19.9	120	14	SPT		CL		5	CL	-50.1	8400	4962	1.0	22.9	1.00	0	0.63	75	11	5	1.04	12	0.66	0.75	0.065	0.61	0.482	0.586	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	80.0		19.9	120	35	MC		CL		5	CL	-60.1	9600	5538	0.8	25.9	1.00	0	0.60	75	21	5	1.03	22	0.71	0.76	0.135	0.61	0.493	0.593	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	90.0		19.9	120	22	SPT		CL		5	CL	-70.1	10800	6114	1.0	29.0	1.00	0	0.57	75	16	5	1.04	16	0.68	0.71	0.087	0.61	0.502	0.640	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	100.0		19.9	120	30	SPT		CL		5	CL	-80.1	12000	6690	1.0	32.0	1.00	0	0.55	75	21	5	1.03	21	0.71	0.71	0.123	0.61	0.510	0.651	0.2	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.9		Total=	5.0
URS-9	CH	2.0		17.3	120	NA	NA		CH		5	CH	15.3	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-9	CL	5.0		17.3	120	16	MC		CL		5	CL	12.3	600	600	0.8	3.0	0.80	0	1.70	75	22	5	1.03	22	0.71	1.00	0.264	0.99	0.460	0.418	0.6	Yes	0.98	No	No	No		-	-						No	0
URS-9	CL	10.0		17.3	120	22	MC		CL		5	CL	7.3	1200	1200	0.8	4.6	0.85	0	1.29	75	24	5	1.03	25	0.72	1.00	0.261	0.99	0.456	0.415	0.6	Yes	0.98	No	No	No		-	-						No	0
URS-9	CL	15.0		17.3	120	18	MC		CL		5	CL	2.3	1800	1632	0.8	6.1	0.95	0	1.11	75	19	5	1.03	20	0.70	1.00	0.161	0.97	0.496	0.451	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	20.0		17.3	120	12	MC		CL		5	CL	-2.7	2400	1920	0.8	7.6	0.95	0	1.02	75	12	5	1.04	12	0.66	1.00	0.088	0.95	0.549	0.499	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	25.0		17.3	120	13	MC		CL		5	CL	-7.7	3000	2208	0.8	9.1	0.95	0	0.95	75	12	5	1.04	12	0.66	0.99	0.085	0.92	0.577	0.532	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	30.0		17.3	120	17	MC		CL		5	CL	-12.7	3600	2496	0.8	10.7	1.00	0	0.90	75	15	5	1.04	16	0.68	0.95	0.108	0.87	0.584	0.560	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	35.0		17.3	120	8	MC		CL		5	CL	-17.7	4200	2784	0.8	12.2	1.00	0	0.85	75	7	5	1.06	7	0.64	0.90	0.055	0.82	0.576	0.578	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	SP-SM	40.0		17.3	120	35	SPT	10.6	SP-SM		5	SP-SM	-22.7	4800	3072	1.0	13.7	1.00	11	0.81	75	35	11	1.06	37	0.79	0.92	0.512	0.77	0.557	0.549	0.9	Yes	0.27	Yes	Yes	Yes		0.9	0.3		3755	0.64	0.0		No	0
URS-9	SP-SM	45.0		17.3	120	38	SPT	10.6	SP-SM		5	SP-SM	-27.7	5400	3360	1.0	15.2	1.00	11	0.77	75	37	11	1.06	39	0.79	0.91	0.555	0.72	0.536	0.536	1.0		0.11	Yes	Yes	No		-	-						No	0
URS-9	CH	50.0		17.3	120	15	MC		CH		5	CH	-32.7	6000	3648	0.8	16.8	1.00	0	0.74	75	11	5	1.04	12	0.66	0.83	0.071	0.68	0.517	0.567	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	60.0		17.3	120	40	MC		CL		5	CL	-42.7	7200	4224	0.8	19.8	1.00	0	0.69	75	28	5	1.03	28	0.74	0.84	0.238	0.63	0.496	0.539	0.5	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	70.0		17.3	120	27	MC		CL		5	CL	-52.7	8400	4800	0.8	22.9	1.00	0	0.65	75	17	5	1.03	18	0.69	0.78	0.106	0.61	0.498	0.583	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	80.0		17.3	120	40	MC		CL		5	CL	-62.7	9600	5376	0.8	25.9	1.00	0	0.61	75	24	5	1.03	25	0.73	0.77	0.176	0.61	0.508	0.596	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	90.0		17.3	120	28	SPT		CL		5	CL	-72.7	10800	5952	1.0	29.0	1.00	0	0.58	75	20	5	1.03	21	0.70	0.74	0.125	0.61	0.516	0.637	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	100.0		17.3	120	38	MC		CL		5	CL	-82.7	12000	6528	0.8	32.0	1.00	0	0.55	75	21	5	1.03	22	0.71	0.72	0.129	0.61	0.523	0.660	0.2	Yes	1.00	No	Yes	No		-	-						No	0

I-880 at 23rd and 29th Ave.
Liquefaction Evaluation
Seed et al. (2003) Procedure

Earthquake Magnitude M = 7.30 (MCE)
Peak Ground Acceleration: 0.71 (g)
Vs,40 = 695 (fps) (S-CPT measurements)
MSF (Seed et, al., 2003) = 1.10

Boring ID	USCS class from boring log	Depth to Sample (ft)	Layer Thickness (ft)	GS Elev	γ_m (pcf)	Blows foot, N	Sampler code	% finer than No200	USCS class lab	PI	GWT Elev. Ft	Assigned Class.	Sample Elev. (ft)	σ_v, psf	σ_v', psf	Sampler Correction	Rod Length, m	CR	FC, %	C_N	ER	$N_{1,60}$	Capped FC	C_{Fines}	$(N_1)_{60cs}$	f	Kσ	CRR	Rd	CSR	CSR*	FS_L	FS_L < 1	P_L	Liquefaction Susceptibility	Below GWT	Assessment	FS_L	P_L	Lookup Num	Vol. Strain (%)	Settlement (inches)	PI	Final Enginering Judgment	Liquefied Layer Thickness (ft)
																																				Estimated Settlement of Entire Boring Depth (inches) =							0.0		Total=	0.0
URS-11	CL	1.0		13.4	120	NA	NA		CL		5	CL	12.4	120	120	Check	1.8	0.75	0	1.70	75	#####	5	#####	#####	#####	1.00	#VALUE!	1.00	0.462	0.420	#####	#####	#####	No	No	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-11	CH	5.0		13.4	120	21	MC		CH		5	CH	8.4	600	600	0.8	3.0	0.80	0	1.70	75	29	5	1.03	29	0.75	1.00	0.444	0.99	0.460	0.418	1.0	Yes	0.29	No	No	No	-	-					No	0
URS-11	CL	10.0		13.4	120	14	MC		CL		5	CL	3.4	1200	1100	0.8	4.6	0.85	0	1.35	75	16	5	1.04	17	0.68	1.00	0.144	0.99	0.497	0.452	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	SC	15.0		13.4	120	36	SPT	16.9	SC		5	SC	-1.6	1800	1388	1.0	6.1	0.95	17	1.20	75	51	17	1.08	56	0.80	1.00	0.600	0.97	0.583	0.530	1.0		0.00	Yes	Yes	No	-	-					No	0
URS-11	CL	20.0		13.4	120	15	MC		CL		5	CL	-6.6	2400	1676	0.8	7.6	0.95	0	1.09	75	16	5	1.04	16	0.68	1.00	0.123	0.95	0.629	0.572	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	25.0		13.4	120	3	SPT		CH		5	CH	-11.6	3000	1964	1.0	9.1	0.95	0	1.01	75	4	5	1.09	4	0.62	1.00	0.047	0.92	0.648	0.589	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	27.0		13.4	120		Shelby		CH		5	CH	-13.6	3240	2079	1.0	9.8	0.95	0	0.98	75	0	5	0.00	0	0.60	1.00	0.035	0.90	0.650	0.591	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	30.0		13.4	120	13	MC		CH		5	CH	-16.6	3600	2252	0.8	10.7	1.00	0	0.94	75	12	5	1.04	13	0.66	0.98	0.088	0.87	0.647	0.601	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	35.0		13.4	120	10	MC		CH		5	CH	-21.6	4200	2540	0.8	12.2	1.00	0	0.89	75	9	5	1.05	9	0.65	0.94	0.066	0.82	0.631	0.612	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	40.0		13.4	120	12	MC		CL		5	CL	-26.6	4800	2828	0.8	13.7	1.00	0	0.84	75	10	5	1.04	11	0.65	0.90	0.070	0.77	0.605	0.609	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	45.0		13.4	120	15	SPT		CL		5	CL	-31.6	5400	3116	1.0	15.2	1.00	0	0.80	75	15	5	1.04	16	0.68	0.88	0.100	0.72	0.578	0.595	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	50.0		13.4	120	17	MC		CL		5	CL	-36.6	6000	3404	0.8	16.8	1.00	0	0.77	75	13	5	1.04	14	0.67	0.85	0.083	0.68	0.554	0.590	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	60.0		13.4	120	21	SPT		CL		5	CL	-46.6	7200	3980	1.0	19.8	1.00	0	0.71	75	19	5	1.03	19	0.70	0.83	0.122	0.63	0.526	0.579	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	70.0		13.4	120	20	MC		CL		5	CL	-56.6	8400	4556	0.8	22.9	1.00	0	0.66	75	13	5	1.04	14	0.67	0.78	0.078	0.61	0.524	0.615	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	80.0		13.4	120	38	MC		CL		5	CL	-66.6	9600	5132	0.8	25.9	1.00	0	0.62	75	24	5	1.03	24	0.72	0.78	0.169	0.61	0.532	0.619	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	90.0		13.4	120	41	MC		CL		5	CL	-76.6	10800	5708	0.8	29.0	1.00	0	0.59	75	24	5	1.03	25	0.73	0.76	0.171	0.61	0.538	0.643	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	100.0		13.4	120	36	SPT		CL		5	CL	-86.6	12000	6284	1.0	32.0	1.00	0	0.56	75	25	5	1.03	26	0.73	0.75	0.181	0.61	0.543	0.662	0.3	Yes	1.00	No	Yes	No	-	-					No	0
																																			Estimated Settlement of Entire Boring Depth (inches) =							0.0		Total=	0.0

Note:
1. Highlight cell is assumed value

Final Enginering Judgment is based on:
1.N160cs: if N160cs>35, no liquification problem
2.Induced settlement: if induced settlement is limited and the liquefied layer is deep, no liquefaction problem

23rd AVE. Abut 1

Note: Required pile length: Add 1D to length (Column E)

ird AVE. Abut 1

Ground surface elevation/Top of soil elevation (feet)	17.00
Bottom of footing elevation / Pile top elevation (feet)	8.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-51.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{max} (ksf)	f_{max} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{max} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	9	8.5	0.0	0	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1062.50	93.60	968.90	0.00	0.00	0.00	7
14.696	2.116	8	9.5	1.0	12	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.72	0.72	125.00	1187.50	156.00	1031.50	0.00	0.00	0.00	6
14.696	2.116	7	10.5	2.0	24	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.71	0.71	125.00	1312.50	218.40	1094.10	0.77	6.22	6.22	5
14.696	2.116	6	11.5	3.0	36	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.69	0.69	125.00	1437.50	280.80	1156.70	0.80	6.05	12.27	4
14.696	2.116	5	12.5	4.0	48	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.68	0.68	125.00	1562.50	343.20	1219.30	0.83	5.87	18.14	3
14.696	2.116	4	13.5	5.0	60	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.67	0.67	125.00	1687.50	405.60	1281.90	0.86	5.70	23.84	2
14.696	2.116	3	14.5	6.0	72	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.66	0.66	125.00	1812.50	468.00	1344.50	0.88	5.53	29.37	1
14.696	2.116	2	15.5	7.0	84	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	1937.50	530.40	1407.10	0.91	5.36	34.73	-1
14.696	2.116	1	16.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	592.80	1469.70	0.93	5.18	39.91	-2
14.696	2.116	-1	17.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	655.20	1532.30	0.95	5.18	45.10	-3
14.696	2.116	-2	18.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	717.60	1594.90	0.98	5.18	50.28	-4
14.696	2.116	-3	19.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	780.00	1657.50	1.00	5.18	55.46	-5
14.696	2.116	-4	20.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	842.40	1720.10	1.02	5.18	60.65	-6
14.696	2.116	-5	21.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	904.80	1782.70	1.04	5.18	65.83	-7
14.696	2.116	-6	22.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	967.20	1845.30	1.06	5.18	71.02	-8
14.696	2.116	-7	23.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	1029.60	1907.90	1.07	5.18	76.20	-9
14.696	2.116	-8	24.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	1092.00	1970.50	1.09	5.18	81.38	-10
14.696	2.116	-9	25.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	1154.40	2033.10	1.11	5.18	86.57	-11
14.696	2.116	-10	26.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1216.80	2095.70	1.12	5.18	91.75	-12
14.696	2.116	-11	27.5	19.0	228	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.53	0.53	125.00	3437.50	1279.20	2158.30	1.14	5.29	97.04	-13
14.696	2.116	-12	28.5	20.0	240	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.52	0.52	125.00	3562.50	1341.60	2220.90	1.15	5.40	102.44	-14
14.696	2.116	-13	29.5	21.0	252	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10.5	0.54	0.54	125.00	3687.50	1404.00	2283.50	1.22	5.51	107.95	-15
14.696	2.116	-14	30.5	22.0	264	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	11	0.55	0.55	125.00	3812.50	1466.40	2346.10	1.30	5.62	113.57	-16
14.696	2.116	-15	31.5	23.0	276	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	11.5	0.57	0.57	125.00	3937.50	1528.80	2408.70	1.37	5.73	119.30	-17
14.696	2.116	-16	32.5	24.0	288	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	12	0.58	0.58	125.00	4062.50	1591.20	2471.30	1.44	5.84	125.14	-18
14.696	2.116	-17	33.5	25.0	300	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	12.5	0.60	0.60	125.00	4187.50	1653.60	2533.90	1.51	5.95	131.10	-19
14.696	2.116	-18	34.5	26.0	312	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	13	0.61	0.61	125.00	4312.50	1716.00	2596.50	1.59	6.06	137.16	-20
14.696	2.116	-19	35.5	27.0	324	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	13.5	0.62	0.62	125.00	4437.50	1778.40	2659.10	1.66	6.17	143.33	-21
14.696	2.116	-20	36.5	28.0	336	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	14	0.64	0.64	125.00	4562.50	1840.80	2721.70	1.73	6.28	149.61	-22
14.696	2.116	-21	37.5	29.0	348	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	14.5	0.65	0.65	125.00	4687.50	1903.20	2784.30	1.81	6.39	156.01	-23
14.696	2.116	-22	38.5	30.0	360	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	15	0.66	0.66	125.00	4812.50	1965.60	2846.90	1.88	6.50	162.51	-24
14.696	2.116	-23	39.5	31.0	372	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	15.5	0.65	0.65	125.00	4937.50	2028.00	2909.50	1.89	6.61	169.12	-25
14.696	2.116	-24	40.5	32.0	384	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	16	0.64	0.64	125.00	5062.50	2090.40	2972.10	1.90	6.72	175.85	-26
14.696	2.116	-25	41.5	33.0	396	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	16.5	0.63	0.63	125.00	5187.50	2152.80	3034.70	1.91	6.83	182.68	-27
14.696	2.116	-26	42.5	34.0	408	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	17	0.62	0.62	125.00	5312.50	2215.20	3097.30	1.91	6.94	189.63	-28
14.696	2.116	-27	43.5	35.0	420	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	17.5	0.61	0.61	125.00	5437.50	2277.60	3159.90	1.92	7.06	196.68	-29
14.696	2.116	-28	44.5	36.0	432	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	18	0.60	0.60	125.00	5562.50	2340.00	3222.50	1.93	7.17	203.85	-30
14.696	2.116	-29	45.5	37.0	444	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	18.5	0.59	0.59	125.00	5687.50	2402.40	3285.10	1.93	7.28	211.12	-31
14.696	2.116	-30	46.5	38.0	456	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	19	0.58	0.58	125.00	5812.50	2464.80	3347.70	1.93	7.39	218.51	-32
14.696	2.116	-31	47.5	39.0	468	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	19.5	0.57	0.57	125.00	5937.50	2527.20	3410.30	1.94	7.50	226.00	-33
14.696	2.116	-32	48.5	40.0	480	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	20	0.56	0.56	125.00	6062.50	2589.60	3472.90	1.94	7.61	233.61	-34
14.696	2.116	-33	49.5	41.0	492	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	20.5	0.55	0.55	125.00	6187.50	2652.00	3535.50	1.94	7.72	241.33	-35
14.696	2.116	-34	50.5	42.0	504	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	21	0.54	0.54	125.00	6312.50	2714.40	3598.10	1.94	7.83	249.16	-36
14.696	2.116	-35	51.5	43.0	516	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	21.5	0.53	0.53	125.00	6437.50	2776.80	3660.70	1.94	7.94	257.09	-37
14.696	2.116	-36	52.5	44.0	528	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	22	0.52	0.52	125.00	6562.50	2839.20	3723.30	1.94	8.05	265.14	-38
14.696	2.116	-37	53.5	45.0	540	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	22.5	0.51	0.51	125.00	6687.50	2901.60	3785.90	1.93	8.16	273.30	-39
14.696	2.116	-38	54.5	46.0	552	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	23	0.50	0.50	125.00	6812.50	2964.00	3848.50	1.93	8.27	281.57	-40
14.696	2.116	-39	55.5	47.0	564	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	23.5	0.49	0.49	125.00	6937.50	3026.40	3911.10	1.93	8.38	289.95	-41
14.696	2.116	-40	56.5	48.0	576	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	24	0.48	0.48	125.00	7062.50	3088.80	3973.70	1.92	8.49	298.44	-42
14.696	2.116	-41	57.5	49.0	588	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	24.5	0.47	0.47	125.00	7187.50	3151.20	4036.30	1.91	8.60	307.04	-43
14.696	2.116	-42	58.5	50.0	600	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	25	0.47	0.47	125.00	7312.50	3213.60	4098.90	1.91	8.71	315.75	-44
14.696	2.116	-43	59.5	51.0	612	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	25.5	0.46	0.46	125.00	7437.50	3276.00	4161.50	1.90	8.82	324.57	-45
14.696	2.116	-44	60.5	52.0	624	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	26	0.45	0.45	125.00	7562.50	3338.40	4224.10	1.89	8.93	333.50	-46
14.696	2.116	-45	61.5	53.0	636	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	26.5	0.44	0.44	125.00	7687.50	3400.80	4286.70	1.88	9.04	342.54	-47
14.696	2.116	-46	62.5	54.0	648	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	27	0.43	0.43	125.00	7812.50	3463.20	4349.30	1.87	9.15	351.69	-48
14.696	2.116	-47	63.5	55.0	660	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	27.5	0.42	0.42	125.00	7937.50	3525.60	4411.90	1.86	9.26	360.95	-49
14.696	2.116	-48	64.5	56.0	672	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	28	0.41	0.41	125.00	8062.50	3588.00	4474.50	1.85	9.37	370.32	-50
14.696	2.116	-49	65.5	57.0	684	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	28.5	0.41	0.41	125.00	8187.50	3650.40	4537.10	1.84	9.48	379.80	-51
14.696	2.116	-50	66.5	58.0	696	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	29	0.40	0.40	125.00	8312.50	3712.80	4599.70	1.83	9.59	389.40	-52
14.696	2.116	-51	67.5	59.0	708	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	29.5	0.39	0.39	125.00	8437.50	3775.20	4662.30	1.81	9.70	399.10	-53
14.696	2.116	-52	68.5	60.0	720	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	30	0.38	0.38	125.00	8562.50	3837.60	4724.90	1.80	9.81	408.91	-54
14.696	2.116	-53	69.5	61.0	732	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	30.5	0.37	0.37	125.00	8687.50	3900.00	4787.50	1.78	9.92	418.84	-55
14.696	2.116	-54	70.5	62.0	744	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	31	0.36	0.36	125.00	8812.50	3962.40	4850.10	1.77	10.03	428.87	-56
14.696	2.116	-55	71.5	63.0	756	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	31.5	0.36	0.36	125.00	8937.50	4024.80	4912.70	1.75	10.14	439.01	-57
14.696	2.116	-56	72.5	64.0	768	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	32	0.35	0.35	125.00	9062.50	4087.20	4975.30	1.73	10.25	449.27	-58
14.696	2.116	-57	73.5	65.0	780	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	32.5	0.34	0.34	125.00	9187.50	4149.60	5037.90	1.71	10.36	459.63	-59
14.696	2.116	-58	74.5	66.0	792	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	33	0.33	0.33	125.00	9312.50	4212.00	5100.50	1.70	10.48	470.11	-60
14.696	2.116	-59	75.5	67.0	804	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	33.5	0.32	0.32	125.00	9437.50	4274.40	5163.10	1.68	10.59	480.69	-61
14.696	2.116	-60	76.5	68.0	816	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	34	0.32	0.32	125.00	9562.50	4336.80	5225.70	1.66	10.70	491.39	-62
14.696	2.116	-61	77.5	69.0	828	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	34.5	0.31	0.31	125.00	9687.50	4399.20	5288.30	1.64	10.81	502.20	-63
14.696	2.116	-62	78.5	70.0	840	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	35	0.30	0.30	125.00	9812.50	4461.60	5350.90	1.61	10.92	513.11	-64
14.696	2.116	-63	79.5	71.0	852	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	35.5	0.29	0.29	125.00	9937.50	4524.00	5413.50	1.59	11.01	524.12	-65
14.696	2.116	-64	80.5	72.0	864	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	36	0.29	0.29	125.00	10062.50	4586.40	5476.10	1.57	11.09	535.22	-66
14.696	2.116	-65	81.5	73.0	876	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	36.5	0.28	0.28	125.00	10187.50	4648.80	5538.70	1.54	11.17	546.39	-67
14.696	2.116	-66	82.5	74.0	888	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	37	0.27	0.27	125.00	10312.50	4711.20	5601.30	1.52	11.25	557.63	-68
14.696	2.116	-67	83.5	75.0	900	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	37.5	0.26	0.26	125.00	10437.50	4773.60	5663.90	1.50	11.33	568.96	-69
14.696	2.116	-68	84.5	76.0	912	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	38	0.26	0.26	125.00	10562.50	4836.00	5726.50	1.47	11.40	580.36	-70
14.696	2.116	-69	85.5	77.0	924	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	38.5	0.25	0.25	125.00	10687.50	4898.40	5789.10	1.45	11.48	591.84	-71
14.696	2.116	-70	86.5	78.0	936	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	39	0.24	0.25	125.00	10812.50	4960.80	5851.70	1.46	11.56	603.40	-72
14.696	2.116	-71	87.5	79.0	948	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	39.5	0.23	0.25	125.00	10937.50	5023.20	5914.30	1.48	11.63	615.03	-73
14.696	2.116	-72	88.5	80.0	960	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	40	0.23	0.25	125.00	11062.50	5085.60	5976.90	1.49	11.71	626.74	-74
14.696	2.116	-73	89.5	81.0	972	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	40.5	0.22	0.25	125.00	11187.50	5148.00	6039.50	1.51	11.78	638.52	-75
14.696	2.116	-74	90.5	82.0	984	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	41	0.21	0.25	125.00	11312.50	5210.40	6102.10	1.53	11.85	650.37	-76
14.696	2.116	-75	91.5	83.0	996	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	41.5	0.21	0.25	125.00	11437.50	5272.80	6164.70	1.54	11.93	662.30	-77
14.696	2.116	-76	92.5	84.0	1008	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	42	0.20	0.25	125.00	11562.50	5335.20	6227.30	1.56	12.00	674.30	-78
14.696	2.116	-77	93.5	85.0	1020	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	42.5	0.19	0.25	125.00	11687.50	5397.60	6289.90	1.57	12.07	686.37	-79
14.696	2.116	-78	94.5	86.0	1032	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	43	0.19	0.25	125.00	11812.50	5460.00	6352.50	1.59	12.14	698.51	-80
14.696	2.116	-79	95.5	87.0	1044	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	43.5	0.18	0.25	125.00	11937.50	5522.40	6415.10	1.60	12.21	710.72	-81
14.696	2.116	-80	96.5	88.0	1056	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	44	0.17	0.25	125.00	12062.50	5584.80	6477.70	1.62	12.28	723.00	-82
14.696	2.116	-81	97.5	89.0	1068	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	44.5	0.16	0.25	125.00	12187.50	5647.20	6540.30	1.64	12.35	735.35	-83
14.696	2.116	-82	98.5	90.0	1080	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	45	0.16	0.25	125.00	12312.50	5709.60	6602.90	1.65	12.42	747.78	-84
14.696	2.116	-83	99.5	91.0	1092	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	45.5	0.15	0.25	125.00	12437.50	5772.00	6665.50	1.67	12.49	760.26	-85
14.696	2.116	-84	100.5	92.0	1104	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	46	0.14	0.25	125.00	12562.50	5834.40	6728.10	1.68	12.56	772.82	-86
14.696	2.116	-85	101.5	93.0	1116	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	46.5	0.14	0.25	125.00	12687.50	5896.80	6790.70	1.70	12.62	785.44	-87
14.696	2.116	-86	102.5	94.0	1128	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	47	0.13	0.25	125.00	12812.50	5959.20	6853.30	1.71	12.69	798.13	-88
14.696	2.116	-87	103.5	95.0	1140	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	47.5	0.12	0.25	125.00	12937.50	6021.60	6915.90	1.73	12.76	810.89	-89
14.696	2.116	-88	104.5	96.0	1152	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	48	0.12	0.25	125.00	13062.50	6084.00	6978.50	1.74	12.82	823.71	-90
14.696	2.116	-89	105.5	97.0	1164	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	48.5	0.11	0.25	125.00	13187.50	6146.40	7041.10	1.76	12.88	836.59	-91
14.696	2.116	-90	106.5	98.0	1176	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	49	0.10	0.25	125.00	13312.50	6208.80	7103.70	1.78	12.95	849.54	-92
14.696	2.116	-91	107.5	99.0	1188	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	49.5	0.10	0.25	125.00	13437.50	6271.20	7166.30	1.79	13.01	862.55	-93
14.696	2.116	-92	108.5	100.0	1200	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	50	0.09	0.25	125.00	13562.50	6333.60	7228.90	1.81	13.07	875.63	-94
14.696	2.116	-93	109.5	101.0	1212	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	50.5	0.08	0.25	125.00	13687.50	6396.00	7291.50	1.82	13.14	888.76	-95
14.696	2.116	-94	110.5	102.0	1224	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	51	0.08	0.25	125.00	13812.50	6458.40	7354.10	1.84	13.20	901.96	-96
14.696	2.116	-95	111.5	103.0	1236	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	51.5	0.07	0.25	125.00	13937.50	6520.80	7416.70	1.85	13.26	915.22	-97
14.696	2.116	-96	112.5	104.0	1248	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	52	0.07	0.25	125.00	14062.50	6583.20	7479.30	1.87	13.32	928.54	-98
14.696	2.116	-97	113.5	105.0	1260	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	52.5	0.06	0.25	125.00	14187.50	6645.60	7541.90	1.89	13.38	941.92	-99
14.696	2.116	-98	114.5	106.0	1272	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	53	0.05	0.25	125.00	14312.50	6708.00	7604.50	1.90	13.44	955.36	-100
14.696	2.116	-99	115.5	107.0	1284	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	53.5	0.05	0.25	125.00	14437.50	6770.40	7667.10	1.92	13.50	968.85	-101
14.696	2.116	-100	116.5	108.0	1296	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	54	0.04	0.25	125.00	14562.50	6832.80	7729.70	1.93	13.55	982.41	-102
14.696	2.116	-101	117.5	109.0	1308	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	54.5	0.03	0.25	125.00	14687.50	6895.20	7792.30	1.95	13.61	996.02	-103
14.696	2.116	-102	118.5	110.0	1320	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	55	0.03	0.25	125.00	14812.50	6957.60	7854.90	1.96	13.67	1009.69	-104
14.696	2.116	-103	119.5	111.0	1332	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	55.5	0.02	0.25	125.00	14937.50	7020.00	7917.50	1.98	13.72	1023.41	-105
14.696	2.116	-104	120.5	112.0	1344	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	56	0.02	0.25	125.00	15062.50	7082.40	7980.10	2.00	13.78	1037.19	-106
14.696	2.116	-105	121.5	113.0	1356	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	56.5	0.01	0.25	125.00	15187.50	7144.80	8042.70	2.01	13.83	1051.02	-107
14.696	2.116	-106	122.5	114.0	1368	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	57	0.00	0.25	125.00	15312.50	7207.20	8105.30	2.03	13.89	1064.91	-108
14.696	2.116	-107	123.5	115.0	1380	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	57.5	0.00	0.25	125.00	15437.50	7269.60	8167.90	2.04	13.94	1078.85	-109
14.696	2.116	-108	124.5	116.0	1392	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	58	-0.01	0.25	125.00	15562.50	7332.00	8230.50	2.06	14.00	1092.85	-110
14.696	2.116	-109	125.5	117.0	1404	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	58.5	-0.02	0.25	125.00	15687.50	7394.40	8293.10	2.07	14.05	1106.90	-111
14.696	2.116	-110	126.5	118.0	1416	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	59	-0.02	0.25	125.00	15812.50	7456.80	8355.70	2.09	14.10	1121.00	-112
14.696	2.116	-111	127.5	119.0	1428	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	59.5	-0.03	0.25	125.00	15937.50	7519.20	8418.30	2.10	14.15	1135.15	-113
14.696	2.116	-112	128.5	120.0	1440	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	60	-0.03	0.25	125.00	16062.50	7581.60	8480.90	2.12	14.20	1149.35	-114
14.696	2.116	-113	129.5	121.0	1452	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	60.5	-0.04	0.25	125.00	16187.50	7644.00	8543.50	2.14	14.25	1163.60	-115
14.696	2.116	-114	130.5	122.0	1464	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	61	-0.05	0.25	125.00	16312.50	7706.40	8606.10	2.15	14.30	1177.90	-116
14.696	2.116	-115	131.5	123.0	1476	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	61.5	-0.05	0.25	125.00	16437.50	7768.80	8668.70	2.17	14.35	1192.25	-117
14.696	2.116	-116	132.5	124.0	1488	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	62	-0.06	0.25	125.00	16562.50	7831.20	8731.30	2.18	14.40	1206.64	-118
14.696	2.116	-117	133.5	125.0	1500	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	62.5	-0.06	0.25	125.00	16687.50	7893.60	8793.90	2.20	14.44	1221.09	-119
14.696	2.116	-118	134.5	126.0	1512	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	63	-0.07	0.25	125.00	16812.50	7956.00	8856.50	2.21	14.49	1235.58	-120
14.696	2.116	-119	135.5	127.0	1524	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	63.5	-0.07	0.25	125.00	16937.50	8018.40	8919.10	2.23	14.54	1250.12	-121
14.696	2.116	-120	136.5	128.0	1536	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	64	-0.08	0.25	125.00	17062.50	8080.80	8981.70	2.25	14.58	1264.70	-122
14.696	2.116	-121	137.5	129.0	1548	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	64.5	-0.09	0.25	125.00	17187.50	8143.20	9044.30	2.26	14.63	1279.33	-123
14.696	2.116	-122	138.5	130.0	1560	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	65	-0.09	0.25	125.00	17312.50	8205.60	9106.90	2.28	14.67	1294.00	-124

23rd AVE. Abut 1 RW Left

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	17.00
Bottom of footing elevation / Pile top elevation (feet)	8.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-51.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	9	8.5	0.0	0	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1062.50	93.60	968.90	0.00	0.00	0.00	7
14.696	2.116	8	9.5	1.0	12	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.72	0.72	125.00	1187.50	156.00	1031.50	0.00	0.00	0.00	6
14.696	2.116	7	10.5	2.0	24	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.71	0.71	125.00	1312.50	218.40	1094.10	0.77	6.22	6.22	5
14.696	2.116	6	11.5	3.0	36	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.69	0.69	125.00	1437.50	280.80	1156.70	0.80	6.05	12.27	4
14.696	2.116	5	12.5	4.0	48	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.68	0.68	125.00	1562.50	343.20	1219.30	0.83	5.87	18.14	3
14.696	2.116	4	13.5	5.0	60	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.67	0.67	125.00	1687.50	405.60	1281.90	0.86	5.70	23.84	2
14.696	2.116	3	14.5	6.0	72	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.66	0.66	125.00	1812.50	468.00	1344.50	0.88	5.53	29.37	1
14.696	2.116	2	15.5	7.0	84	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	1937.50	530.40	1407.10	0.91	5.36	34.73	-1
14.696	2.116	1	16.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	592.80	1469.70	0.93	5.18	39.91	-2
14.696	2.116	-1	17.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	655.20	1532.30	0.95	5.18	45.10	-3
14.696	2.116	-2	18.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	717.60	1594.90	0.98	5.18	50.28	-4
14.696	2.116	-3	19.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	780.00	1657.50	1.00	5.18	55.46	-5
14.696	2.116	-4	20.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	842.40	1720.10	1.02	5.18	60.65	-6
14.696	2.116	-5	21.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	904.80	1782.70	1.04	5.18	65.83	-7
14.696	2.116	-6	22.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	967.20	1845.30	1.06	5.18	71.02	-8
14.696	2.116	-7	23.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	1029.60	1907.90	1.07	5.18	76.20	-9
14.696	2.116	-8	24.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	1092.00	1970.50	1.09	5.18	81.38	-10
14.696	2.116	-9	25.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	1154.40	2033.10	1.11	5.18	86.57	-11
14.696	2.116	-10	26.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1216.80	2095.70	1.12	5.18	91.75	-12
14.696	2.116	-11	27.5	19.0	228	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.53	0.53	125.00	3437.50	1279.20	2158.30	1.14	5.29	97.04	-13
14.696	2.116	-12	28.5	20.0	240	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.52	0.52	125.00	3562.50	1341.60	2220.90	1.15	5.40	102.44	-14
14.696	2.116	-13	29.5	21.0	252	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10.5	0.54	0.54	125.00	3687.50	1404.00	2283.50	1.22	5.51	107.95	-15
14.696	2.116	-14	30.5	22.0	264	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	11	0.55	0.55	125.00	3812.50	1466.40	2346.10	1.30	5.62	113.57	-16
14.696	2.116	-15	31.5	23.0	276	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	11.5	0.57	0.57	125.00	3937.50	1528.80	2408.70	1.37	5.73	119.30	-17
14.696	2.116	-16	32.5	24.0	288	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	12	0.58	0.58	125.00	4062.50	1591.20	2471.30	1.44	5.84	125.14	-18
14.696	2.116	-17	33.5	25.0	300	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	12.5	0.60	0.60	125.00	4187.50	1653.60	2533.90	1.51	5.95	131.10	-19
14.696	2.116	-18	34.5	26.0	312	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	13	0.61	0.61	125.00	4312.50	1716.00	2596.50	1.59	6.06	137.16	-20
14.696	2.116	-19	35.5	27.0	324	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	13.5	0.62	0.62	125.00	4437.50	1778.40	2659.10	1.66	6.17	143.33	-21
14.696	2.116	-20	36.5	28.0	336	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	14	0.64	0.64	125.00	4562.50	1840.80	2721.70	1.73	6.28	149.61	-22
14.696	2.116	-21	37.5	29.0	348	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	14.5	0.65	0.65	125.00	4687.50	1903.20	2784.30	1.81	6.39	156.01	-23
14.696	2.116	-22	38.5	30.0	360	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	15	0.66	0.66	125.00	4812.50	1965.60	2846.90	1.88	6.50	162.51	-24
14.696	2.116	-23	39.5	31.0	372	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	15.5	0.65	0.65	125.00	4937.50	2028.00	2909.50	1.89	6.61	169.12	-25
14.696	2.116	-24	40.5	32.0	384	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	16	0.64	0.64	125.00	5062.50	2090.40	2972.10	1.90	6.72	175.85	-26
14.696	2.116	-25	41.5	33.0	396	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	16.5	0.63	0.63	125.00	5187.50	2152.80	3034.70	1.91	6.83	182.68	-27
14.696	2.116	-26	42.5	34.0	408	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	17	0.62	0.62	125.00	5312.50	2215.20	3097.30	1.91	6.94	189.63	-28
14.696	2.116	-27	43.5	35.0	420	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	17.5	0.61	0.61	125.00	5437.50	2277.60	3159.90	1.92	7.06	196.68	-29
14.696	2.116	-28	44.5	36.0	432	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	18	0.60	0.60	125.00	5562.50	2340.00	3222.50	1.93	7.17	203.85	-30
14.696	2.116	-29	45.5	37.0	444	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	18.5	0.59	0.59	125.00	5687.50	2402.40	3285.10	1.93	7.28	211.12	-31
14.696	2.116	-30	46.5	38.0	456	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	19	0.58	0.58	125.00	5812.50	2464.80	3347.70	1.93	7.39	218.51	-32
14.696	2.116	-31	47.5	39.0	468	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	19.5	0.57	0.57	125.00	5937.50	2527.20	3410.30	1.94	7.50	226.00	-33
14.696	2.116	-32	48.5	40.0	480	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	20	0.56	0.56	125.00	6062.50	2589.60	3472.90	1.94	7.61	233.61	-34
14.696	2.116	-33	49.5	41.0	492	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	20.5	0.55	0.55	125.00	6187.50	2652.00	3535.50	1.94	7.72	241.33	-35
14.696	2.116	-34	50.5	42.0	504	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	21	0.54	0.54	125.00	6312.50	2714.40	3598.10	1.94	7.83	249.16	-36
14.696	2.116	-35	51.5	43.0	516	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	21.5	0.53	0.53	125.00	6437.50	2776.80	3660.70	1.94	7.94	257.09	-37
14.696	2.116	-36	52.5	44.0	528	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	22	0.52	0.52	125.00	6562.50	2839.20	3723.30	1.94	8.05	265.14	-38
14.696	2.116	-37	53.5	45.0	540	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	22.5	0.51	0.51	125.00	6687.50	2901.60	3785.90	1.93	8.16	273.30	-39
14.696	2.116	-38	54.5	46.0	552	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	23	0.50	0.50	125.00	6812.50	2964.00	3848.50	1.93	8.27	281.57	-40
14.696	2.116	-39	55.5	47.0	564	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	23.5	0.49	0.49	125.00	6937.50	3026.40	3911.10	1.93	8.38	289.95	-41
14.696	2.116	-40	56.5	48.0	576	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	24	0.48	0.48	125.00	7062.50	3088.80	3973.70	1.92	8.49	298.44	-42
14.696	2.116	-41	57.5	49.0	588	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	24.5	0.47	0.47	125.00	7187.50	3151.20	4036.30	1.91	8.60	307.04	-43
14.696	2.116	-42	58.5	50.0	600	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	25	0.47	0.47	125.00	7312.50	3213.60	4098.90	1.91	8.71	315.75	-44
14.696	2.116	-43	59.5	51.0	612	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	25.5	0.46	0.46	125.00	7437.50	3276.00	4161.50	1.90	8.82	324.57	-45
14.696	2.116	-44	60.5	52.0	624	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	26	0.45	0.45	125.00	7562.50	3338.40	4224.10	1.89	8.93	333.50	-46
14.696	2.116	-45	61.5	53.0	636	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	26.5	0.44	0.44	125.00	7687.50	3400.80	4286.70	1.88	9.04	342.54	-47
14.696	2.116	-46	62.5	54.0	648	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	27	0.43	0.43	125.00	7812.50	3463.20	4349.30	1.87	9.15	351.69	-48
14.696	2.116	-47	63.5	55.0	660	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	27.5	0.42	0.42	125.00	7937.50	3525.60	4411.90	1.86	9.26	360.95	-49
14.696	2.116	-48	64.5	56.0	672	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	28	0.41	0.41	125.00	8062.50	3588.00	4474.50	1.85	9.37	370.32	-50
14.696	2.116	-49	65.5	57.0	684	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	28.5	0.41	0.41	125.00	8187.50	3650.40	4537.10	1.84	9.48	379.80	-51
14.696	2.116	-50	66.5	58.0	696	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	29	0.40	0.40	125.00	8312.50	3712.80	4599.70	1.83	9.59	389.40	-52
14.696	2.116	-51	67.5	59.0	708	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	29.5	0.39	0.39	125.00	8437.50	3775.20	4662.30	1.81	9.70	399.10	-53
14.696	2.116	-52	68.5	60.0	720	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	30	0.38	0.38	125.00	8562.50	3837.60	4724.90	1.80	9.81	408.91	-54
14.696	2.116	-53	69.5	61.0	732	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	30.5	0.37	0.37	125.00	8687.50	3900.00	4787.50	1.78	9.92	418.84	-55
14.696	2.116	-54	70.5	62.0	744	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	31	0.36	0.36	125.00	8812.50	3962.40	4850.10	1.77	10.03	428.87	-56
14.696	2.116	-55	71.5	63.0	756	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	31.5	0.36	0.36	125.00	8937.50	4024.80	4912.70	1.75	10.14	439.01	-57
14.696	2.116	-56	72.5	64.0	768	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	32	0.35	0.35	125.00	9062.50	4087.20	4975.30	1.73	10.25	449.27	-58
14.696	2.116	-57	73.5	65.0	780	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	32.5	0.34	0.34	125.00	9187.50	4149.60	5037.90	1.71	10.36	459.63	-59
14.696	2.116	-58	74.5	66.0	792	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	33	0.33	0.33	125.00	9312.50	4212.00	5100.50	1.70	10.48	470.11	-60
14.696	2.116	-59	75.5	67.0	804	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	33.5	0.32	0.32	125.00	9437.50	4274.40	5163.10	1.68	10.59	480.69	-61
14.696	2.116	-60	76.5	68.0	816	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	34	0.32	0.32	125.00	9562.50	4336.80	5225.70	1.66	10.70	491.39	-62
14.696	2.116	-61	77.5	69.0	828	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	34.5	0.31	0.31	125.00	9687.50	4399.20	5288.30	1.64	10.81	502.20	-63
14.696	2.116	-62	78.5	70.0	840	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	35	0.30	0.30	125.00	9812.50	4461.60	5350.90	1.61	10.92	513.11	-64
14.696	2.116	-63	79.5	71.0	852	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	35.5	0.29	0.29	125.00	9937.50	4524.00	5413.50	1.59	11.01	524.12	-65
14.696	2.116	-64	80.5	72.0	864	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	36	0.29	0.29	125.00	10062.50	4586.40	5476.10	1.57	11.09	535.22	-66
14.696	2.116	-65	81.5	73.0	876	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	36.5	0.28	0.28	125.00	10187.50	4648.80	5538.70	1.54	11.17	546.39	-67
14.696	2.116	-66	82.5	74.0	888	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	37	0.27	0.27	125.00	10312.50	4711.20	5601.30	1.52	11.25	557.63	-68
14.696	2.116	-67	83.5	75.0	900	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	37.5	0.26	0.26	125.00	10437.50	4773.60	5663.90	1.50	11.33	568.96	-69
14.696	2.116	-68	84.5	76.0	912	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	38	0.26	0.26	125.00	10562.50	4836.00	5726.50	1.47	11.40	580.36	-70
14.696	2.116	-69	85.5	77.0	924	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	38.5	0.25	0.25	125.00	10687.50	4898.40	5789.10	1.45	11.48	591.84	-71
14.696	2.116	-70	86.5	78.0	936	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	39	0.24	0.25	125.00	10812.50	4960.80	5851.70	1.46	11.56	603.40	-72
14.696	2.116	-71	87.5	79.0	948	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	39.5	0.23	0.25	125.00	10937.50	5023.20	5914.30	1.48	11.63	615.03	-73
14.696	2.116	-72	88.5	80.0	960	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	40	0.23	0.25	125.00	11062.50	5085.60	5976.90	1.49	11.71	626.74	-74
14.696	2.116	-73	89.5	81.0	972	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	40.5	0.22	0.25	125.00	11187.50	5148.00	6039.50	1.51	11.78	638.52	-75
14.696	2.116	-74	90.5	82.0	984	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	41	0.21	0.25	125.00	11312.50	5210.40	6102.10	1.53	11.85	650.37	-76
14.696	2.116	-75	91.5	83.0	996	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	41.5	0.21	0.25	125.00	11437.50	5272.80	6164.70	1.54	11.93	662.30	-77
14.696	2.116	-76	92.5	84.0	1008	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	42	0.20	0.25	125.00	11562.50	5335.20	6227.30	1.56	12.00	674.30	-78
14.696	2.116	-77	93.5	85.0	1020	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	42.5	0.19	0.25	125.00	11687.50	5397.60	6289.90	1.57	12.07	686.37	-79
14.696	2.116	-78	94.5	86.0	1032	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	43	0.19	0.25	125.00	11812.50	5460.00	6352.50	1.59	12.14	698.51	-80
14.696	2.116	-79	95.5	87.0	1044	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	43.5	0.18	0.25	125.00	11937.50	5522.40	6415.10	1.60	12.21	710.72	-81
14.696	2.116	-80	96.5	88.0	1056	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	44	0.17	0.25	125.00	12062.50	5584.80	6477.70	1.62	12.28	723.00	-82
14.696	2.116	-81	97.5	89.0	1068	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	44.5	0.16	0.25	125.00	12187.50	5647.20	6540.30	1.64	12.35	735.35	-83
14.696	2.116	-82	98.5	90.0	1080	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	45	0.16	0.25	125.00	12312.50	5709.60	6602.90	1.65	12.42	747.78	-84
14.696	2.116	-83	99.5	91.0	1092	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	45.5	0.15	0.25	125.00	12437.50	5772.00	6665.50	1.67	12.49	760.26	-85
14.696	2.116	-84	100.5	92.0	1104	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	46	0.14	0.25	125.00	12562.50	5834.40	6728.10	1.68	12.56	772.82	-86
14.696	2.116	-85	101.5	93.0	1116	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	46.5	0.14	0.25	125.00	12687.50	5896.80	6790.70	1.70	12.62	785.44	-87
14.696	2.116	-86	102.5	94.0	1128	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	47	0.13	0.25	125.00	12812.50	5959.20	6853.30	1.71	12.69	798.13	-88
14.696	2.116	-87	103.5	95.0	1140	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	47.5	0.12	0.25	125.00	12937.50	6021.60	6915.90	1.73	12.76	810.89	-89
14.696	2.116	-88	104.5	96.0	1152	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	48	0.12	0.25	125.00	13062.50	6084.00	6978.50	1.74	12.82	823.71	-90
14.696	2.116	-89	105.5	97.0	1164	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	48.5	0.11	0.25	125.00	13187.50	6146.40	7041.10	1.76	12.88	836.59	-91
14.696	2.116	-90	106.5	98.0	1176	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	49	0.10	0.25	125.00	13312.50	6208.80	7103.70	1.78	12.95	849.54	-92
14.696	2.116	-91	107.5	99.0	1188	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	49.5	0.10	0.25	125.00	13437.50	6271.20	7166.30	1.79	13.01	862.55	-93
14.696	2.116	-92	108.5	100.0	1200	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	50	0.09	0.25	125.00	13562.50	6333.60	7228.90	1.81	13.07	875.63	-94
14.696	2.116	-93	109.5	101.0	1212	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	50.5	0.08	0.25	125.00	13687.50	6396.00	7291.50	1.82	13.14	888.76	-95
14.696	2.116	-94	110.5	102.0	1224	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	51	0.08	0.25	125.00	13812.50	6458.40	7354.10	1.84	13.20	901.96	-96
14.696	2.116	-95	111.5	103.0	1236	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	51.5	0.07	0.25	125.00	13937.50	6520.80	7416.70	1.85	13.26	915.22	-97
14.696	2.116	-96	112.5	104.0	1248	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	52	0.07	0.25	125.00	14062.50	6583.20	7479.30	1.87	13.32	928.54	-98
14.696	2.116	-97	113.5	105.0	1260	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	52.5	0.06	0.25	125.00	14187.50	6645.60	7541.90	1.89	13.38	941.92	-99
14.696	2.116	-98	114.5	106.0	1272	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	53	0.05	0.25	125.00	14312.50	6708.00	7604.50	1.90	13.44	955.36	-100
14.696	2.116	-99	115.5	107.0	1284	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	53.5	0.05	0.25	125.00	14437.50	6770.40	7667.10	1.92	13.50	968.85	-101
14.696	2.116	-100	116.5	108.0	1296	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	54	0.04	0.25	125.00	14562.50	6832.80	7729.70	1.93	13.55	982.41	-102
14.696	2.116	-101	117.5	109.0	1308	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	54.5	0.03	0.25	125.00	14687.50	6895.20	7792.30	1.95	13.61	996.02	-103
14.696	2.116	-102	118.5	110.0	1320	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	55	0.03	0.25	125.00	14812.50	6957.60	7854.90	1.96	13.67	1009.69	-104
14.696	2.116	-103	119.5	111.0	1332	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	55.5	0.02	0.25	125.00	14937.50	7020.00	7917.50	1.98	13.72	1023.41	-105
14.696	2.116	-104	120.5	112.0	1344	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	56	0.02	0.25	125.00	15062.50	7082.40	7980.10	2.00	13.78	1037.19	-106
14.696	2.116	-105	121.5	113.0	1356	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	56.5	0.01	0.25	125.00	15187.50	7144.80	8042.70	2.01	13.83	1051.02	-107
14.696	2.116	-106	122.5	114.0	1368	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	57	0.00	0.25	125.00	15312.50	7207.20	8105.30	2.03	13.89	1064.91	-108
14.696	2.116	-107	123.5	115.0	1380	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	57.5	0.00	0.25	125.00	15437.50	7269.60	8167.90	2.04	13.94	1078.85	-109
14.696	2.116	-108	124.5	116.0	1392	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	58	-0.01	0.25	125.00	15562.50	7332.00	8230.50	2.06	14.00	1092.85	-110
14.696	2.116	-109	125.5	117.0	1404	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	58.5	-0.02	0.25	125.00	15687.50	7394.40	8293.10	2.07	14.05	1106.90	-111
14.696	2.116	-110	126.5	118.0	1416	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	59	-0.02	0.25	125.00	15812.50	7456.80	8355.70	2.09	14.10	1121.00	-112
14.696	2.116	-111	127.5	119.0	1428	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	59.5	-0.03	0.25	125.00	15937.50	7519.20	8418.30	2.10	14.15	1135.15	-113
14.696	2.116	-112	128.5	120.0	1440	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	60	-0.03	0.25	125.00	16062.50	7581.60	8480.90	2.12	14.20	1149.35	-114
14.696	2.116	-113	129.5	121.0	1452	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	60.5	-0.04	0.25	125.00	16187.50	7644.00	8543.50	2.14	14.25	1163.60	-115
14.696	2.116	-114	130.5	122.0	1464	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	61	-0.05	0.25	125.00	16312.50	7706.40	8606.10	2.15	14.30	1177.90	-116
14.696	2.116	-115	131.5	123.0	1476	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	61.5	-0.05	0.25	125.00	16437.50	7768.80	8668.70	2.17	14.35	1192.25	-117
14.696	2.116	-116	132.5	124.0	1488	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	62	-0.06	0.25	125.00	16562.50	7831.20	8731.30	2.18	14.40	1206.64	-118
14.696	2.116	-117	133.5	125.0	1500	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	62.5	-0.06	0.25	125.00	16687.50	7893.60	8793.90	2.20	14.44	1221.09	-119
14.696	2.116	-118	134.5	126.0	1512	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	63	-0.07	0.25	125.00	16812.50	7956.00	8856.50	2.21	14.49	1235.58	-120
14.696	2.116	-119	135.5	127.0	1524	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	63.5	-0.07	0.25	125.00	16937.50	8018.40	8919.10	2.23	14.54	1250.12	-121
14.696	2.116	-120	136.5	128.0	1536	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	64	-0.08	0.25	125.00	17062.50	8080.80	8981.70	2.25	14.58	1264.70	-122
14.696	2.116	-121	137.5	129.0	1548	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	64.5	-0.09	0.25	125.00	17187.50	8143.20	9044.30	2.26	14.63	1279.33	-123
14.696	2.116	-122	138.5	130.0	1560	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	65	-0.09	0.25	125.00	17312.50	8205.60	9106.90	2.28	14.67	1294.00	-124

23rd AVE. Abut 1 RW Right

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	17.00
Bottom of footing elevation / Pile top elevation (feet)	8.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-51.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	9	8.5	0.0	0	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1062.50	93.60	968.90	0.00	0.00	0.00	7
14.696	2.116	8	9.5	1.0	12	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.72	0.72	125.00	1187.50	156.00	1031.50	0.00	0.00	0.00	6
14.696	2.116	7	10.5	2.0	24	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.71	0.71	125.00	1312.50	218.40	1094.10	0.77	6.22	6.22	5
14.696	2.116	6	11.5	3.0	36	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.69	0.69	125.00	1437.50	280.80	1156.70	0.80	6.05	12.27	4
14.696	2.116	5	12.5	4.0	48	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.68	0.68	125.00	1562.50	343.20	1219.30	0.83	5.87	18.14	3
14.696	2.116	4	13.5	5.0	60	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.67	0.67	125.00	1687.50	405.60	1281.90	0.86	5.70	23.84	2
14.696	2.116	3	14.5	6.0	72	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.66	0.66	125.00	1812.50	468.00	1344.50	0.88	5.53	29.37	1
14.696	2.116	2	15.5	7.0	84	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	1937.50	530.40	1407.10	0.91	5.36	34.73	-1
14.696	2.116	1	16.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	592.80	1469.70	0.93	5.18	39.91	-2
14.696	2.116	-1	17.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	655.20	1532.30	0.95	5.18	45.10	-3
14.696	2.116	-2	18.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	717.60	1594.90	0.98	5.18	50.28	-4
14.696	2.116	-3	19.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	780.00	1657.50	1.00	5.18	55.46	-5
14.696	2.116	-4	20.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	842.40	1720.10	1.02	5.18	60.65	-6
14.696	2.116	-5	21.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	904.80	1782.70	1.04	5.18	65.83	-7
14.696	2.116	-6	22.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	967.20	1845.30	1.06	5.18	71.02	-8
14.696	2.116	-7	23.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	1029.60	1907.90	1.07	5.18	76.20	-9
14.696	2.116	-8	24.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	1092.00	1970.50	1.09	5.18	81.38	-10
14.696	2.116	-9	25.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	1154.40	2033.10	1.11	5.18	86.57	-11
14.696	2.116	-10	26.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1216.80	2095.70	1.12	5.18	91.75	-12
14.696	2.116	-11	27.5	19.0	228	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.53	0.53	125.00	3437.50	1279.20	2158.30	1.14	5.29	97.04	-13
14.696	2.116	-12	28.5	20.0	240	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.52	0.52	125.00	3562.50	1341.60	2220.90	1.15	5.40	102.44	-14
14.696	2.116	-13	29.5	21.0	252	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10.5	0.54	0.54	125.00	3687.50	1404.00	2283.50	1.22	5.51	107.95	-15
14.696	2.116	-14	30.5	22.0	264	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	11	0.55	0.55	125.00	3812.50	1466.40	2346.10	1.30	5.62	113.57	-16
14.696	2.116	-15	31.5	23.0	276	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	11.5	0.57	0.57	125.00	3937.50	1528.80	2408.70	1.37	5.73	119.30	-17
14.696	2.116	-16	32.5	24.0	288	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	12	0.58	0.58	125.00	4062.50	1591.20	2471.30	1.44	5.84	125.14	-18
14.696	2.116	-17	33.5	25.0	300	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	12.5	0.60	0.60	125.00	4187.50	1653.60	2533.90	1.51	5.95	131.10	-19
14.696	2.116	-18	34.5	26.0	312	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	13	0.61	0.61	125.00	4312.50	1716.00	2596.50	1.59	6.06	137.16	-20
14.696	2.116	-19	35.5	27.0	324	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	13.5	0.62	0.62	125.00	4437.50	1778.40	2659.10	1.66	6.17	143.33	-21
14.696	2.116	-20	36.5	28.0	336	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	14	0.64	0.64	125.00	4562.50	1840.80	2721.70	1.73	6.28	149.61	-22
14.696	2.116	-21	37.5	29.0	348	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	14.5	0.65	0.65	125.00	4687.50	1903.20	2784.30	1.81	6.39	156.01	-23
14.696	2.116	-22	38.5	30.0	360	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	15	0.66	0.66	125.00	4812.50	1965.60	2846.90	1.88	6.50	162.51	-24
14.696	2.116	-23	39.5	31.0	372	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	15.5	0.65	0.65	125.00	4937.50	2028.00	2909.50	1.89	6.61	169.12	-25
14.696	2.116	-24	40.5	32.0	384	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	16	0.64	0.64	125.00	5062.50	2090.40	2972.10	1.90	6.72	175.85	-26
14.696	2.116	-25	41.5	33.0	396	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	16.5	0.63	0.63	125.00	5187.50	2152.80	3034.70	1.91	6.83	182.68	-27
14.696	2.116	-26	42.5	34.0	408	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	17	0.62	0.62	125.00	5312.50	2215.20	3097.30	1.91	6.94	189.63	-28
14.696	2.116	-27	43.5	35.0	420	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	17.5	0.61	0.61	125.00	5437.50	2277.60	3159.90	1.92	7.06	196.68	-29
14.696	2.116	-28	44.5	36.0	432	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	18	0.60	0.60	125.00	5562.50	2340.00	3222.50	1.93	7.17	203.85	-30
14.696	2.116	-29	45.5	37.0	444	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	18.5	0.59	0.59	125.00	5687.50	2402.40	3285.10	1.93	7.28	211.12	-31
14.696	2.116	-30	46.5	38.0	456	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	19	0.58	0.58	125.00	5812.50	2464.80	3347.70	1.93	7.39	218.51	-32
14.696	2.116	-31	47.5	39.0	468	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	19.5	0.57	0.57	125.00	5937.50	2527.20	3410.30	1.94	7.50	226.00	-33
14.696	2.116	-32	48.5	40.0	480	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	20	0.56	0.56	125.00	6062.50	2589.60	3472.90	1.94	7.61	233.61	-34
14.696	2.116	-33	49.5	41.0	492	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	20.5	0.55	0.55	125.00	6187.50	2652.00	3535.50	1.94	7.72	241.33	-35
14.696	2.116	-34	50.5	42.0	504	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	21	0.54	0.54	125.00	6312.50	2714.40	3598.10	1.94	7.83	249.16	-36
14.696	2.116	-35	51.5	43.0	516	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	21.5	0.53	0.53	125.00	6437.50	2776.80	3660.70	1.94	7.94	257.09	-37
14.696	2.116	-36	52.5	44.0	528	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	22	0.52	0.52	125.00	6562.50	2839.20	3723.30	1.94	8.05	265.14	-38
14.696	2.116	-37	53.5	45.0	540	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	22.5	0.51	0.51	125.00	6687.50	2901.60	3785.90	1.93	8.16	273.30	-39
14.696	2.116	-38	54.5	46.0	552	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	23	0.50	0.50	125.00	6812.50	2964.00	3848.50	1.93	8.27	281.57	-40
14.696	2.116	-39	55.5	47.0	564	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	23.5	0.49	0.49	125.00	6937.50	3026.40	3911.10	1.93	8.38	289.95	-41
14.696	2.116	-40	56.5	48.0	576	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	24	0.48	0.48	125.00	7062.50	3088.80	3973.70	1.92	8.49	298.44	-42
14.696	2.116	-41	57.5	49.0	588	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	24.5	0.47	0.47	125.00	7187.50	3151.20	4036.30	1.91	8.60	307.04	-43
14.696	2.116	-42	58.5	50.0	600	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	25	0.47	0.47	125.00	7312.50	3213.60	4098.90	1.91	8.71	315.75	-44
14.696	2.116	-43	59.5	51.0	612	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	25.5	0.46	0.46	125.00	7437.50	3276.00	4161.50	1.90	8.82	324.57	-45
14.696	2.116	-44	60.5	52.0	624	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	26	0.45	0.45	125.00	7562.50	3338.40	4224.10	1.89	8.93	333.50	-46
14.696	2.116	-45	61.5	53.0	636	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	26.5	0.44	0.44	125.00	7687.50	3400.80	4286.70	1.88	9.04	342.54	-47
14.696	2.116	-46	62.5	54.0	648	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	27	0.43	0.43	125.00	7812.50	3463.20	4349.30	1.87	9.15	351.69	-48
14.696	2.116	-47	63.5	55.0	660	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	27.5	0.42	0.42	125.00	7937.50	3525.60	4411.90	1.86	9.26	360.95	-49
14.696	2.116	-48	64.5	56.0	672	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	28	0.41	0.41	125.00	8062.50	3588.00	4474.50	1.85	9.37	370.32	-50
14.696	2.116	-49	65.5	57.0	684	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	28.5	0.41	0.41	125.00	8187.50	3650.40	4537.10	1.84	9.48	379.80	-51
14.696	2.116	-50	66.5	58.0	696	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	29	0.40	0.40	125.00	8312.50	3712.80	4599.70	1.83	9.59	389.40	-52
14.696	2.116	-51	67.5	59.0	708	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	29.5	0.39	0.39	125.00	8437.50	3775.20	4662.30	1.81	9.70	399.10	-53
14.696	2.116	-52	68.5	60.0	720	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	30	0.38	0.38	125.00	8562.50	3837.60	4724.90	1.80	9.81	408.91	-54
14.696	2.116	-53	69.5	61.0	732	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	30.5	0.37	0.37	125.00	8687.50	3900.00	4787.50	1.78	9.92	418.84	-55
14.696	2.116	-54	70.5	62.0	744	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	31	0.36	0.36	125.00	8812.50	3962.40	4850.10	1.77	10.03	428.87	-56
14.696	2.116	-55	71.5	63.0	756	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	31.5	0.36	0.36	125.00	8937.50	4024.80	4912.70	1.75	10.14	439.01	-57
14.696	2.116	-56	72.5	64.0	768	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	32	0.35	0.35	125.00	9062.50	4087.20	4975.30	1.73	10.25	449.27	-58
14.696	2.116	-57	73.5	65.0	780	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	32.5	0.34	0.34	125.00	9187.50	4149.60	5037.90	1.71	10.36	459.63	-59
14.696	2.116	-58	74.5	66.0	792	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	33	0.33	0.33	125.00	9312.50	4212.00	5100.50	1.70	10.48	470.11	-60
14.696	2.116	-59	75.5	67.0	804	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	33.5	0.32	0.32	125.00	9437.50	4274.40	5163.10	1.68	10.59	480.69	-61
14.696	2.116	-60	76.5	68.0	816	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	34	0.32	0.32	125.00	9562.50	4336.80	5225.70	1.66	10.70	491.39	-62
14.696	2.116	-61	77.5	69.0	828	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	34.5	0.31	0.31	125.00	9687.50	4399.20	5288.30	1.64	10.81	502.20	-63
14.696	2.116	-62	78.5	70.0	840	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	35	0.30	0.30	125.00	9812.50	4461.60	5350.90	1.61	10.92	513.11	-64
14.696	2.116	-63	79.5	71.0	852	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	35.5	0.29	0.29	125.00	9937.50	4524.00	5413.50	1.59	11.01	524.12	-65
14.696	2.116	-64	80.5	72.0	864	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	36	0.29	0.29	125.00	10062.50	4586.40	5476.10	1.57	11.09	535.22	-66
14.696	2.116	-65	81.5	73.0	876	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	36.5	0.28	0.28	125.00	10187.50	4648.80	5538.70	1.54	11.17	546.39	-67
14.696	2.116	-66	82.5	74.0	888	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	37	0.27	0.27	125.00	10312.50	4711.20	5601.30	1.52	11.25	557.63	-68
14.696	2.116	-67	83.5	75.0	900	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	37.5	0.26	0.26	125.00	10437.50	4773.60	5663.90	1.50	11.33	568.96	-69
14.696	2.116	-68	84.5	76.0	912	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	38	0.26	0.26	125.00	10562.50	4836.00	5726.50	1.47	11.40	580.36	-70
14.696	2.116	-69	85.5	77.0	924	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	38.5	0.25	0.25	125.00	10687.50	4898.40	5789.10	1.45	11.48	591.84	-71
14.696	2.116	-70	86.5	78.0	936	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	39	0.24	0.25	125.00	10812.50	4960.80	5851.70	1.46	11.56	603.40	-72
14.696	2.116	-71	87.5	79.0	948	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	39.5	0.23	0.25	125.00	10937.50	5023.20	5914.30	1.48	11.63	615.03	-73
14.696	2.116	-72	88.5	80.0	960	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	40	0.23	0.25	125.00	11062.50	5085.60	5976.90	1.49	11.71	626.74	-74
14.696	2.116	-73	89.5	81.0	972	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	40.5	0.22	0.25	125.00	11187.50	5148.00	6039.50	1.51	11.78	638.52	-75
14.696	2.116	-74	90.5	82.0	984	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	41	0.21	0.25	125.00	11312.50	5210.40	6102.10	1.53	11.85	650.37	-76
14.696	2.116	-75	91.5	83.0	996	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	41.5	0.21	0.25	125.00	11437.50	5272.80	6164.70	1.54	11.93	662.30	-77
14.696	2.116	-76	92.5	84.0	1008	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	42	0.20	0.25	125.00	11562.50	5335.20	6227.30	1.56	12.00	674.30	-78
14.696	2.116	-77	93.5	85.0	1020	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	42.5	0.19	0.25	125.00	11687.50	5397.60	6289.90	1.57	12.07	686.37	-79
14.696	2.116	-78	94.5	86.0	1032	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	43	0.19	0.25	125.00	11812.50	5460.00	6352.50	1.59	12.14	698.51	-80
14.696	2.116	-79	95.5	87.0	1044	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	43.5	0.18	0.25	125.00	11937.50	5522.40	6415.10	1.60	12.21	710.72	-81
14.696	2.116	-80	96.5	88.0	1056	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	44	0.17	0.25	125.00	12062.50	5584.80	6477.70	1.62	12.28	723.00	-82
14.696	2.116	-81	97.5	89.0	1068	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	44.5	0.16	0.25	125.00	12187.50	5647.20	6540.30	1.64	12.35	735.35	-83
14.696	2.116	-82	98.5	90.0	1080	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	45	0.16	0.25	125.00	12312.50	5709.60	6602.90	1.65	12.42	747.78	-84
14.696	2.116	-83	99.5	91.0	1092	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	45.5	0.15	0.25	125.00	12437.50	5772.00	6665.50	1.67	12.49	760.26	-85
14.696	2.116	-84	100.5	92.0	1104	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	46	0.14	0.25	125.00	12562.50	5834.40	6728.10	1.68	12.56	772.82	-86
14.696	2.116	-85	101.5	93.0	1116	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	46.5	0.14	0.25	125.00	12687.50	5896.80	6790.70	1.70	12.62	785.44	-87
14.696	2.116	-86	102.5	94.0	1128	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	47	0.13	0.25	125.00	12812.50	5959.20	6853.30	1.71	12.69	798.13	-88
14.696	2.116	-87	103.5	95.0	1140	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	47.5	0.12	0.25	125.00	12937.50	6021.60	6915.90	1.73	12.76	810.89	-89
14.696	2.116	-88	104.5	96.0	1152	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	48	0.12	0.25	125.00	13062.50	6084.00	6978.50	1.74	12.82	823.71	-90
14.696	2.116	-89	105.5	97.0	1164	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	48.5	0.11	0.25	125.00	13187.50	6146.40	7041.10	1.76	12.88	836.59	-91
14.696	2.116	-90	106.5	98.0	1176	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	49	0.10	0.25	125.00	13312.50	6208.80	7103.70	1.78	12.95	849.54	-92
14.696	2.116	-91	107.5	99.0	1188	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	49.5	0.10	0.25	125.00	13437.50	6271.20	7166.30	1.79	13.01	862.55	-93
14.696	2.116	-92	108.5	100.0	1200	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	50	0.09	0.25	125.00	13562.50	6333.60	7228.90	1.81	13.07	875.63	-94
14.696	2.116	-93	109.5	101.0	1212	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	50.5	0.08	0.25	125.00	13687.50	6396.00	7291.50	1.82	13.14	888.76	-95
14.696	2.116	-94	110.5	102.0	1224	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	51	0.08	0.25	125.00	13812.50	6458.40	7354.10	1.84	13.20	901.96	-96
14.696	2.116	-95	111.5	103.0	1236	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	51.5	0.07	0.25	125.00	13937.50	6520.80	7416.70	1.85	13.26	915.22	-97
14.696	2.116	-96	112.5	104.0	1248	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	52	0.07	0.25	125.00	14062.50	6583.20	7479.30	1.87	13.32	928.54	-98
14.696	2.116	-97	113.5	105.0	1260	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	52.5	0.06	0.25	125.00	14187.50	6645.60	7541.90	1.89	13.38	941.92	-99
14.696	2.116	-98	114.5	106.0	1272	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	53	0.05	0.25	125.00	14312.50	6708.00	7604.50	1.90	13.44	955.36	-100
14.696	2.116	-99	115.5	107.0	1284	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	53.5	0.05	0.25	125.00	14437.50	6770.40	7667.10	1.92	13.50	968.85	-101
14.696	2.116	-100	116.5	108.0	1296	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	54	0.04	0.25	125.00	14562.50	6832.80	7729.70	1.93	13.55	982.41	-102
14.696	2.116	-101	117.5	109.0	1308	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	54.5	0.03	0.25	125.00	14687.50	6895.20	7792.30	1.95	13.61	996.02	-103
14.696	2.116	-102	118.5	110.0	1320	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	55	0.03	0.25	125.00	14812.50	6957.60	7854.90	1.96	13.67	1009.69	-104
14.696	2.116	-103	119.5	111.0	1332	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	55.5	0.02	0.25	125.00	14937.50	7020.00	7917.50	1.98	13.72	1023.41	-105
14.696	2.116	-104	120.5	112.0	1344	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	56	0.02	0.25	125.00	15062.50	7082.40	7980.10	2.00	13.78	1037.19	-106
14.696	2.116	-105	121.5	113.0	1356	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	56.5	0.01	0.25	125.00	15187.50	7144.80	8042.70	2.01	13.83	1051.02	-107
14.696	2.116	-106	122.5	114.0	1368	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	57	0.00	0.25	125.00	15312.50	7207.20	8105.30	2.03	13.89	1064.91	-108
14.696	2.116	-107	123.5	115.0	1380	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	57.5	0.00	0.25	125.00	15437.50	7269.60	8167.90	2.04	13.94	1078.85	-109
14.696	2.116	-108	124.5	116.0	1392	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	58	-0.01	0.25	125.00	15562.50	7332.00	8230.50	2.06	14.00	1092.85	-110
14.696	2.116	-109	125.5	117.0	1404	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	58.5	-0.02	0.25	125.00	15687.50	7394.40	8293.10	2.07	14.05	1106.90	-111
14.696	2.116	-110	126.5	118.0	1416	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	59	-0.02	0.25	125.00	15812.50	7456.80	8355.70	2.09	14.10	1121.00	-112
14.696	2.116	-111	127.5	119.0	1428	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	59.5	-0.03	0.25	125.00	15937.50	7519.20	8418.30	2.10	14.15	1135.15	-113
14.696	2.116	-112	128.5	120.0	1440	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	60	-0.03	0.25	125.00	16062.50	7581.60	8480.90	2.12	14.20	1149.35	-114
14.696	2.116	-113	129.5	121.0	1452	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	60.5	-0.04	0.25	125.00	16187.50	7644.00	8543.50	2.14	14.25	1163.60	-115
14.696	2.116	-114	130.5	122.0	1464	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	61	-0.05	0.25	125.00	16312.50	7706.40	8606.10	2.15	14.30	1177.90	-116
14.696	2.116	-115	131.5	123.0	1476	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	61.5	-0.05	0.25	125.00	16437.50	7768.80	8668.70	2.17	14.35	1192.25	-117
14.696	2.116	-116	132.5	124.0	1488	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	62	-0.06	0.25	125.00	16562.50	7831.20	8731.30	2.18	14.40	1206.64	-118
14.696	2.116	-117	133.5	125.0	1500	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	62.5	-0.06	0.25	125.00	16687.50	7893.60	8793.90	2.20	14.44	1221.09	-119
14.696	2.116	-118	134.5	126.0	1512	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	63	-0.07	0.25	125.00	16812.50	7956.00	8856.50	2.21	14.49	1235.58	-120
14.696	2.116	-119	135.5	127.0	1524	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	63.5	-0.07	0.25	125.00	16937.50	8018.40	8919.10	2.23	14.54	1250.12	-121
14.696	2.116	-120	136.5	128.0	1536	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	64	-0.08	0.25	125.00	17062.50	8080.80	8981.70	2.25	14.58	1264.70	-122
14.696	2.116	-121	137.5	129.0	1548	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	64.5	-0.09	0.25	125.00	17187.50	8143.20	9044.30	2.26	14.63	1279.33	-123
14.696	2.116	-122	138.5	130.0	1560	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	65	-0.09	0.25	125.00	17312.50	8205.60	9106.90	2.28	14.67	1294.00	-124

23rd AVE. Bent 2

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	10.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-109.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	4.0	feet
	48	inches

										Cohesive Soil					Cohesionless Soil									
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	11	9.5	0.0	0	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.72	0.72	125.00	1187.50	0.00	1187.50	0.00	0.00	0.00	7
14.696	2.116	10	10.5	1.0	12	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.71	0.71	125.00	1312.50	31.20	1281.30	0.00	0.00	0.00	6
14.696	2.116	9	11.5	2.0	24	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.69	0.69	125.00	1437.50	93.60	1343.90	0.00	0.00	0.00	5
14.696	2.116	8	12.5	3.0	36	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.68	0.68	125.00	1562.50	156.00	1406.50	0.00	0.00	0.00	4
14.696	2.116	7	13.5	4.0	48	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.67	0.67	125.00	1687.50	218.40	1469.10	0.98	12.44	12.44	3
14.696	2.116	6	14.5	5.0	60	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.66	0.66	125.00	1812.50	280.80	1531.70	1.01	12.10	24.54	2
14.696	2.116	5	15.5	6.0	72	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.64	0.64	125.00	1937.50	343.20	1594.30	1.03	11.75	36.29	1
14.696	2.116	4	16.5	7.0	84	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.63	0.63	125.00	2062.50	405.60	1656.90	1.05	11.40	47.69	-1
14.696	2.116	3	17.5	8.0	96	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.62	0.62	125.00	2187.50	468.00	1719.50	1.07	11.06	58.75	-2
14.696	2.116	2	18.5	9.0	108	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.61	0.61	125.00	2312.50	530.40	1782.10	1.09	10.71	69.46	-3
14.696	2.116	1	19.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	592.80	1844.70	1.11	10.37	79.83	-4
14.696	2.116	-1	20.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	655.20	1907.30	1.13	10.37	90.20	-5
14.696	2.116	-2	21.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	717.60	1969.90	1.15	10.37	100.56	-6
14.696	2.116	-3	22.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	780.00	2032.50	1.16	10.37	110.93	-7
14.696	2.116	-4	23.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	842.40	2095.10	1.18	10.37	121.30	-8
14.696	2.116	-5	24.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	904.80	2157.70	1.19	10.37	131.66	-9
14.696	2.116	-6	25.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	967.20	2220.30	1.21	10.37	142.03	-10
14.696	2.116	-7	26.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1029.60	2282.90	1.22	10.37	152.40	-11
14.696	2.116	-8	27.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	1092.00	2345.50	1.24	10.37	162.77	-12
14.696	2.116	-9	28.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3562.50	1154.40	2408.10	1.25	10.37	173.13	-13
14.696	2.116	-10	29.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3687.50	1216.80	2470.70	1.26	10.37	183.50	-14
14.696	2.116	-11	30.5	21.0	252	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10.5	0.53	0.53	125.00	3812.50	1279.20	2533.30	1.34	10.58	194.08	-15
14.696	2.116	-12	31.5	22.0	264	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	11	0.54	0.54	125.00	3937.50	1341.60	2595.90	1.41	10.80	204.88	-16
14.696	2.116	-13	32.5	23.0	276	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	11.5	0.56	0.56	125.00	4062.50	1404.00	2658.50	1.49	11.02	215.90	-17
14.696	2.116	-14	33.5	24.0	288	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	12	0.57	0.57	125.00	4187.50	1466.40	2721.10	1.56	11.24	227.14	-18
14.696	2.116	-15	34.5	25.0	300	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	12.5	0.59	0.59	125.00	4312.50	1528.80	2783.70	1.64	11.46	238.60	-19
14.696	2.116	-16	35.5	26.0	312	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	13	0.60	0.60	125.00	4437.50	1591.20	2846.30	1.71	11.68	250.29	-20
14.696	2.116	-17	36.5	27.0	324	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	13.5	0.61	0.61	125.00	4562.50	1653.60	2908.90	1.79	11.90	262.19	-21
14.696	2.116	-18	37.5	28.0	336	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	14	0.63	0.63	125.00	4687.50	1716.00	2971.50	1.86	12.12	274.32	-22
14.696	2.116	-19	38.5	29.0	348	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	14.5	0.64	0.64	125.00	4812.50	1778.40	3034.10	1.94	12.34	286.66	-23
14.696	2.116	-20	39.5	30.0	360	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	15	0.65	0.65	125.00	4937.50	1840.80	3096.70	2.01	12.57	299.23	-24
14.696	2.116	-21	40.5	31.0	372	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	15.5	0.64	0.64	125.00	5062.50	1903.20	3159.30	2.02	12.79	312.01	-25
14.696	2.116	-22	41.5	32.0	384	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	16	0.63	0.63	125.00	5187.50	1965.60	3221.90	2.03	13.01	325.02	-26
14.696	2.116	-23	42.5	33.0	396	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	16.5	0.62	0.62	125.00	5312.50	2028.00	3284.50	2.03	13.23	338.25	-27
14.696	2.116	-24	43.5	34.0	408	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	17	0.61	0.61	125.00	5437.50	2090.40	3347.10	2.03	13.45	351.69	-28
14.696	2.116	-25	44.5	35.0	420	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	17.5	0.60	0.60	125.00	5562.50	2152.80	3409.70	2.04	13.67	365.36	-29
14.696	2.116	-26	45.5	36.0	432	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	18	0.59	0.59	125.00	5687.50	2215.20	3472.30	2.04	13.89	379.25	-30
14.696	2.116	-27	46.5	37.0	444	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	18.5	0.58	0.58	125.00	5812.50	2277.60	3534.90	2.04	14.11	393.36	-31
14.696	2.116	-28	47.5	38.0	456	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	19	0.57	0.57	125.00	5937.50	2340.00	3597.50	2.04	14.33	407.69	-32
14.696	2.116	-29	48.5	39.0	468	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	19.5	0.56	0.56	125.00	6062.50	2402.40	3660.10	2.04	14.55	422.24	-33
14.696	2.116	-30	49.5	40.0	480	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	20	0.55	0.55	125.00	6187.50	2464.80	3722.70	2.04	14.77	437.02	-34
14.696	2.116	-31	50.5	41.0	492	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	20.5	0.54	0.54	125.00	6312.50	2527.20	3785.30	2.04	14.99	452.01	-35
14.696	2.116	-32	51.5	42.0	504	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	21	0.53	0.53	125.00	6437.50	2589.60	3847.90	2.04	15.21	467.22	-36
14.696	2.116	-33	52.5	43.0	516	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	21.5	0.52	0.52	125.00	6562.50	2652.00	3910.50	2.03	15.43	482.66	-37
14.696	2.116	-34	53.5	44.0	528	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	22	0.51	0.51	125.00	6687.50	2714.40	3973.10	2.03	15.65	498.31	-38
14.696	2.116	-35	54.5	45.0	540	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	22.5	0.50	0.50	125.00	6812.50	2776.80	4035.70	2.02	15.88	514.19	-39
14.696	2.116	-36	55.5	46.0	552	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	23	0.49	0.49	125.00	6937.50	2839.20	4098.30	2.02	16.10	530.28	-40
14.696	2.116	-37	56.5	47.0	564	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	23.5	0.48	0.48	125.00	7062.50	2901.60	4160.90	2.01	16.32	546.60	-41
14.696	2.116	-38	57.5	48.0	576	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	24	0.47	0.47	125.00	7187.50	2964.00	4223.50	2.00	16.54	563.14	-42
14.696	2.116	-39	58.5	49.0	588	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	24.5	0.47	0.47	125.00	7312.50	3026.40	4286.10	1.99	16.76	579.89	-43
14.696	2.116	-40	59.5	50.0	600	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	25	0.46	0.46	125.00	7437.50	3088.80	4348.70	1.99	16.98	596.87	-44
14.696	2.116	-41	60.5	51.0	612	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	25.5	0.45	0.45	125.00	7562.50	3151.20	4411.30	1.98	17.20	614.07	-45
14.696	2.116	-42	61.5	52.0	624	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	26	0.44	0.44	125.00	7687.50	3213.60	4473.90	1.97	17.42	631.49	-46
14.696	2.116	-43	62.5	53.0	636	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	26.5	0.43	0.43	125.00	7812.50	3276.00	4536.50	1.95	17.64	649.13	-47
14.696	2.116	-44	63.5	54.0	648	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	27	0.42	0.42	125.00	7937.50	3338.40	4599.10	1.94	17.86	666.99	-48
14.696	2.116	-45	64.5	55.0	660	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	27.5	0.41	0.41	125.00	8062.50	3400.80	4661.70	1.93	18.08	685.07	-49
14.696	2.116	-46	65.5	56.0	672	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	28	0.41	0.41	125.00	8187.50	3463.20	4724.30	1.91	18.30	703.38	-50
14.696	2.116	-47	66.5	57.0	684	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	28.5	0.40	0.40	125.00	8312.50	3525.60	4786.90	1.90	18.52	721.90	-51
14.696	2.116	-48	67.5	58.0	696	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	29	0.39	0.39	125.00	8437.50	3588.00	4849.50	1.89	18.74	740.64	-52
14.696	2.116	-49	68.5	59.0	708	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	29.5	0.38	0.38	125.00	8562.50	3650.40	4912.10	1.87	18.96	759.61	-53
14.696	2.116	-50	69.5	60.0	720	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	30	0.37	0.37	125.00	8687.50	3712.80	4974.70	1.85	19.19	778.79	-54
14.696	2.116	-51	70.5	61.0	732	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	30.5	0.36	0.36	125.00	8812.50	3775.20	5037.30	1.84	19.41	798.20	-55
14.696	2.116	-52	71.5	62.0	744	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	31	0.36	0.36	125.00	8937.50	3837.60	5099.90	1.82	19.63	817.83	-56
14.696	2.116	-53	72.5	63.0	756	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	31.5	0.35	0.35	125.00	9062.50	3900.00	5162.50	1.80	19.85	837.67	-57
14.696	2.116	-54	73.5	64.0	768	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	32	0.34	0.34	125.00	9187.50	3962.40	5225.10	1.78	20.07	857.74	-58
14.696	2.116	-55	74.5	65.0	780	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	32.5	0.33	0.33	125.00	9312.50	4024.80	5287.70	1.76	20.29	878.03	-59
14.696	2.116	-56	75.5	66.0	792	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	33	0.32	0.32	125.00	9437.50	4087.20	5350.30	1.74	20.51	898.54	-60
14.696	2.116	-57	76.5	67.0	804	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	33.5	0.32	0.32	125.00	9562.50	4149.60	5412.90	1.72	20.73	919.27	-61
14.696	2.116	-58	77.5	68.0	816	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	34	0.31	0.31	125.00	9687.50	4212.00	5475.50	1.69	20.95	940.22	-62
14.696	2.116	-59	78.5	69.0	828	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	34.5	0.30	0.30	125.00	9812.50	4274.40	5538.10	1.67	21.17	961.39	-63
14.696	2.116	-60	79.5	70.0	840	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	35	0.29	0.29	125.00	9937.50	4336.80	5600.70	1.65	21.39	982.78	-64
14.696	2.116	-61	80.5	71.0	852	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	35.5	0.29	0.29	125.00	10062.50	4399.20	5663.30	1.62	21.61	1004.39	-65
14.696	2.116	-62	81.5	72.0	864	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	36	0.28	0.28	125.00	10187.50	4461.60	5725.90	1.60	21.83	1026.23	-66
14.696	2.116	-63	82.5	73.0	876	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	36.5	0.27	0.27	125.00	10312.50	4524.00	5788.50	1.57	22.02	1048.25	-67
14.696	2.116	-64	83.5	74.0	888	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	37	0.26	0.26	125.00	10437.50	4586.40	5851.10	1.54	22.18	1070.43	-68
14.696	2.116	-65	84.5	75.0	900	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	37.5	0.26	0.26	125.00	10562.50	4648.80	5913.70	1.52	22.34	1092.77	-69
14.696	2.116	-66	85.5	76.0	912	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	38	0.25	0.25	125.00	10687.50	4711.20	5976.30	1.49	22.50	1115.27	-70
14.696	2.116	-67	86.5	77.0	924	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	38.5	0.24	0.25	125.00	10812.50	4773.60	6038.90	1.51	22.65	1137.92	-71
14.696	2.116	-68	87.5	78.0	936	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	39	0.23	0.25	125.00	10937.50	4836.00	6101.50	1.53	22.81	1160.73	-72
14.696	2.116	-69	88.5	79.0	948	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	39.5	0.23	0.25	125.00	11062.50	4898.40	6164.10	1.54	22.96	1183.69	-73
14.696	2.116	-70	89.5	80.0	960	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	40	0.22	0.25	125.00	11187.50	4960.80	6226.70	1.56	23.11	1206.80	-74
14.696	2.116	-71	90.5	81.0	972	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	40.5	0.21	0.25	125.00	11312.50	5023.20	6289.30	1.57	23.26	1230.06	-75
14.696	2.116	-72	91.5	82.0	984	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	41	0.21	0.25	125.00	11437.50	5085.60	6351.90	1.59	23.41	1253.47	-76
14.696	2.116	-73	92.5	83.0	996	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	41.5	0.20	0.25	125.00	11562.50	5148.00	6414.50	1.60	23.56	1277.03	-77
14.696	2.116	-74	93.5	84.0	1008	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	42	0.19	0.25	125.00	11687.50	5210.40	6477.10	1.62	23.71	1300.74	-78
14.696	2.116	-75	94.5	85.0	1020	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	42.5	0.19	0.25	125.00	11812.50	5272.80	6539.70	1.63	23.85	1324.59	-79
14.696	2.116	-76	95.5	86.0	1032	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	43	0.18	0.25	125.00	11937.50	5335.20	6602.30	1.65	24.00	1348.59	-80
14.696	2.116	-77	96.5	87.0	1044	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	43.5	0.17	0.25	125.00	12062.50	5397.60	6664.90	1.67	24.14	1372.73	-81
14.696	2.116	-78	97.5	88.0	1056	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	44	0.16	0.25	125.00	12187.50	5460.00	6727.50	1.68	24.28	1397.02	-82
14.696	2.116	-79	98.5	89.0	1068	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	44.5	0.16	0.25	125.00	12312.50	5522.40	6790.10	1.70	24.43	1421.44	-83
14.696	2.116	-80	99.5	90.0	1080	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	45	0.15	0.25	125.00	12437.50	5584.80	6852.70	1.71	24.56	1446.01	-84
14.696	2.116	-81	100.5	91.0	1092	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	45.5	0.14	0.25	125.00	12562.50	5647.20	6915.30	1.73	24.70	1470.71	-85
14.696	2.116	-82	101.5	92.0	1104	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	46	0.14	0.25	125.00	12687.50	5709.60	6977.90	1.74	24.84	1495.55	-86
14.696	2.116	-83	102.5	93.0	1116	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	46.5	0.13	0.25	125.00	12812.50	5772.00	7040.50	1.76	24.98	1520.53	-87
14.696	2.116	-84	103.5	94.0	1128	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	47	0.12	0.25	125.00	12937.50	5834.40	7103.10	1.78	25.11	1545.64	-88
14.696	2.116	-85	104.5	95.0	1140	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	47.5	0.12	0.25	125.00	13062.50	5896.80	7165.70	1.79	25.25	1570.89	-89
14.696	2.116	-86	105.5	96.0	1152	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	48	0.11	0.25	125.00	13187.50	5959.20	7228.30	1.81	25.38	1596.27	-90
14.696	2.116	-87	106.5	97.0	1164	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	48.5	0.10	0.25	125.00	13312.50	6021.60	7290.90	1.82	25.51	1621.78	-91
14.696	2.116	-88	107.5	98.0	1176	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	49	0.10	0.25	125.00	13437.50	6084.00	7353.50	1.84	25.64	1647.42	-92
14.696	2.116	-89	108.5	99.0	1188	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	49.5	0.09	0.25	125.00	13562.50	6146.40	7416.10	1.85	25.77	1673.19	-93
14.696	2.116	-90	109.5	100.0	1200	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	50	0.08	0.25	125.00	13687.50	6208.80	7478.70	1.87	25.90	1699.08	-94
14.696	2.116	-91	110.5	101.0	1212	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	50.5	0.08	0.25	125.00	13812.50	6271.20	7541.30	1.89	26.02	1725.11	-95
14.696	2.116	-92	111.5	102.0	1224	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	51	0.07	0.25	125.00	13937.50	6333.60	7603.90	1.90	26.15	1751.26	-96
14.696	2.116	-93	112.5	103.0	1236	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	51.5	0.07	0.25	125.00	14062.50	6396.00	7666.50	1.92	26.27	1777.53	-97
14.696	2.116	-94	113.5	104.0	1248	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	52	0.06	0.25	125.00	14187.50	6458.40	7729.10	1.93	26.40	1803.92	-98
14.696	2.116	-95	114.5	105.0	1260	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	52.5	0.05	0.25	125.00	14312.50	6520.80	7791.70	1.95	26.52	1830.44	-99
14.696	2.116	-96	115.5	106.0	1272	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	53	0.05	0.25	125.00	14437.50	6583.20	7854.30	1.96	26.64	1857.08	-100
14.696	2.116	-97	116.5	107.0	1284	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	53.5	0.04	0.25	125.00	14562.50	6645.60	7916.90	1.98	26.76	1883.84	-101
14.696	2.116	-98	117.5	108.0	1296	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	54	0.03	0.25	125.00	14687.50	6708.00	7979.50	1.99	26.88	1910.71	-102
14.696	2.116	-99	118.5	109.0	1308	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	54.5	0.03	0.25	125.00	14812.50	6770.40	8042.10	2.01	26.99	1937.71	-103
14.696	2.116	-100	119.5	110.0	1320	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	55	0.02	0.25	125.00	14937.50	6832.80	8104.70	2.03	27.11	1964.81	-104
14.696	2.116	-101	120.5	111.0	1332	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	55.5	0.02	0.25	125.00	15062.50	6895.20	8167.30	2.04	27.22	1992.04	-105
14.696	2.116	-102	121.5	112.0	1344	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	56	0.01	0.25	125.00	15187.50	6957.60	8229.90	2.06	27.34	2019.37	-106
14.696	2.116	-103	122.5	113.0	1356	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	56.5	0.00	0.25	125.00	15312.50	7020.00	8292.50	2.07	27.45	2046.82	-107
14.696	2.116	-104	123.5	114.0	1368	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	57	0.00	0.25	125.00	15437.50	7082.40	8355.10	2.09	27.56	2074.38	-108
14.696	2.116	-105	124.5	115.0	1380	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	57.5	-0.01	0.25	125.00	15562.50	7144.80	8417.70	2.10	27.67	2102.05	-109
14.696	2.116	-106	125.5	116.0	1392	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	58	-0.02	0.25	125.00	15687.50	7207.20	8480.30	2.12	27.78	2129.83	-110
14.696	2.116	-107	126.5	117.0	1404	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	58.5	-0.02	0.25	125.00	15812.50	7269.60	8542.90	2.14	27.88	2157.71	-111
14.696	2.116	-108	127.5	118.0	1416	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	59	-0.03	0.25	125.00	15937.50	7332.00	8605.50	2.15	27.99	2185.70	-112
14.696	2.116	-109	128.5	119.0	1428	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	59.5	-0.03	0.25	125.00	16062.50	7394.40	8668.10	2.17	28.09	2213.79	-113
14.696	2.116	-110	129.5	120.0	1440	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	60	-0.04	0.25	125.00	16187.50	7456.80	8730.70	2.18	28.20	2241.99	-114
14.696	2.116	-111	130.5	121.0	1452	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	60.5	-0.05	0.25	125.00	16312.50	7519.20	8793.30	2.20	28.30	2270.29	-115
14.696	2.116	-112	131.5	122.0	1464	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	61	-0.05	0.25	125.00	16437.50	7581.60	8855.90	2.21	28.40	2298.70	-116
14.696	2.116	-113	132.5	123.0	1476	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	61.5	-0.06	0.25	125.00	16562.50	7644.00	8918.50	2.23	28.50	2327.20	-117
14.696	2.116	-114	133.5	124.0	1488	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	62	-0.06	0.25	125.00	16687.50	7706.40	8981.10	2.25	28.60	2355.80	-118
14.696	2.116	-115	134.5	125.0	1500	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	62.5	-0.07	0.25	125.00	16812.50	7768.80	9043.70	2.26	28.70	2384.50	-119
14.696	2.116	-116	135.5	126.0	1512	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	63	-0.07	0.25	125.00	16937.50	7831.20	9106.30	2.28	28.79	2413.29	-120
14.696	2.116	-117	136.5	127.0	1524	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	63.5	-0.08	0.25	125.00	17062.50	7893.60	9168.90	2.29	28.89	2442.18	-121
14.696	2.116	-118	137.5	128.0	1536	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	64	-0.09	0.25	125.00	17187.50	7956.00	9231.50	2.31	28.98	2471.16	-122
14.696	2.116	-119	138.5	129.0	1548	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	64.5	-0.09	0.25	125.00	17312.50	8018.40	9294.10	2.32	29.08	2500.24	-123
14.696	2.116	-120	139.5	130.0	1560	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	65	-0.10	0.25	125.00	17437.50	8080.80	9356.70	2.34	29.17	2529.41	-124

23rd AVE. Bent 3

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	8.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-111.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 4.0 feet
48 inches

											Cohesive Soil						Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	9	11.5	0.0	0	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.69	0.69	125.00	1437.50	93.60	1343.90	0.00	0.00	0.00	5
14.696	2.116	8	12.5	1.0	12	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.68	0.68	125.00	1562.50	156.00	1406.50	0.00	0.00	0.00	4
14.696	2.116	7	13.5	2.0	24	1.80	12.50	0.851	0	0.55	0.00	0.000	0.00	10	0.67	0.67	125.00	1687.50	218.40	1469.10	0.00	0.00	0.00	3
14.696	2.116	6	14.5	3.0	36	1.75	12.15	0.827	0	0.55	0.00	0.000	0.00	10	0.66	0.66	125.00	1812.50	280.80	1531.70	0.00	0.00	0.00	2
14.696	2.116	5	15.5	4.0	48	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.64	0.64	125.00	1937.50	343.20	1594.30	1.03	11.75	11.75	1
14.696	2.116	4	16.5	5.0	60	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.63	0.63	125.00	2062.50	405.60	1656.90	1.05	11.40	23.15	-1
14.696	2.116	3	17.5	6.0	72	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.62	0.62	125.00	2187.50	468.00	1719.50	1.07	11.06	34.21	-2
14.696	2.116	2	18.5	7.0	84	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.61	0.61	125.00	2312.50	530.40	1782.10	1.09	10.71	44.92	-3
14.696	2.116	1	19.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	592.80	1844.70	1.11	10.37	55.29	-4
14.696	2.116	-1	20.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	655.20	1907.30	1.13	10.37	65.66	-5
14.696	2.116	-2	21.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	717.60	1969.90	1.15	10.37	76.03	-6
14.696	2.116	-3	22.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	780.00	2032.50	1.16	10.37	86.39	-7
14.696	2.116	-4	23.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	842.40	2095.10	1.18	10.37	96.76	-8
14.696	2.116	-5	24.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	904.80	2157.70	1.19	10.37	107.13	-9
14.696	2.116	-6	25.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	967.20	2220.30	1.21	10.37	117.50	-10
14.696	2.116	-7	26.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1029.60	2282.90	1.22	10.37	127.86	-11
14.696	2.116	-8	27.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	1092.00	2345.50	1.24	10.37	138.23	-12
14.696	2.116	-9	28.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3562.50	1154.40	2408.10	1.25	10.37	148.60	-13
14.696	2.116	-10	29.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3687.50	1216.80	2470.70	1.26	10.37	158.96	-14
14.696	2.116	-11	30.5	19.0	228	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.50	0.50	125.00	3812.50	1279.20	2533.30	1.27	10.58	169.54	-15
14.696	2.116	-12	31.5	20.0	240	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.49	0.49	125.00	3937.50	1341.60	2595.90	1.28	10.80	180.34	-16
14.696	2.116	-13	32.5	21.0	252	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10.5	0.51	0.51	125.00	4062.50	1404.00	2658.50	1.36	11.02	191.37	-17
14.696	2.116	-14	33.5	22.0	264	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	11	0.53	0.53	125.00	4187.50	1466.40	2721.10	1.43	11.24	202.61	-18
14.696	2.116	-15	34.5	23.0	276	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	11.5	0.54	0.54	125.00	4312.50	1528.80	2783.70	1.51	11.46	214.07	-19
14.696	2.116	-16	35.5	24.0	288	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	12	0.56	0.56	125.00	4437.50	1591.20	2846.30	1.58	11.68	225.75	-20
14.696	2.116	-17	36.5	25.0	300	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	12.5	0.57	0.57	125.00	4562.50	1653.60	2908.90	1.66	11.90	237.66	-21
14.696	2.116	-18	37.5	26.0	312	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	13	0.58	0.58	125.00	4687.50	1716.00	2971.50	1.73	12.12	249.78	-22
14.696	2.116	-19	38.5	27.0	324	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	13.5	0.59	0.59	125.00	4812.50	1778.40	3034.10	1.80	12.34	262.12	-23
14.696	2.116	-20	39.5	28.0	336	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	14	0.61	0.61	125.00	4937.50	1840.80	3096.70	1.88	12.57	274.69	-24
14.696	2.116	-21	40.5	29.0	348	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	14.5	0.62	0.62	125.00	5062.50	1903.20	3159.30	1.95	12.79	287.48	-25
14.696	2.116	-22	41.5	30.0	360	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	15	0.63	0.63	125.00	5187.50	1965.60	3221.90	2.03	13.01	300.48	-26
14.696	2.116	-23	42.5	31.0	372	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	15.5	0.62	0.62	125.00	5312.50	2028.00	3284.50	2.03	13.23	313.71	-27
14.696	2.116	-24	43.5	32.0	384	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	16	0.61	0.61	125.00	5437.50	2090.40	3347.10	2.03	13.45	327.16	-28
14.696	2.116	-25	44.5	33.0	396	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	16.5	0.60	0.60	125.00	5562.50	2152.80	3409.70	2.04	13.67	340.83	-29
14.696	2.116	-26	45.5	34.0	408	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	17	0.59	0.59	125.00	5687.50	2215.20	3472.30	2.04	13.89	354.72	-30
14.696	2.116	-27	46.5	35.0	420	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	17.5	0.58	0.58	125.00	5812.50	2277.60	3534.90	2.04	14.11	368.83	-31
14.696	2.116	-28	47.5	36.0	432	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	18	0.57	0.57	125.00	5937.50	2340.00	3597.50	2.04	14.33	383.16	-32
14.696	2.116	-29	48.5	37.0	444	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	18.5	0.56	0.56	125.00	6062.50	2402.40	3660.10	2.04	14.55	397.71	-33
14.696	2.116	-30	49.5	38.0	456	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	19	0.55	0.55	125.00	6187.50	2464.80	3722.70	2.04	14.77	412.48	-34
14.696	2.116	-31	50.5	39.0	468	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	19.5	0.54	0.54	125.00	6312.50	2527.20	3785.30	2.04	14.99	427.47	-35
14.696	2.116	-32	51.5	40.0	480	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	20	0.53	0.53	125.00	6437.50	2589.60	3847.90	2.04	15.21	442.69	-36
14.696	2.116	-33	52.5	41.0	492	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	20.5	0.52	0.52	125.00	6562.50	2652.00	3910.50	2.03	15.43	458.12	-37
14.696	2.116	-34	53.5	42.0	504	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	21	0.51	0.51	125.00	6687.50	2714.40	3973.10	2.03	15.65	473.77	-38
14.696	2.116	-35	54.5	43.0	516	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	21.5	0.50	0.50	125.00	6812.50	2776.80	4035.70	2.02	15.88	489.65	-39
14.696	2.116	-36	55.5	44.0	528	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	22	0.49	0.49	125.00	6937.50	2839.20	4098.30	2.02	16.10	505.75	-40
14.696	2.116	-37	56.5	45.0	540	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	22.5	0.48	0.48	125.00	7062.50	2901.60	4160.90	2.01	16.32	522.06	-41
14.696	2.116	-38	57.5	46.0	552	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	23	0.47	0.47	125.00	7187.50	2964.00	4223.50	2.00	16.54	538.60	-42
14.696	2.116	-39	58.5	47.0	564	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	23.5	0.47	0.47	125.00	7312.50	3026.40	4286.10	1.99	16.76	555.36	-43
14.696	2.116	-40	59.5	48.0	576	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	24	0.46	0.46	125.00	7437.50	3088.80	4348.70	1.99	16.98	572.34	-44
14.696	2.116	-41	60.5	49.0	588	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	24.5	0.45	0.45	125.00	7562.50	3151.20	4411.30	1.98	17.20	589.54	-45
14.696	2.116	-42	61.5	50.0	600	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	25	0.44	0.44	125.00	7687.50	3213.60	4473.90	1.97	17.42	606.96	-46
14.696	2.116	-43	62.5	51.0	612	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	25.5	0.43	0.43	125.00	7812.50	3276.00	4536.50	1.95	17.64	624.60	-47
14.696	2.116	-44	63.5	52.0	624	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	26	0.42	0.42	125.00	7937.50	3338.40	4599.10	1.94	17.86	642.46	-48
14.696	2.116	-45	64.5	53.0	636	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	26.5	0.41	0.41	125.00	8062.50	3400.80	4661.70	1.93	18.08	660.54	-49
14.696	2.116	-46	65.5	54.0	648	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	27	0.41	0.41	125.00	8187.50	3463.20	4724.30	1.91	18.30	678.84	-50
14.696	2.116	-47	66.5	55.0	660	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	27.5	0.40	0.40	125.00	8312.50	3525.60	4786.90	1.90	18.52	697.36	-51
14.696	2.116	-48	67.5	56.0	672	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	28	0.39	0.39	125.00	8437.50	3588.00	4849.50	1.89	18.74	716.11	-52
14.696	2.116	-49	68.5	57.0	684	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	28.5	0.38	0.38	125.00	8562.50	3650.40	4912.10	1.87	18.96	735.07	-53
14.696	2.116	-50	69.5	58.0	696	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	29	0.37	0.37	125.00	8687.50	3712.80	4974.70	1.85	19.19	754.26	-54
14.696	2.116	-51	70.5	59.0	708	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	29.5	0.36	0.36	125.00	8812.50	3775.20	5037.30	1.84	19.41	773.66	-55
14.696	2.116	-52	71.5	60.0	720	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	30	0.36	0.36	125.00	8937.50	3837.60	5099.90	1.82	19.63	793.29	-56
14.696	2.116	-53	72.5	61.0	732	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	30.5	0.35	0.35	125.00	9062.50	3900.00	5162.50	1.80	19.85	813.14	-57
14.696	2.116	-54	73.5	62.0	744	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	31	0.34	0.34	125.00	9187.50	3962.40	5225.10	1.78	20.07	833.21	-58
14.696	2.116	-55	74.5	63.0	756	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	31.5	0.33	0.33	125.00	9312.50	4024.80	5287.70	1.76	20.29	853.49	-59
14.696	2.116	-56	75.5	64.0	768	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	32	0.32	0.32	125.00	9437.50	4087.20	5350.30	1.74	20.51	874.00	-60
14.696	2.116	-57	76.5	65.0	780	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	32.5	0.32	0.32	125.00	9562.50	4149.60	5412.90	1.72	20.73	894.73	-61
14.696	2.116	-58	77.5	66.0	792	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	33	0.31	0.31	125.00	9687.50	4212.00	5475.50	1.69	20.95	915.68	-62
14.696	2.116	-59	78.5	67.0	804	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	33.5	0.30	0.30	125.00	9812.50	4274.40	5538.10	1.67	21.17	936.85	-63
14.696	2.116	-60	79.5	68.0	816	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	34	0.29	0.29	125.00	9937.50	4336.80	5600.70	1.65	21.39	958.25	-64
14.696	2.116	-61	80.5	69.0	828	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	34.5	0.29	0.29	125.00	10062.50	4399.20	5663.30	1.62	21.61	979.86	-65
14.696	2.116	-62	81.5	70.0	840	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	35	0.28	0.28	125.00	10187.50	4461.60	5725.90	1.60	21.83	1001.69	-66
14.696	2.116	-63	82.5	71.0	852	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	35.5	0.27	0.27	125.00	10312.50	4524.00	5788.50	1.57	22.02	1023.71	-67
14.696	2.116	-64	83.5	72.0	864	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	36	0.26	0.26	125.00	10437.50	4586.40	5851.10	1.54	22.18	1045.90	-68
14.696	2.116	-65	84.5	73.0	876	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	36.5	0.26	0.26	125.00	10562.50	4648.80	5913.70	1.52	22.34	1068.23	-69
14.696	2.116	-66	85.5	74.0	888	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	37	0.25	0.25	125.00	10687.50	4711.20	5976.30	1.49	22.50	1090.73	-70
14.696	2.116	-67	86.5	75.0	900	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	37.5	0.24	0.25	125.00	10812.50	4773.60	6038.90	1.51	22.65	1113.38	-71
14.696	2.116	-68	87.5	76.0	912	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	38	0.23	0.25	125.00	10937.50	4836.00	6101.50	1.53	22.81	1136.19	-72
14.696	2.116	-69	88.5	77.0	924	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	38.5	0.23	0.25	125.00	11062.50	4898.40	6164.10	1.54	22.96	1159.15	-73
14.696	2.116	-70	89.5	78.0	936	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	39	0.22	0.25	125.00	11187.50	4960.80	6226.70	1.56	23.11	1182.26	-74
14.696	2.116	-71	90.5	79.0	948	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	39.5	0.21	0.25	125.00	11312.50	5023.20	6289.30	1.57	23.26	1205.52	-75
14.696	2.116	-72	91.5	80.0	960	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	40	0.21	0.25	125.00	11437.50	5085.60	6351.90	1.59	23.41	1228.94	-76
14.696	2.116	-73	92.5	81.0	972	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	40.5	0.20	0.25	125.00	11562.50	5148.00	6414.50	1.60	23.56	1252.50	-77
14.696	2.116	-74	93.5	82.0	984	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	41	0.19	0.25	125.00	11687.50	5210.40	6477.10	1.62	23.71	1276.20	-78
14.696	2.116	-75	94.5	83.0	996	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	41.5	0.19	0.25	125.00	11812.50	5272.80	6539.70	1.63	23.85	1300.06	-79
14.696	2.116	-76	95.5	84.0	1008	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	42	0.18	0.25	125.00	11937.50	5335.20	6602.30	1.65	24.00	1324.05	-80
14.696	2.116	-77	96.5	85.0	1020	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	42.5	0.17	0.25	125.00	12062.50	5397.60	6664.90	1.67	24.14	1348.20	-81
14.696	2.116	-78	97.5	86.0	1032	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	43	0.16	0.25	125.00	12187.50	5460.00	6727.50	1.68	24.28	1372.48	-82
14.696	2.116	-79	98.5	87.0	1044	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	43.5	0.16	0.25	125.00	12312.50	5522.40	6790.10	1.70	24.43	1396.91	-83
14.696	2.116	-80	99.5	88.0	1056	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	44	0.15	0.25	125.00	12437.50	5584.80	6852.70	1.71	24.56	1421.47	-84
14.696	2.116	-81	100.5	89.0	1068	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	44.5	0.14	0.25	125.00	12562.50	5647.20	6915.30	1.73	24.70	1446.17	-85
14.696	2.116	-82	101.5	90.0	1080	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	45	0.14	0.25	125.00	12687.50	5709.60	6977.90	1.74	24.84	1471.02	-86
14.696	2.116	-83	102.5	91.0	1092	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	45.5	0.13	0.25	125.00	12812.50	5772.00	7040.50	1.76	24.98	1495.99	-87
14.696	2.116	-84	103.5	92.0	1104	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	46	0.12	0.25	125.00	12937.50	5834.40	7103.10	1.78	25.11	1521.10	-88
14.696	2.116	-85	104.5	93.0	1116	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	46.5	0.12	0.25	125.00	13062.50	5896.80	7165.70	1.79	25.25	1546.35	-89
14.696	2.116	-86	105.5	94.0	1128	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	47	0.11	0.25	125.00	13187.50	5959.20	7228.30	1.81	25.38	1571.73	-90
14.696	2.116	-87	106.5	95.0	1140	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	47.5	0.10	0.25	125.00	13312.50	6021.60	7290.90	1.82	25.51	1597.24	-91
14.696	2.116	-88	107.5	96.0	1152	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	48	0.10	0.25	125.00	13437.50	6084.00	7353.50	1.84	25.64	1622.88	-92
14.696	2.116	-89	108.5	97.0	1164	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	48.5	0.09	0.25	125.00	13562.50	6146.40	7416.10	1.85	25.77	1648.65	-93
14.696	2.116	-90	109.5	98.0	1176	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	49	0.08	0.25	125.00	13687.50	6208.80	7478.70	1.87	25.90	1674.55	-94
14.696	2.116	-91	110.5	99.0	1188	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	49.5	0.08	0.25	125.00	13812.50	6271.20	7541.30	1.89	26.02	1700.57	-95
14.696	2.116	-92	111.5	100.0	1200	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	50	0.07	0.25	125.00	13937.50	6333.60	7603.90	1.90	26.15	1726.72	-96
14.696	2.116	-93	112.5	101.0	1212	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	50.5	0.07	0.25	125.00	14062.50	6396.00	7666.50	1.92	26.27	1752.99	-97
14.696	2.116	-94	113.5	102.0	1224	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	51	0.06	0.25	125.00	14187.50	6458.40	7729.10	1.93	26.40	1779.39	-98
14.696	2.116	-95	114.5	103.0	1236	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	51.5	0.05	0.25	125.00	14312.50	6520.80	7791.70	1.95	26.52	1805.91	-99
14.696	2.116	-96	115.5	104.0	1248	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	52	0.05	0.25	125.00	14437.50	6583.20	7854.30	1.96	26.64	1832.54	-100
14.696	2.116	-97	116.5	105.0	1260	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	52.5	0.04	0.25	125.00	14562.50	6645.60	7916.90	1.98	26.76	1859.30	-101
14.696	2.116	-98	117.5	106.0	1272	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	53	0.03	0.25	125.00	14687.50	6708.00	7979.50	1.99	26.88	1886.18	-102
14.696	2.116	-99	118.5	107.0	1284	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	53.5	0.03	0.25	125.00	14812.50	6770.40	8042.10	2.01	26.99	1913.17	-103
14.696	2.116	-100	119.5	108.0	1296	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	54	0.02	0.25	125.00	14937.50	6832.80	8104.70	2.03	27.11	1940.28	-104
14.696	2.116	-101	120.5	109.0	1308	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	54.5	0.02	0.25	125.00	15062.50	6895.20	8167.30	2.04	27.22	1967.50	-105
14.696	2.116	-102	121.5	110.0	1320	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	55	0.01	0.25	125.00	15187.50	6957.60	8229.90	2.06	27.34	1994.84	-106
14.696	2.116	-103	122.5	111.0	1332	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	55.5	0.00	0.25	125.00	15312.50	7020.00	8292.50	2.07	27.45	2022.29	-107
14.696	2.116	-104	123.5	112.0	1344	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	56	0.00	0.25	125.00	15437.50	7082.40	8355.10	2.09	27.56	2049.84	-108
14.696	2.116	-105	124.5	113.0	1356	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	56.5	-0.01	0.25	125.00	15562.50	7144.80	8417.70	2.10	27.67	2077.51	-109
14.696	2.116	-106	125.5	114.0	1368	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	57	-0.02	0.25	125.00	15687.50	7207.20	8480.30	2.12	27.78	2105.29	-110
14.696	2.116	-107	126.5	115.0	1380	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	57.5	-0.02	0.25	125.00	15812.50	7269.60	8542.90	2.14	27.88	2133.17	-111
14.696	2.116	-108	127.5	116.0	1392	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	58	-0.03	0.25	125.00	15937.50	7332.00	8605.50	2.15	27.99	2161.16	-112
14.696	2.116	-109	128.5	117.0	1404	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	58.5	-0.03	0.25	125.00	16062.50	7394.40	8668.10	2.17	28.09	2189.26	-113
14.696	2.116	-110	129.5	118.0	1416	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	59	-0.04	0.25	125.00	16187.50	7456.80	8730.70	2.18	28.20	2217.46	-114
14.696	2.116	-111	130.5	119.0	1428	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	59.5	-0.05	0.25	125.00	16312.50	7519.20	8793.30	2.20	28.30	2245.76	-115
14.696	2.116	-112	131.5	120.0	1440	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	60	-0.05	0.25	125.00	16437.50	7581.60	8855.90	2.21	28.40	2274.16	-116
14.696	2.116	-113	132.5	121.0	1452	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	60.5	-0.06	0.25	125.00	16562.50	7644.00	8918.50	2.23	28.50	2302.66	-117
14.696	2.116	-114	133.5	122.0	1464	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	61	-0.06	0.25	125.00	16687.50	7706.40	8981.10	2.25	28.60	2331.26	-118
14.696	2.116	-115	134.5	123.0	1476	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	61.5	-0.07	0.25	125.00	16812.50	7768.80	9043.70	2.26	28.70	2359.96	-119
14.696	2.116	-116	135.5	124.0	1488	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	62	-0.07	0.25	125.00	16937.50	7831.20	9106.30	2.28	28.79	2388.75	-120
14.696	2.116	-117	136.5	125.0	1500	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	62.5	-0.08	0.25	125.00	17062.50	7893.60	9168.90	2.29	28.89	2417.64	-121
14.696	2.116	-118	137.5	126.0	1512	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	63	-0.09	0.25	125.00	17187.50	7956.00	9231.50	2.31	28.98	2446.63	-122
14.696	2.116	-119	138.5	127.0	1524	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	63.5	-0.09	0.25	125.00	17312.50	8018.40	9294.10	2.32	29.08	2475.70	-123
14.696	2.116	-120	139.5	128.0	1536	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	64	-0.10	0.25	125.00	17437.50	8080.80	9356.70	2.34	29.17	2504.87	-124
14.696	2.116	-121	140.5	129.0	1548	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	64.5	-0.10	0.25	125.00	17562.50	8143.20	9419.30	2.35	29.26	2534.13	-125
14.696	2.116	-122	141.5	130.0	1560	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	65	-0.11	0.25	125.00	17687.50	8205.60	9481.90	2.37	29.35	2563.47	-126

23rd AVE. Bent 4

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	6.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-113.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 4.0 feet
48 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	7	13.5	0.0	0	1.80	12.50	0.851	0	0.55	0.00	0.000	0.00	10	0.67	0.67	125.00	1687.50	218.40	1469.10	0.00	0.00	0.00	3
14.696	2.116	6	14.5	1.0	12	1.75	12.15	0.827	0	0.55	0.00	0.000	0.00	10	0.66	0.66	125.00	1812.50	280.80	1531.70	0.00	0.00	0.00	2
14.696	2.116	5	15.5	2.0	24	1.70	11.81	0.803	0	0.55	0.00	0.000	0.00	10	0.64	0.64	125.00	1937.50	343.20	1594.30	0.00	0.00	0.00	1
14.696	2.116	4	16.5	3.0	36	1.65	11.46	0.780	0	0.55	0.00	0.000	0.00	10	0.63	0.63	125.00	2062.50	405.60	1656.90	0.00	0.00	0.00	-1
14.696	2.116	3	17.5	4.0	48	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.62	0.62	125.00	2187.50	468.00	1719.50	1.07	11.06	11.06	-2
14.696	2.116	2	18.5	5.0	60	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.61	0.61	125.00	2312.50	530.40	1782.10	1.09	10.71	21.77	-3
14.696	2.116	1	19.5	6.0	72	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	592.80	1844.70	1.11	10.37	32.14	-4
14.696	2.116	-1	20.5	7.0	84	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	655.20	1907.30	1.13	10.37	42.51	-5
14.696	2.116	-2	21.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	717.60	1969.90	1.15	10.37	52.87	-6
14.696	2.116	-3	22.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	780.00	2032.50	1.16	10.37	63.24	-7
14.696	2.116	-4	23.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	842.40	2095.10	1.18	10.37	73.61	-8
14.696	2.116	-5	24.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	904.80	2157.70	1.19	10.37	83.97	-9
14.696	2.116	-6	25.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	967.20	2220.30	1.21	10.37	94.34	-10
14.696	2.116	-7	26.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1029.60	2282.90	1.22	10.37	104.71	-11
14.696	2.116	-8	27.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	1092.00	2345.50	1.24	10.37	115.08	-12
14.696	2.116	-9	28.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3562.50	1154.40	2408.10	1.25	10.37	125.44	-13
14.696	2.116	-10	29.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3687.50	1216.80	2470.70	1.26	10.37	135.81	-14
14.696	2.116	-11	30.5	17.0	204	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.50	0.50	125.00	3812.50	1279.20	2533.30	1.27	10.58	146.39	-15
14.696	2.116	-12	31.5	18.0	216	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.49	0.49	125.00	3937.50	1341.60	2595.90	1.28	10.80	157.19	-16
14.696	2.116	-13	32.5	19.0	228	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10	0.49	0.49	125.00	4062.50	1404.00	2658.50	1.29	11.02	168.21	-17
14.696	2.116	-14	33.5	20.0	240	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	10	0.48	0.48	125.00	4187.50	1466.40	2721.10	1.30	11.24	179.45	-18
14.696	2.116	-15	34.5	21.0	252	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	10.5	0.49	0.49	125.00	4312.50	1528.80	2783.70	1.37	11.46	190.92	-19
14.696	2.116	-16	35.5	22.0	264	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	11	0.51	0.51	125.00	4437.50	1591.20	2846.30	1.45	11.68	202.60	-20
14.696	2.116	-17	36.5	23.0	276	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	11.5	0.52	0.52	125.00	4562.50	1653.60	2908.90	1.52	11.90	214.50	-21
14.696	2.116	-18	37.5	24.0	288	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	12	0.54	0.54	125.00	4687.50	1716.00	2971.50	1.60	12.12	226.63	-22
14.696	2.116	-19	38.5	25.0	300	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	12.5	0.55	0.55	125.00	4812.50	1778.40	3034.10	1.67	12.34	238.97	-23
14.696	2.116	-20	39.5	26.0	312	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	13	0.56	0.56	125.00	4937.50	1840.80	3096.70	1.74	12.57	251.54	-24
14.696	2.116	-21	40.5	27.0	324	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	13.5	0.58	0.58	125.00	5062.50	1903.20	3159.30	1.82	12.79	264.32	-25
14.696	2.116	-22	41.5	28.0	336	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	14	0.59	0.59	125.00	5187.50	1965.60	3221.90	1.89	13.01	277.33	-26
14.696	2.116	-23	42.5	29.0	348	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	14.5	0.60	0.60	125.00	5312.50	2028.00	3284.50	1.96	13.23	290.56	-27
14.696	2.116	-24	43.5	30.0	360	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	15	0.61	0.61	125.00	5437.50	2090.40	3347.10	2.03	13.45	304.00	-28
14.696	2.116	-25	44.5	31.0	372	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	15.5	0.60	0.60	125.00	5562.50	2152.80	3409.70	2.04	13.67	317.67	-29
14.696	2.116	-26	45.5	32.0	384	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	16	0.59	0.59	125.00	5687.50	2215.20	3472.30	2.04	13.89	331.56	-30
14.696	2.116	-27	46.5	33.0	396	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	16.5	0.58	0.58	125.00	5812.50	2277.60	3534.90	2.04	14.11	345.67	-31
14.696	2.116	-28	47.5	34.0	408	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	17	0.57	0.57	125.00	5937.50	2340.00	3597.50	2.04	14.33	360.00	-32
14.696	2.116	-29	48.5	35.0	420	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	17.5	0.56	0.56	125.00	6062.50	2402.40	3660.10	2.04	14.55	374.55	-33
14.696	2.116	-30	49.5	36.0	432	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	18	0.55	0.55	125.00	6187.50	2464.80	3722.70	2.04	14.77	389.33	-34
14.696	2.116	-31	50.5	37.0	444	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	18.5	0.54	0.54	125.00	6312.50	2527.20	3785.30	2.04	14.99	404.32	-35
14.696	2.116	-32	51.5	38.0	456	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	19	0.53	0.53	125.00	6437.50	2589.60	3847.90	2.04	15.21	419.53	-36
14.696	2.116	-33	52.5	39.0	468	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	19.5	0.52	0.52	125.00	6562.50	2652.00	3910.50	2.03	15.43	434.97	-37
14.696	2.116	-34	53.5	40.0	480	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	20	0.51	0.51	125.00	6687.50	2714.40	3973.10	2.03	15.65	450.62	-38
14.696	2.116	-35	54.5	41.0	492	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	20.5	0.50	0.50	125.00	6812.50	2776.80	4035.70	2.02	15.88	466.50	-39
14.696	2.116	-36	55.5	42.0	504	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	21	0.49	0.49	125.00	6937.50	2839.20	4098.30	2.02	16.10	482.59	-40
14.696	2.116	-37	56.5	43.0	516	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	21.5	0.48	0.48	125.00	7062.50	2901.60	4160.90	2.01	16.32	498.91	-41
14.696	2.116	-38	57.5	44.0	528	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	22	0.47	0.47	125.00	7187.50	2964.00	4223.50	2.00	16.54	515.45	-42
14.696	2.116	-39	58.5	45.0	540	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	22.5	0.47	0.47	125.00	7312.50	3026.40	4286.10	1.99	16.76	532.20	-43
14.696	2.116	-40	59.5	46.0	552	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	23	0.46	0.46	125.00	7437.50	3088.80	4348.70	1.99	16.98	549.18	-44
14.696	2.116	-41	60.5	47.0	564	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	23.5	0.45	0.45	125.00	7562.50	3151.20	4411.30	1.98	17.20	566.38	-45
14.696	2.116	-42	61.5	48.0	576	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	24	0.44	0.44	125.00	7687.50	3213.60	4473.90	1.97	17.42	583.80	-46
14.696	2.116	-43	62.5	49.0	588	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	24.5	0.43	0.43	125.00	7812.50	3276.00	4536.50	1.95	17.64	601.44	-47
14.696	2.116	-44	63.5	50.0	600	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	25	0.42	0.42	125.00	7937.50	3338.40	4599.10	1.94	17.86	619.30	-48
14.696	2.116	-45	64.5	51.0	612	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	25.5	0.41	0.41	125.00	8062.50	3400.80	4661.70	1.93	18.08	637.39	-49
14.696	2.116	-46	65.5	52.0	624	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	26	0.41	0.41	125.00	8187.50	3463.20	4724.30	1.91	18.30	655.69	-50
14.696	2.116	-47	66.5	53.0	636	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	26.5	0.40	0.40	125.00	8312.50	3525.60	4786.90	1.90	18.52	674.21	-51
14.696	2.116	-48	67.5	54.0	648	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	27	0.39	0.39	125.00	8437.50	3588.00	4849.50	1.89	18.74	692.96	-52
14.696	2.116	-49	68.5	55.0	660	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	27.5	0.38	0.38	125.00	8562.50	3650.40	4912.10	1.87	18.96	711.92	-53
14.696	2.116	-50	69.5	56.0	672	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	28	0.37	0.37	125.00	8687.50	3712.80	4974.70	1.85	19.19	731.10	-54
14.696	2.116	-51	70.5	57.0	684	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	28.5	0.36	0.36	125.00	8812.50	3775.20	5037.30	1.84	19.41	750.51	-55
14.696	2.116	-52	71.5	58.0	696	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	29	0.36	0.36	125.00	8937.50	3837.60	5099.90	1.82	19.63	770.14	-56
14.696	2.116	-53	72.5	59.0	708	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	29.5	0.35	0.35	125.00	9062.50	3900.00	5162.50	1.80	19.85	789.98	-57
14.696	2.116	-54	73.5	60.0	720	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	30	0.34	0.34	125.00	9187.50	3962.40	5225.10	1.78	20.07	810.05	-58
14.696	2.116	-55	74.5	61.0	732	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	30.5	0.33	0.33	125.00	9312.50	4024.80	5287.70	1.76	20.29	830.34	-59
14.696	2.116	-56	75.5	62.0	744	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	31	0.32	0.32	125.00	9437.50	4087.20	5350.30	1.74	20.51	850.85	-60
14.696	2.116	-57	76.5	63.0	756	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	31.5	0.32	0.32	125.00	9562.50	4149.60	5412.90	1.72	20.73	871.58	-61
14.696	2.116	-58	77.5	64.0	768	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	32	0.31	0.31	125.00	9687.50	4212.00	5475.50	1.69	20.95	892.53	-62
14.696	2.116	-59	78.5	65.0	780	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	32.5	0.30	0.30	125.00	9812.50	4274.40	5538.10	1.67	21.17	913.70	-63
14.696	2.116	-60	79.5	66.0	792	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	33	0.29	0.29	125.00	9937.50	4336.80	5600.70	1.65	21.39	935.09	-64
14.696	2.116	-61	80.5	67.0	804	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	33.5	0.29	0.29	125.00	10062.50	4399.20	5663.30	1.62	21.61	956.70	-65
14.696	2.116	-62	81.5	68.0	816	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	34	0.28	0.28	125.00	10187.50	4461.60	5725.90	1.60	21.83	978.54	-66
14.696	2.116	-63	82.5	69.0	828	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	34.5	0.27	0.27	125.00	10312.50	4524.00	5788.50	1.57	22.02	1000.56	-67
14.696	2.116	-64	83.5	70.0	840	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	35	0.26	0.26	125.00	10437.50	4586.40	5851.10	1.54	22.18	1022.74	-68
14.696	2.116	-65	84.5	71.0	852	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	35.5	0.26	0.26	125.00	10562.50	4648.80	5913.70	1.52	22.34	1045.08	-69
14.696	2.116	-66	85.5	72.0	864	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	36	0.25	0.25	125.00	10687.50	4711.20	5976.30	1.49	22.50	1067.58	-70
14.696	2.116	-67	86.5	73.0	876	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	36.5	0.24	0.25	125.00	10812.50	4773.60	6038.90	1.51	22.65	1090.23	-71
14.696	2.116	-68	87.5	74.0	888	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	37	0.23	0.25	125.00	10937.50	4836.00	6101.50	1.53	22.81	1113.04	-72
14.696	2.116	-69	88.5	75.0	900	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	37.5	0.23	0.25	125.00	11062.50	4898.40	6164.10	1.54	22.96	1136.00	-73
14.696	2.116	-70	89.5	76.0	912	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	38	0.22	0.25	125.00	11187.50	4960.80	6226.70	1.56	23.11	1159.11	-74
14.696	2.116	-71	90.5	77.0	924	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	38.5	0.21	0.25	125.00	11312.50	5023.20	6289.30	1.57	23.26	1182.37	-75
14.696	2.116	-72	91.5	78.0	936	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	39	0.21	0.25	125.00	11437.50	5085.60	6351.90	1.59	23.41	1205.78	-76
14.696	2.116	-73	92.5	79.0	948	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	39.5	0.20	0.25	125.00	11562.50	5148.00	6414.50	1.60	23.56	1229.34	-77
14.696	2.116	-74	93.5	80.0	960	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	40	0.19	0.25	125.00	11687.50	5210.40	6477.10	1.62	23.71	1253.05	-78
14.696	2.116	-75	94.5	81.0	972	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	40.5	0.19	0.25	125.00	11812.50	5272.80	6539.70	1.63	23.85	1276.90	-79
14.696	2.116	-76	95.5	82.0	984	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	41	0.18	0.25	125.00	11937.50	5335.20	6602.30	1.65	24.00	1300.90	-80
14.696	2.116	-77	96.5	83.0	996	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	41.5	0.17	0.25	125.00	12062.50	5397.60	6664.90	1.67	24.14	1325.04	-81
14.696	2.116	-78	97.5	84.0	1008	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	42	0.16	0.25	125.00	12187.50	5460.00	6727.50	1.68	24.28	1349.33	-82
14.696	2.116	-79	98.5	85.0	1020	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	42.5	0.16	0.25	125.00	12312.50	5522.40	6790.10	1.70	24.43	1373.75	-83
14.696	2.116	-80	99.5	86.0	1032	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	43	0.15	0.25	125.00	12437.50	5584.80	6852.70	1.71	24.56	1398.32	-84
14.696	2.116	-81	100.5	87.0	1044	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	43.5	0.14	0.25	125.00	12562.50	5647.20	6915.30	1.73	24.70	1423.02	-85
14.696	2.116	-82	101.5	88.0	1056	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	44	0.14	0.25	125.00	12687.50	5709.60	6977.90	1.74	24.84	1447.86	-86
14.696	2.116	-83	102.5	89.0	1068	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	44.5	0.13	0.25	125.00	12812.50	5772.00	7040.50	1.76	24.98	1472.84	-87
14.696	2.116	-84	103.5	90.0	1080	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	45	0.12	0.25	125.00	12937.50	5834.40	7103.10	1.78	25.11	1497.95	-88
14.696	2.116	-85	104.5	91.0	1092	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	45.5	0.12	0.25	125.00	13062.50	5896.80	7165.70	1.79	25.25	1523.20	-89
14.696	2.116	-86	105.5	92.0	1104	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	46	0.11	0.25	125.00	13187.50	5959.20	7228.30	1.81	25.38	1548.58	-90
14.696	2.116	-87	106.5	93.0	1116	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	46.5	0.10	0.25	125.00	13312.50	6021.60	7290.90	1.82	25.51	1574.09	-91
14.696	2.116	-88	107.5	94.0	1128	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	47	0.10	0.25	125.00	13437.50	6084.00	7353.50	1.84	25.64	1599.73	-92
14.696	2.116	-89	108.5	95.0	1140	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	47.5	0.09	0.25	125.00	13562.50	6146.40	7416.10	1.85	25.77	1625.50	-93
14.696	2.116	-90	109.5	96.0	1152	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	48	0.08	0.25	125.00	13687.50	6208.80	7478.70	1.87	25.90	1651.39	-94
14.696	2.116	-91	110.5	97.0	1164	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	48.5	0.08	0.25	125.00	13812.50	6271.20	7541.30	1.89	26.02	1677.42	-95
14.696	2.116	-92	111.5	98.0	1176	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	49	0.07	0.25	125.00	13937.50	6333.60	7603.90	1.90	26.15	1703.57	-96
14.696	2.116	-93	112.5	99.0	1188	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	49.5	0.07	0.25	125.00	14062.50	6396.00	7666.50	1.92	26.27	1729.84	-97
14.696	2.116	-94	113.5	100.0	1200	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	50	0.06	0.25	125.00	14187.50	6458.40	7729.10	1.93	26.40	1756.23	-98
14.696	2.116	-95	114.5	101.0	1212	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	50.5	0.05	0.25	125.00	14312.50	6520.80	7791.70	1.95	26.52	1782.75	-99
14.696	2.116	-96	115.5	102.0	1224	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	51	0.05	0.25	125.00	14437.50	6583.20	7854.30	1.96	26.64	1809.39	-100
14.696	2.116	-97	116.5	103.0	1236	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	51.5	0.04	0.25	125.00	14562.50	6645.60	7916.90	1.98	26.76	1836.15	-101
14.696	2.116	-98	117.5	104.0	1248	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	52	0.03	0.25	125.00	14687.50	6708.00	7979.50	1.99	26.88	1863.02	-102
14.696	2.116	-99	118.5	105.0	1260	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	52.5	0.03	0.25	125.00	14812.50	6770.40	8042.10	2.01	26.99	1890.02	-103
14.696	2.116	-100	119.5	106.0	1272	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	53	0.02	0.25	125.00	14937.50	6832.80	8104.70	2.03	27.11	1917.13	-104
14.696	2.116	-101	120.5	107.0	1284	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	53.5	0.02	0.25	125.00	15062.50	6895.20	8167.30	2.04	27.22	1944.35	-105
14.696	2.116	-102	121.5	108.0	1296	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	54	0.01	0.25	125.00	15187.50	6957.60	8229.90	2.06	27.34	1971.68	-106
14.696	2.116	-103	122.5	109.0	1308	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	54.5	0.00	0.25	125.00	15312.50	7020.00	8292.50	2.07	27.45	1999.13	-107
14.696	2.116	-104	123.5	110.0	1320	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	55	0.00	0.25	125.00	15437.50	7082.40	8355.10	2.09	27.56	2026.69	-108
14.696	2.116	-105	124.5	111.0	1332	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	55.5	-0.01	0.25	125.00	15562.50	7144.80	8417.70	2.10	27.67	2054.36	-109
14.696	2.116	-106	125.5	112.0	1344	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	56	-0.02	0.25	125.00	15687.50	7207.20	8480.30	2.12	27.78	2082.14	-110
14.696	2.116	-107	126.5	113.0	1356	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	56.5	-0.02	0.25	125.00	15812.50	7269.60	8542.90	2.14	27.88	2110.02	-111
14.696	2.116	-108	127.5	114.0	1368	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	57	-0.03	0.25	125.00	15937.50	7332.00	8605.50	2.15	27.99	2138.01	-112
14.696	2.116	-109	128.5	115.0	1380	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	57.5	-0.03	0.25	125.00	16062.50	7394.40	8668.10	2.17	28.09	2166.10	-113
14.696	2.116	-110	129.5	116.0	1392	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	58	-0.04	0.25	125.00	16187.50	7456.80	8730.70	2.18	28.20	2194.30	-114
14.696	2.116	-111	130.5	117.0	1404	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	58.5	-0.05	0.25	125.00	16312.50	7519.20	8793.30	2.20	28.30	2222.60	-115
14.696	2.116	-112	131.5	118.0	1416	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	59	-0.05	0.25	125.00	16437.50	7581.60	8855.90	2.21	28.40	2251.01	-116
14.696	2.116	-113	132.5	119.0	1428	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	59.5	-0.06	0.25	125.00	16562.50	7644.00	8918.50	2.23	28.50	2279.51	-117
14.696	2.116	-114	133.5	120.0	1440	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	60	-0.06	0.25	125.00	16687.50	7706.40	8981.10	2.25	28.60	2308.11	-118
14.696	2.116	-115	134.5	121.0	1452	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	60.5	-0.07	0.25	125.00	16812.50	7768.80	9043.70	2.26	28.70	2336.81	-119
14.696	2.116	-116	135.5	122.0	1464	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	61	-0.07	0.25	125.00	16937.50	7831.20	9106.30	2.28	28.79	2365.60	-120
14.696	2.116	-117	136.5	123.0	1476	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	61.5	-0.08	0.25	125.00	17062.50	7893.60	9168.90	2.29	28.89	2394.49	-121
14.696	2.116	-118	137.5	124.0	1488	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	62	-0.09	0.25	125.00	17187.50	7956.00	9231.50	2.31	28.98	2423.47	-122
14.696	2.116	-119	138.5	125.0	1500	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	62.5	-0.09	0.25	125.00	17312.50	8018.40	9294.10	2.32	29.08	2452.55	-123
14.696	2.116	-120	139.5	126.0	1512	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	63	-0.10	0.25	125.00	17437.50	8080.80	9356.70	2.34	29.17	2481.72	-124
14.696	2.116	-121	140.5	127.0	1524	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	63.5	-0.10	0.25	125.00	17562.50	8143.20	9419.30	2.35	29.26	2510.97	-125
14.696	2.116	-122	141.5	128.0	1536	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	64	-0.11	0.25	125.00	17687.50	8205.60	9481.90	2.37	29.35	2540.32	-126
14.696	2.116	-123	142.5	129.0	1548	5.11	35.46	2.413	0	0.46	0.46	2.342	16.27	64.5	-0.11	0.25	125.00	17812.50	8268.00	9544.50	2.39	29.43	2569.75	-127
14.696	2.116	-124	143.5	130.0	1560	5.14	35.68	2.428	0	0.46	0.46	2.349	16.31	65	-0.12	0.25	125.00	17937.50	8330.40	9607.10	2.40	29.52	2599.28	-128

23rd AVE. Abut 5A

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	21.50
Bottom of footing elevation / Pile top elevation (feet)	14.00
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-46.00

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	2.0	feet
	24	inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	14	7.5	0.0	0	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.75	0.75	125.00	937.50	0.00	937.50	0.00	0.00	0.00	12
14.696	2.116	13	8.5	1.0	12	2.15	14.93	1.016	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1062.50	0.00	1062.50	0.00	0.00	0.00	11
14.696	2.116	12	9.5	2.0	24	2.10	14.58	0.992	0	0.55	0.55	1.155	8.02	10	0.72	0.72	125.00	1187.50	0.00	1187.50	0.86	7.26	7.26	10
14.696	2.116	11	10.5	3.0	36	2.05	14.24	0.969	0	0.55	0.55	1.128	7.83	10	0.71	0.71	125.00	1312.50	0.00	1312.50	0.93	7.08	14.34	9
14.696	2.116	10	11.5	4.0	48	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.69	0.69	125.00	1437.50	0.00	1437.50	1.00	6.91	21.25	8
14.696	2.116	9	12.5	5.0	60	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.68	0.68	125.00	1562.50	62.40	1500.10	1.02	6.74	27.99	7
14.696	2.116	8	13.5	6.0	72	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.67	0.67	125.00	1687.50	124.80	1562.70	1.04	6.57	34.56	6
14.696	2.116	7	14.5	7.0	84	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.66	0.66	125.00	1812.50	187.20	1625.30	1.07	6.39	40.95	5
14.696	2.116	6	15.5	8.0	96	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.64	0.64	125.00	1937.50	249.60	1687.90	1.09	6.22	47.17	4
14.696	2.116	5	16.5	9.0	108	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.63	0.63	125.00	2062.50	312.00	1750.50	1.11	6.05	53.22	3
14.696	2.116	4	17.5	10.0	120	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.62	0.62	125.00	2187.50	374.40	1813.10	1.13	5.87	59.09	2
14.696	2.116	3	18.5	11.0	132	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.61	0.61	125.00	2312.50	436.80	1875.70	1.15	5.70	64.80	1
14.696	2.116	2	19.5	12.0	144	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.60	0.60	125.00	2437.50	499.20	1938.30	1.17	5.53	70.32	0
14.696	2.116	1	20.5	13.0	156	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.59	0.59	125.00	2562.50	561.60	2000.90	1.18	5.36	75.68	-1
14.696	2.116	0	21.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	624.00	2063.50	1.20	5.18	80.86	-2
14.696	2.116	-1	22.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	686.40	2126.10	1.22	5.18	86.05	-3
14.696	2.116	-2	23.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	748.80	2188.70	1.23	5.18	91.23	-4
14.696	2.116	-3	24.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	811.20	2251.30	1.25	5.18	96.42	-5
14.696	2.116	-4	25.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	873.60	2313.90	1.26	5.18	101.60	-6
14.696	2.116	-5	26.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	936.00	2376.50	1.27	5.18	106.78	-7
14.696	2.116	-6	27.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	998.40	2439.10	1.29	5.18	111.97	-8
14.696	2.116	-7	28.5	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.54	0.54	125.00	3562.50	1060.80	2501.70	1.36	5.18	117.15	-9
14.696	2.116	-8	29.5	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.56	0.56	125.00	3687.50	1123.20	2564.30	1.44	5.18	122.33	-10
14.696	2.116	-9	30.5	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.58	0.58	125.00	3812.50	1185.60	2626.90	1.52	5.18	127.52	-11
14.696	2.116	-10	31.5	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.59	0.59	125.00	3937.50	1248.00	2689.50	1.59	5.18	132.70	-12
14.696	2.116	-11	32.5	25.0	300	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	12.5	0.61	0.61	125.00	4062.50	1310.40	2752.10	1.67	5.29	137.99	-13
14.696	2.116	-12	33.5	26.0	312	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	13	0.62	0.62	125.00	4187.50	1372.80	2814.70	1.75	5.40	143.39	-14
14.696	2.116	-13	34.5	27.0	324	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	13.5	0.63	0.63	125.00	4312.50	1435.20	2877.30	1.83	5.51	148.90	-15
14.696	2.116	-14	35.5	28.0	336	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	14	0.65	0.65	125.00	4437.50	1497.60	2939.90	1.90	5.62	154.52	-16
14.696	2.116	-15	36.5	29.0	348	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	14.5	0.66	0.66	125.00	4562.50	1560.00	3002.50	1.98	5.73	160.25	-17
14.696	2.116	-16	37.5	30.0	360	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	15	0.67	0.67	125.00	4687.50	1622.40	3065.10	2.06	5.84	166.09	-18
14.696	2.116	-17	38.5	31.0	372	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	15.5	0.66	0.66	125.00	4812.50	1684.80	3127.70	2.07	5.95	172.05	-19
14.696	2.116	-18	39.5	32.0	384	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	16	0.65	0.65	125.00	4937.50	1747.20	3190.30	2.07	6.06	178.11	-20
14.696	2.116	-19	40.5	33.0	396	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	16.5	0.64	0.64	125.00	5062.50	1809.60	3252.90	2.08	6.17	184.28	-21
14.696	2.116	-20	41.5	34.0	408	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	17	0.63	0.63	125.00	5187.50	1872.00	3315.50	2.08	6.28	190.56	-22
14.696	2.116	-21	42.5	35.0	420	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	17.5	0.62	0.62	125.00	5312.50	1934.40	3378.10	2.09	6.39	196.96	-23
14.696	2.116	-22	43.5	36.0	432	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	18	0.61	0.61	125.00	5437.50	1996.80	3440.70	2.09	6.50	203.46	-24
14.696	2.116	-23	44.5	37.0	444	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18.5	0.60	0.60	125.00	5562.50	2059.20	3503.30	2.09	6.61	210.07	-25
14.696	2.116	-24	45.5	38.0	456	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	19	0.59	0.59	125.00	5687.50	2121.60	3565.90	2.10	6.72	216.80	-26
14.696	2.116	-25	46.5	39.0	468	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	19.5	0.58	0.58	125.00	5812.50	2184.00	3628.50	2.10	6.83	223.63	-27
14.696	2.116	-26	47.5	40.0	480	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	20	0.57	0.57	125.00	5937.50	2246.40	3691.10	2.10	6.94	230.58	-28
14.696	2.116	-27	48.5	41.0	492	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	20.5	0.56	0.56	125.00	6062.50	2308.80	3753.70	2.09	7.06	237.63	-29
14.696	2.116	-28	49.5	42.0	504	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	21	0.55	0.55	125.00	6187.50	2371.20	3816.30	2.09	7.17	244.80	-30
14.696	2.116	-29	50.5	43.0	516	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	21.5	0.54	0.54	125.00	6312.50	2433.60	3878.90	2.09	7.28	252.07	-31
14.696	2.116	-30	51.5	44.0	528	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	22	0.53	0.53	125.00	6437.50	2496.00	3941.50	2.09	7.39	259.46	-32
14.696	2.116	-31	52.5	45.0	540	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	22.5	0.52	0.52	125.00	6562.50	2558.40	4004.10	2.08	7.50	266.95	-33
14.696	2.116	-32	53.5	46.0	552	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	23	0.51	0.51	125.00	6687.50	2620.80	4066.70	2.08	7.61	274.56	-34
14.696	2.116	-33	54.5	47.0	564	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	23.5	0.50	0.50	125.00	6812.50	2683.20	4129.30	2.07	7.72	282.28	-35
14.696	2.116	-34	55.5	48.0	576	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	24	0.49	0.49	125.00	6937.50	2745.60	4191.90	2.06	7.83	290.11	-36
14.696	2.116	-35	56.5	49.0	588	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	24.5	0.48	0.48	125.00	7062.50	2808.00	4254.50	2.06	7.94	298.04	-37
14.696	2.116	-36	57.5	50.0	600	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	25	0.47	0.47	125.00	7187.50	2870.40	4317.10	2.05	8.05	306.09	-38
14.696	2.116	-37	58.5	51.0	612	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	25.5	0.47	0.47	125.00	7312.50	2932.80	4379.70	2.04	8.16	314.25	-39
14.696	2.116	-38	59.5	52.0	624	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	26	0.46	0.46	125.00	7437.50	2995.20	4442.30	2.03	8.27	322.52	-40
14.696	2.116	-39	60.5	53.0	636	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	26.5	0.45	0.45	125.00	7562.50	3057.60	4504.90	2.02	8.38	330.90	-41
14.696	2.116	-40	61.5	54.0	648	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	27	0.44	0.44	125.00	7687.50	3120.00	4567.50	2.01	8.49	339.39	-42
14.696	2.116	-41	62.5	55.0	660	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	27.5	0.43	0.43	125.00	7812.50	3182.40	4630.10	1.99	8.60	347.99	-43
14.696	2.116	-42	63.5	56.0	672	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	28	0.42	0.42	125.00	7937.50	3244.80	4692.70	1.98	8.71	356.70	-44
14.696	2.116	-43	64.5	57.0	684	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	28.5	0.41	0.41	125.00	8062.50	3307.20	4755.30	1.97	8.82	365.52	-45
14.696	2.116	-44	65.5	58.0	696	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	29	0.41	0.41	125.00	8187.50	3369.60	4817.90	1.95	8.93	374.45	-46
14.696	2.116	-45	66.5	59.0	708	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	29.5	0.40	0.40	125.00	8312.50	3432.00	4880.50	1.94	9.04	383.49	-47
14.696	2.116	-46	67.5	60.0	720	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	30	0.39	0.39	125.00	8437.50	3494.40	4943.10	1.92	9.15	392.64	-48
14.696	2.116	-47	68.5	61.0	732	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	30.5	0.38	0.38	125.00	8562.50	3556.80	5005.70	1.90	9.26	401.90	-49
14.696	2.116	-48	69.5	62.0	744	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	31	0.37	0.37	125.00	8687.50	3619.20	5068.30	1.89	9.37	411.27	-50
14.696	2.116	-49	70.5	63.0	756	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	31.5	0.36	0.36	125.00	8812.50	3681.60	5130.90	1.87	9.48	420.76	-51
14.696	2.116	-50	71.5	64.0	768	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	32	0.36	0.36	125.00	8937.50	3744.00	5193.50	1.85	9.59	430.35	-52
14.696	2.116	-51	72.5	65.0	780	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	32.5	0.35	0.35	125.00	9062.50	3806.40	5256.10	1.83	9.70	440.05	-53
14.696	2.116	-52	73.5	66.0	792	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	33	0.34	0.34	125.00	9187.50	3868.80	5318.70	1.81	9.81	449.86	-54
14.696	2.116	-53	74.5	67.0	804	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	33.5	0.33	0.33	125.00	9312.50	3931.20	5381.30	1.79	9.92	459.79	-55
14.696	2.116	-54	75.5	68.0	816	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	34	0.32	0.32	125.00	9437.50	3993.60	5443.90	1.77	10.03	469.82	-56
14.696	2.116	-55	76.5	69.0	828	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	34.5	0.32	0.32	125.00	9562.50	4056.00	5506.50	1.75	10.14	479.97	-57
14.696	2.116	-56	77.5	70.0	840	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	35	0.31	0.31	125.00	9687.50	4118.40	5569.10	1.72	10.25	490.22	-58
14.696	2.116	-57	78.5	71.0	852	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	35.5	0.30	0.30	125.00	9812.50	4180.80	5631.70	1.70	10.36	500.58	-59
14.696	2.116	-58	79.5	72.0	864	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	36	0.29	0.29	125.00	9937.50	4243.20	5694.30	1.67	10.48	511.06	-60
14.696	2.116	-59	80.5	73.0	876	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	36.5	0.29	0.29	125.00	10062.50	4305.60	5756.90	1.65	10.59	521.65	-61
14.696	2.116	-60	81.5	74.0	888	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	37	0.28	0.28	125.00	10187.50	4368.00	5819.50	1.62	10.70	532.34	-62
14.696	2.116	-61	82.5	75.0	900	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	37.5	0.27	0.27	125.00	10312.50	4430.40	5882.10	1.60	10.81	543.15	-63
14.696	2.116	-62	83.5	76.0	912	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	38	0.26	0.26	125.00	10437.50	4492.80	5944.70	1.57	10.92	554.06	-64
14.696	2.116	-63	84.5	77.0	924	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	38.5	0.26	0.26	125.00	10562.50	4555.20	6007.30	1.54	11.01	565.08	-65
14.696	2.116	-64	85.5	78.0	936	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	39	0.25	0.25	125.00	10687.50	4617.60	6069.90	1.52	11.09	576.17	-66
14.696	2.116	-65	86.5	79.0	948	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	39.5	0.24	0.25	125.00	10812.50	4680.00	6132.50	1.53	11.17	587.34	-67
14.696	2.116	-66	87.5	80.0	960	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	40	0.23	0.25	125.00	10937.50	4742.40	6195.10	1.55	11.25	598.58	-68
14.696	2.116	-67	88.5	81.0	972	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	40.5	0.23	0.25	125.00	11062.50	4804.80	6257.70	1.56	11.33	609.91	-69
14.696	2.116	-68	89.5	82.0	984	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	41	0.22	0.25	125.00	11187.50	4867.20	6320.30	1.58	11.40	621.31	-70
14.696	2.116	-69	90.5	83.0	996	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	41.5	0.21	0.25	125.00	11312.50	4929.60	6382.90	1.60	11.48	632.79	-71
14.696	2.116	-70	91.5	84.0	1008	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	42	0.21	0.25	125.00	11437.50	4992.00	6445.50	1.61	11.56	644.35	-72
14.696	2.116	-71	92.5	85.0	1020	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	42.5	0.20	0.25	125.00	11562.50	5054.40	6508.10	1.63	11.63	655.98	-73
14.696	2.116	-72	93.5	86.0	1032	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	43	0.19	0.25	125.00	11687.50	5116.80	6570.70	1.64	11.71	667.69	-74
14.696	2.116	-73	94.5	87.0	1044	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	43.5	0.19	0.25	125.00	11812.50	5179.20	6633.30	1.66	11.78	679.47	-75
14.696	2.116	-74	95.5	88.0	1056	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	44	0.18	0.25	125.00	11937.50	5241.60	6695.90	1.67	11.85	691.32	-76
14.696	2.116	-75	96.5	89.0	1068	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	44.5	0.17	0.25	125.00	12062.50	5304.00	6758.50	1.69	11.93	703.25	-77
14.696	2.116	-76	97.5	90.0	1080	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	45	0.16	0.25	125.00	12187.50	5366.40	6821.10	1.71	12.00	715.25	-78
14.696	2.116	-77	98.5	91.0	1092	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	45.5	0.16	0.25	125.00	12312.50	5428.80	6883.70	1.72	12.07	727.32	-79
14.696	2.116	-78	99.5	92.0	1104	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	46	0.15	0.25	125.00	12437.50	5491.20	6946.30	1.74	12.14	739.46	-80
14.696	2.116	-79	100.5	93.0	1116	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	46.5	0.14	0.25	125.00	12562.50	5553.60	7008.90	1.75	12.21	751.67	-81
14.696	2.116	-80	101.5	94.0	1128	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	47	0.14	0.25	125.00	12687.50	5616.00	7071.50	1.77	12.28	763.95	-82
14.696	2.116	-81	102.5	95.0	1140	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	47.5	0.13	0.25	125.00	12812.50	5678.40	7134.10	1.78	12.35	776.31	-83
14.696	2.116	-82	103.5	96.0	1152	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	48	0.12	0.25	125.00	12937.50	5740.80	7196.70	1.80	12.42	788.73	-84
14.696	2.116	-83	104.5	97.0	1164	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	48.5	0.12	0.25	125.00	13062.50	5803.20	7259.30	1.81	12.49	801.21	-85
14.696	2.116	-84	105.5	98.0	1176	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	49	0.11	0.25	125.00	13187.50	5865.60	7321.90	1.83	12.56	813.77	-86
14.696	2.116	-85	106.5	99.0	1188	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	49.5	0.10	0.25	125.00	13312.50	5928.00	7384.50	1.85	12.62	826.39	-87
14.696	2.116	-86	107.5	100.0	1200	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	50	0.10	0.25	125.00	13437.50	5990.40	7447.10	1.86	12.69	839.08	-88
14.696	2.116	-87	108.5	101.0	1212	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	50.5	0.09	0.25	125.00	13562.50	6052.80	7509.70	1.88	12.76	851.84	-89
14.696	2.116	-88	109.5	102.0	1224	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	51	0.08	0.25	125.00	13687.50	6115.20	7572.30	1.89	12.82	864.66	-90
14.696	2.116	-89	110.5	103.0	1236	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	51.5	0.08	0.25	125.00	13812.50	6177.60	7634.90	1.91	12.88	877.54	-91
14.696	2.116	-90	111.5	104.0	1248	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	52	0.07	0.25	125.00	13937.50	6240.00	7697.50	1.92	12.95	890.49	-92
14.696	2.116	-91	112.5	105.0	1260	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	52.5	0.07	0.25	125.00	14062.50	6302.40	7760.10	1.94	13.01	903.50	-93
14.696	2.116	-92	113.5	106.0	1272	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	53	0.06	0.25	125.00	14187.50	6364.80	7822.70	1.96	13.07	916.58	-94
14.696	2.116	-93	114.5	107.0	1284	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	53.5	0.05	0.25	125.00	14312.50	6427.20	7885.30	1.97	13.14	929.71	-95
14.696	2.116	-94	115.5	108.0	1296	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	54	0.05	0.25	125.00	14437.50	6489.60	7947.90	1.99	13.20	942.91	-96
14.696	2.116	-95	116.5	109.0	1308	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	54.5	0.04	0.25	125.00	14562.50	6552.00	8010.50	2.00	13.26	956.17	-97
14.696	2.116	-96	117.5	110.0	1320	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	55	0.03	0.25	125.00	14687.50	6614.40	8073.10	2.02	13.32	969.49	-98
14.696	2.116	-97	118.5	111.0	1332	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	55.5	0.03	0.25	125.00	14812.50	6676.80	8135.70	2.03	13.38	982.87	-99
14.696	2.116	-98	119.5	112.0	1344	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	56	0.02	0.25	125.00	14937.50	6739.20	8198.30	2.05	13.44	996.31	-100
14.696	2.116	-99	120.5	113.0	1356	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	56.5	0.02	0.25	125.00	15062.50	6801.60	8260.90	2.07	13.50	1009.80	-101
14.696	2.116	-100	121.5	114.0	1368	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	57	0.01	0.25	125.00	15187.50	6864.00	8323.50	2.08	13.55	1023.36	-102
14.696	2.116	-101	122.5	115.0	1380	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	57.5	0.00	0.25	125.00	15312.50	6926.40	8386.10	2.10	13.61	1036.97	-103
14.696	2.116	-102	123.5	116.0	1392	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	58	0.00	0.25	125.00	15437.50	6988.80	8448.70	2.11	13.67	1050.64	-104
14.696	2.116	-103	124.5	117.0	1404	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	58.5	-0.01	0.25	125.00	15562.50	7051.20	8511.30	2.13	13.72	1064.36	-105
14.696	2.116	-104	125.5	118.0	1416	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	59	-0.02	0.25	125.00	15687.50	7113.60	8573.90	2.14	13.78	1078.14	-106
14.696	2.116	-105	126.5	119.0	1428	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	59.5	-0.02	0.25	125.00	15812.50	7176.00	8636.50	2.16	13.83	1091.97	-107
14.696	2.116	-106	127.5	120.0	1440	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	60	-0.03	0.25	125.00	15937.50	7238.40	8699.10	2.17	13.89	1105.86	-108
14.696	2.116	-107	128.5	121.0	1452	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	60.5	-0.03	0.25	125.00	16062.50	7300.80	8761.70	2.19	13.94	1119.81	-109
14.696	2.116	-108	129.5	122.0	1464	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	61	-0.04	0.25	125.00	16187.50	7363.20	8824.30	2.21	14.00	1133.80	-110
14.696	2.116	-109	130.5	123.0	1476	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	61.5	-0.05	0.25	125.00	16312.50	7425.60	8886.90	2.22	14.05	1147.85	-111
14.696	2.116	-110	131.5	124.0	1488	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	62	-0.05	0.25	125.00	16437.50	7488.00	8949.50	2.24	14.10	1161.95	-112
14.696	2.116	-111	132.5	125.0	1500	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	62.5	-0.06	0.25	125.00	16562.50	7550.40	9012.10	2.25	14.15	1176.10	-113
14.696	2.116	-112	133.5	126.0	1512	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	63	-0.06	0.25	125.00	16687.50	7612.80	9074.70	2.27	14.20	1190.30	-114
14.696	2.116	-113	134.5	127.0	1524	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	63.5	-0.07	0.25	125.00	16812.50	7675.20	9137.30	2.28	14.25	1204.55	-115
14.696	2.116	-114	135.5	128.0	1536	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	64	-0.07	0.25	125.00	16937.50	7737.60	9199.90	2.30	14.30	1218.85	-116
14.696	2.116	-115	136.5	129.0	1548	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	64.5	-0.08	0.25	125.00	17062.50	7800.00	9262.50	2.32	14.35	1233.20	-117
14.696	2.116	-116	137.5	130.0	1560	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	65	-0.09	0.25	125.00	17187.50	7862.40	9325.10	2.33	14.40	1247.60	-118

23rd AVE. Abut 5B

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	24.50	
Bottom of footing elevation / Pile top elevation (feet)	17.50	
GWT elevation (feet)	10.00	
Maximum tip elev for L/d < 30	-42.50	

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

											Cohesive Soil						Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	7	0.0	0	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	875.00	0.00	875.00	0.00	0.00	0.00	16
14.696	2.116	17	8	1.0	12	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.00	0.00	0.00	15
14.696	2.116	16	9	2.0	24	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.82	7.60	7.60	14
14.696	2.116	15	10	3.0	36	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	7.60	15.21	13
14.696	2.116	14	11	4.0	48	2.15	14.93	1.016	0	0.55	0.55	1.183	8.21	10	0.70	0.70	125.00	1375.00	0.00	1375.00	0.96	7.43	22.64	12
14.696	2.116	13	12	5.0	60	2.10	14.58	0.992	0	0.55	0.55	1.155	8.02	10	0.69	0.69	125.00	1500.00	0.00	1500.00	1.03	7.26	29.89	11
14.696	2.116	12	13	6.0	72	2.05	14.24	0.969	0	0.55	0.55	1.128	7.83	10	0.67	0.67	125.00	1625.00	0.00	1625.00	1.10	7.08	36.98	10
14.696	2.116	11	14	7.0	84	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.66	0.66	125.00	1750.00	0.00	1750.00	1.16	6.91	43.89	9
14.696	2.116	10	15	8.0	96	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.65	0.65	125.00	1875.00	31.20	1843.80	1.20	6.74	50.63	8
14.696	2.116	9	16	9.0	108	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.64	0.64	125.00	2000.00	93.60	1906.40	1.22	6.57	57.19	7
14.696	2.116	8	17	10.0	120	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.63	0.63	125.00	2125.00	156.00	1969.00	1.24	6.39	63.59	6
14.696	2.116	7	18	11.0	132	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.62	0.62	125.00	2250.00	218.40	2031.60	1.25	6.22	69.81	5
14.696	2.116	6	19	12.0	144	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.61	0.61	125.00	2375.00	280.80	2094.20	1.27	6.05	75.85	4
14.696	2.116	5	20	13.0	156	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.60	0.60	125.00	2500.00	343.20	2156.80	1.29	5.87	81.73	3
14.696	2.116	4	21	14.0	168	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.59	0.59	125.00	2625.00	405.60	2219.40	1.30	5.70	87.43	2
14.696	2.116	3	22	15.0	180	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.58	0.58	125.00	2750.00	468.00	2282.00	1.32	5.53	92.96	1
14.696	2.116	2	23	16.0	192	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.57	0.57	125.00	2875.00	530.40	2344.60	1.33	5.36	98.32	-1
14.696	2.116	1	24	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3000.00	592.80	2407.20	1.34	5.18	103.50	-2
14.696	2.116	-1	25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3125.00	655.20	2469.80	1.36	5.18	108.68	-3
14.696	2.116	-2	26	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3250.00	717.60	2532.40	1.37	5.18	113.87	-4
14.696	2.116	-3	27	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3375.00	780.00	2595.00	1.38	5.18	119.05	-5
14.696	2.116	-4	28	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.55	0.55	125.00	3500.00	842.40	2657.60	1.46	5.18	124.23	-6
14.696	2.116	-5	29	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.57	0.57	125.00	3625.00	904.80	2720.20	1.54	5.18	129.42	-7
14.696	2.116	-6	30	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.58	0.58	125.00	3750.00	967.20	2782.80	1.62	5.18	134.60	-8
14.696	2.116	-7	31	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.60	0.60	125.00	3875.00	1029.60	2845.40	1.70	5.18	139.79	-9
14.696	2.116	-8	32	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.61	0.61	125.00	4000.00	1092.00	2908.00	1.78	5.18	144.97	-10
14.696	2.116	-9	33	26.0	312	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13	0.63	0.63	125.00	4125.00	1154.40	2970.60	1.86	5.18	150.15	-11
14.696	2.116	-10	34	27.0	324	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13.5	0.64	0.64	125.00	4250.00	1216.80	3033.20	1.94	5.18	155.34	-12
14.696	2.116	-11	35	28.0	336	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	14	0.65	0.65	125.00	4375.00	1279.20	3095.80	2.02	5.29	160.63	-13
14.696	2.116	-12	36	29.0	348	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	14.5	0.67	0.67	125.00	4500.00	1341.60	3158.40	2.10	5.40	166.03	-14
14.696	2.116	-13	37	30.0	360	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	15	0.68	0.68	125.00	4625.00	1404.00	3221.00	2.18	5.51	171.54	-15
14.696	2.116	-14	38	31.0	372	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	15.5	0.67	0.67	125.00	4750.00	1466.40	3283.60	2.19	5.62	177.16	-16
14.696	2.116	-15	39	32.0	384	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	16	0.66	0.66	125.00	4875.00	1528.80	3346.20	2.19	5.73	182.89	-17
14.696	2.116	-16	40	33.0	396	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	16.5	0.64	0.64	125.00	5000.00	1591.20	3408.80	2.20	5.84	188.73	-18
14.696	2.116	-17	41	34.0	408	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	17	0.63	0.63	125.00	5125.00	1653.60	3471.40	2.20	5.95	194.68	-19
14.696	2.116	-18	42	35.0	420	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	17.5	0.62	0.62	125.00	5250.00	1716.00	3534.00	2.20	6.06	200.74	-20
14.696	2.116	-19	43	36.0	432	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	18	0.61	0.61	125.00	5375.00	1778.40	3596.60	2.20	6.17	206.92	-21
14.696	2.116	-20	44	37.0	444	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	18.5	0.60	0.60	125.00	5500.00	1840.80	3659.20	2.21	6.28	213.20	-22
14.696	2.116	-21	45	38.0	456	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	19	0.59	0.59	125.00	5625.00	1903.20	3721.80	2.21	6.39	219.59	-23
14.696	2.116	-22	46	39.0	468	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	19.5	0.58	0.58	125.00	5750.00	1965.60	3784.40	2.20	6.50	226.09	-24
14.696	2.116	-23	47	40.0	480	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	20	0.57	0.57	125.00	5875.00	2028.00	3847.00	2.20	6.61	232.71	-25
14.696	2.116	-24	48	41.0	492	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	20.5	0.56	0.56	125.00	6000.00	2090.40	3909.60	2.20	6.72	239.43	-26
14.696	2.116	-25	49	42.0	504	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	21	0.55	0.55	125.00	6125.00	2152.80	3972.20	2.20	6.83	246.27	-27
14.696	2.116	-26	50	43.0	516	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	21.5	0.54	0.54	125.00	6250.00	2215.20	4034.80	2.19	6.94	253.21	-28
14.696	2.116	-27	51	44.0	528	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	22	0.53	0.53	125.00	6375.00	2277.60	4097.40	2.19	7.06	260.27	-29
14.696	2.116	-28	52	45.0	540	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	22.5	0.52	0.52	125.00	6500.00	2340.00	4160.00	2.18	7.17	267.43	-30
14.696	2.116	-29	53	46.0	552	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	23	0.52	0.52	125.00	6625.00	2402.40	4222.60	2.18	7.28	274.71	-31
14.696	2.116	-30	54	47.0	564	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	23.5	0.51	0.51	125.00	6750.00	2464.80	4285.20	2.17	7.39	282.09	-32
14.696	2.116	-31	55	48.0	576	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	24	0.50	0.50	125.00	6875.00	2527.20	4347.80	2.16	7.50	289.59	-33
14.696	2.116	-32	56	49.0	588	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	24.5	0.49	0.49	125.00	7000.00	2589.60	4410.40	2.15	7.61	297.20	-34
14.696	2.116	-33	57	50.0	600	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	25	0.48	0.48	125.00	7125.00	2652.00	4473.00	2.14	7.72	304.91	-35
14.696	2.116	-34	58	51.0	612	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	25.5	0.47	0.47	125.00	7250.00	2714.40	4535.60	2.13	7.83	312.74	-36
14.696	2.116	-35	59	52.0	624	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	26	0.46	0.46	125.00	7375.00	2776.80	4598.20	2.12	7.94	320.68	-37
14.696	2.116	-36	60	53.0	636	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	26.5	0.45	0.45	125.00	7500.00	2839.20	4660.80	2.11	8.05	328.73	-38
14.696	2.116	-37	61	54.0	648	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	27	0.44	0.44	125.00	7625.00	2901.60	4723.40	2.10	8.16	336.89	-39
14.696	2.116	-38	62	55.0	660	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27.5	0.43	0.43	125.00	7750.00	2964.00	4786.00	2.08	8.27	345.15	-40
14.696	2.116	-39	63	56.0	672	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	28	0.43	0.43	125.00	7875.00	3026.40	4848.60	2.07	8.38	353.53	-41
14.696	2.116	-40	64	57.0	684	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	28.5	0.42	0.42	125.00	8000.00	3088.80	4911.20	2.05	8.49	362.02	-42
14.696	2.116	-41	65	58.0	696	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	29	0.41	0.41	125.00	8125.00	3151.20	4973.80	2.04	8.60	370.62	-43
14.696	2.116	-42	66	59.0	708	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	29.5	0.40	0.40	125.00	8250.00	3213.60	5036.40	2.02	8.71	379.33	-44
14.696	2.116	-43	67	60.0	720	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	30	0.39	0.39	125.00	8375.00	3276.00	5099.00	2.00	8.82	388.15	-45
14.696	2.116	-44	68	61.0	732	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	30.5	0.38	0.38	125.00	8500.00	3338.40	5161.60	1.99	8.93	397.08	-46
14.696	2.116	-45	69	62.0	744	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	31	0.38	0.38	125.00	8625.00	3400.80	5224.20	1.97	9.04	406.12	-47
14.696	2.116	-46	70	63.0	756	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	31.5	0.37	0.37	125.00	8750.00	3463.20	5286.80	1.95	9.15	415.27	-48
14.696	2.116	-47	71	64.0	768	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	32	0.36	0.36	125.00	8875.00	3525.60	5349.40	1.93	9.26	424.54	-49
14.696	2.116	-48	72	65.0	780	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	32.5	0.35	0.35	125.00	9000.00	3588.00	5412.00	1.91	9.37	433.91	-50
14.696	2.116	-49	73	66.0	792	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	33	0.34	0.34	125.00	9125.00	3650.40	5474.60	1.89	9.48	443.39	-51
14.696	2.116	-50	74	67.0	804	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	33.5	0.34	0.34	125.00	9250.00	3712.80	5537.20	1.86	9.59	452.98	-52
14.696	2.116	-51	75	68.0	816	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	34	0.33	0.33	125.00	9375.00	3775.20	5599.80	1.84	9.70	462.69	-53
14.696	2.116	-52	76	69.0	828	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	34.5	0.32	0.32	125.00	9500.00	3837.60	5662.40	1.82	9.81	472.50	-54
14.696	2.116	-53	77	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.31	0.31	125.00	9625.00	3900.00	5725.00	1.79	9.92	482.42	-55
14.696	2.116	-54	78	71.0	852	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	35.5	0.31	0.31	125.00	9750.00	3962.40	5787.60	1.77	10.03	492.46	-56
14.696	2.116	-55	79	72.0	864	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	36	0.30	0.30	125.00	9875.00	4024.80	5850.20	1.74	10.14	502.60	-57
14.696	2.116	-56	80	73.0	876	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	36.5	0.29	0.29	125.00	10000.00	4087.20	5912.80	1.72	10.25	512.86	-58
14.696	2.116	-57	81	74.0	888	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	37	0.28	0.28	125.00	10125.00	4149.60	5975.40	1.69	10.36	523.22	-59
14.696	2.116	-58	82	75.0	900	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	37.5	0.28	0.28	125.00	10250.00	4212.00	6038.00	1.66	10.48	533.70	-60
14.696	2.116	-59	83	76.0	912	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	38	0.27	0.27	125.00	10375.00	4274.40	6100.60	1.63	10.59	544.28	-61
14.696	2.116	-60	84	77.0	924	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	38.5	0.26	0.26	125.00	10500.00	4336.80	6163.20	1.60	10.70	554.98	-62
14.696	2.116	-61	85	78.0	936	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	39	0.25	0.25	125.00	10625.00	4399.20	6225.80	1.57	10.81	565.78	-63
14.696	2.116	-62	86	79.0	948	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	39.5	0.25	0.25	125.00	10750.00	4461.60	6288.40	1.57	10.92	576.70	-64
14.696	2.116	-63	87	80.0	960	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	40	0.24	0.25	125.00	10875.00	4524.00	6351.00	1.59	11.01	587.71	-65
14.696	2.116	-64	88	81.0	972	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	40.5	0.23	0.25	125.00	11000.00	4586.40	6413.60	1.60	11.09	598.80	-66
14.696	2.116	-65	89	82.0	984	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	41	0.22	0.25	125.00	11125.00	4648.80	6476.20	1.62	11.17	609.97	-67
14.696	2.116	-66	90	83.0	996	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	41.5	0.22	0.25	125.00	11250.00	4711.20	6538.80	1.63	11.25	621.22	-68
14.696	2.116	-67	91	84.0	1008	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	42	0.21	0.25	125.00	11375.00	4773.60	6601.40	1.65	11.33	632.55	-69
14.696	2.116	-68	92	85.0	1020	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	42.5	0.20	0.25	125.00	11500.00	4836.00	6664.00	1.67	11.40	643.95	-70
14.696	2.116	-69	93	86.0	1032	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	43	0.20	0.25	125.00	11625.00	4898.40	6726.60	1.68	11.48	655.43	-71
14.696	2.116	-70	94	87.0	1044	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	43.5	0.19	0.25	125.00	11750.00	4960.80	6789.20	1.70	11.56	666.98	-72
14.696	2.116	-71	95	88.0	1056	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	44	0.18	0.25	125.00	11875.00	5023.20	6851.80	1.71	11.63	678.62	-73
14.696	2.116	-72	96	89.0	1068	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	44.5	0.17	0.25	125.00	12000.00	5085.60	6914.40	1.73	11.71	690.32	-74
14.696	2.116	-73	97	90.0	1080	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	45	0.17	0.25	125.00	12125.00	5148.00	6977.00	1.74	11.78	702.10	-75
14.696	2.116	-74	98	91.0	1092	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	45.5	0.16	0.25	125.00	12250.00	5210.40	7039.60	1.76	11.85	713.96	-76
14.696	2.116	-75	99	92.0	1104	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	46	0.15	0.25	125.00	12375.00	5272.80	7102.20	1.78	11.93	725.88	-77
14.696	2.116	-76	100	93.0	1116	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	46.5	0.15	0.25	125.00	12500.00	5335.20	7164.80	1.79	12.00	737.88	-78
14.696	2.116	-77	101	94.0	1128	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	47	0.14	0.25	125.00	12625.00	5397.60	7227.40	1.81	12.07	749.95	-79
14.696	2.116	-78	102	95.0	1140	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	47.5	0.13	0.25	125.00	12750.00	5460.00	7290.00	1.82	12.14	762.09	-80
14.696	2.116	-79	103	96.0	1152	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	48	0.13	0.25	125.00	12875.00	5522.40	7352.60	1.84	12.21	774.31	-81
14.696	2.116	-80	104	97.0	1164	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	48.5	0.12	0.25	125.00	13000.00	5584.80	7415.20	1.85	12.28	786.59	-82
14.696	2.116	-81	105	98.0	1176	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	49	0.11	0.25	125.00	13125.00	5647.20	7477.80	1.87	12.35	798.94	-83
14.696	2.116	-82	106	99.0	1188	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	49.5	0.11	0.25	125.00	13250.00	5709.60	7540.40	1.89	12.42	811.36	-84
14.696	2.116	-83	107	100.0	1200	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	50	0.10	0.25	125.00	13375.00	5772.00	7603.00	1.90	12.49	823.85	-85
14.696	2.116	-84	108	101.0	1212	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	50.5	0.09	0.25	125.00	13500.00	5834.40	7665.60	1.92	12.56	836.41	-86
14.696	2.116	-85	109	102.0	1224	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	51	0.09	0.25	125.00	13625.00	5896.80	7728.20	1.93	12.62	849.03	-87
14.696	2.116	-86	110	103.0	1236	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	51.5	0.08	0.25	125.00	13750.00	5959.20	7790.80	1.95	12.69	861.72	-88
14.696	2.116	-87	111	104.0	1248	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	52	0.07	0.25	125.00	13875.00	6021.60	7853.40	1.96	12.76	874.47	-89
14.696	2.116	-88	112	105.0	1260	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	52.5	0.07	0.25	125.00	14000.00	6084.00	7916.00	1.98	12.82	887.29	-90
14.696	2.116	-89	113	106.0	1272	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	53	0.06	0.25	125.00	14125.00	6146.40	7978.60	1.99	12.88	900.18	-91
14.696	2.116	-90	114	107.0	1284	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	53.5	0.06	0.25	125.00	14250.00	6208.80	8041.20	2.01	12.95	913.13	-92
14.696	2.116	-91	115	108.0	1296	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	54	0.05	0.25	125.00	14375.00	6271.20	8103.80	2.03	13.01	926.14	-93
14.696	2.116	-92	116	109.0	1308	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	54.5	0.04	0.25	125.00	14500.00	6333.60	8166.40	2.04	13.07	939.21	-94
14.696	2.116	-93	117	110.0	1320	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	55	0.04	0.25	125.00	14625.00	6396.00	8229.00	2.06	13.14	952.35	-95
14.696	2.116	-94	118	111.0	1332	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	55.5	0.03	0.25	125.00	14750.00	6458.40	8291.60	2.07	13.20	965.55	-96
14.696	2.116	-95	119	112.0	1344	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	56	0.02	0.25	125.00	14875.00	6520.80	8354.20	2.09	13.26	978.81	-97
14.696	2.116	-96	120	113.0	1356	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	56.5	0.02	0.25	125.00	15000.00	6583.20	8416.80	2.10	13.32	992.13	-98
14.696	2.116	-97	121	114.0	1368	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	57	0.01	0.25	125.00	15125.00	6645.60	8479.40	2.12	13.38	1005.50	-99
14.696	2.116	-98	122	115.0	1380	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	57.5	0.01	0.25	125.00	15250.00	6708.00	8542.00	2.14	13.44	1018.94	-100
14.696	2.116	-99	123	116.0	1392	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	58	0.00	0.25	125.00	15375.00	6770.40	8604.60	2.15	13.50	1032.44	-101
14.696	2.116	-100	124	117.0	1404	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	58.5	-0.01	0.25	125.00	15500.00	6832.80	8667.20	2.17	13.55	1045.99	-102
14.696	2.116	-101	125	118.0	1416	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	59	-0.01	0.25	125.00	15625.00	6895.20	8729.80	2.18	13.61	1059.60	-103
14.696	2.116	-102	126	119.0	1428	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	59.5	-0.02	0.25	125.00	15750.00	6957.60	8792.40	2.20	13.67	1073.27	-104
14.696	2.116	-103	127	120.0	1440	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	60	-0.02	0.25	125.00	15875.00	7020.00	8855.00	2.21	13.72	1087.00	-105
14.696	2.116	-104	128	121.0	1452	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	60.5	-0.03	0.25	125.00	16000.00	7082.40	8917.60	2.23	13.78	1100.78	-106
14.696	2.116	-105	129	122.0	1464	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	61	-0.04	0.25	125.00	16125.00	7144.80	8980.20	2.25	13.83	1114.61	-107
14.696	2.116	-106	130	123.0	1476	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	61.5	-0.04	0.25	125.00	16250.00	7207.20	9042.80	2.26	13.89	1128.50	-108
14.696	2.116	-107	131	124.0	1488	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	62	-0.05	0.25	125.00	16375.00	7269.60	9105.40	2.28	13.94	1142.44	-109
14.696	2.116	-108	132	125.0	1500	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	62.5	-0.05	0.25	125.00	16500.00	7332.00	9168.00	2.29	14.00	1156.44	-110
14.696	2.116	-109	133	126.0	1512	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	63	-0.06	0.25	125.00	16625.00	7394.40	9230.60	2.31	14.05	1170.48	-111
14.696	2.116	-110	134	127.0	1524	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	63.5	-0.07	0.25	125.00	16750.00	7456.80	9293.20	2.32	14.10	1184.58	-112
14.696	2.116	-111	135	128.0	1536	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	64	-0.07	0.25	125.00	16875.00	7519.20	9355.80	2.34	14.15	1198.73	-113
14.696	2.116	-112	136	129.0	1548	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	64.5	-0.08	0.25	125.00	17000.00	7581.60	9418.40	2.35	14.20	1212.93	-114
14.696	2.116	-113	137	130.0	1560	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	65	-0.08	0.25	125.00	17125.00	7644.00	9481.00	2.37	14.25	1227.18	-115

23rd AVE. Abut 5 RW Right

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	25.00
Bottom of footing elevation / Pile top elevation (feet)	17.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-42.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	2.0	feet
	24	inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	7.5	0.0	0	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.75	0.75	125.00	937.50	0.00	937.50	0.00	0.00	0.00	16
14.696	2.116	17	8.5	1.0	12	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1062.50	0.00	1062.50	0.00	0.00	0.00	15
14.696	2.116	16	9.5	2.0	24	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.72	0.72	125.00	1187.50	0.00	1187.50	0.86	7.60	7.60	14
14.696	2.116	15	10.5	3.0	36	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.71	0.71	125.00	1312.50	0.00	1312.50	0.93	7.60	15.21	13
14.696	2.116	14	11.5	4.0	48	2.15	14.93	1.016	0	0.55	0.55	1.183	8.21	10	0.69	0.69	125.00	1437.50	0.00	1437.50	1.00	7.43	22.64	12
14.696	2.116	13	12.5	5.0	60	2.10	14.58	0.992	0	0.55	0.55	1.155	8.02	10	0.68	0.68	125.00	1562.50	0.00	1562.50	1.06	7.26	29.89	11
14.696	2.116	12	13.5	6.0	72	2.05	14.24	0.969	0	0.55	0.55	1.128	7.83	10	0.67	0.67	125.00	1687.50	0.00	1687.50	1.13	7.08	36.98	10
14.696	2.116	11	14.5	7.0	84	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.66	0.66	125.00	1812.50	0.00	1812.50	1.19	6.91	43.89	9
14.696	2.116	10	15.5	8.0	96	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.64	0.64	125.00	1937.50	31.20	1906.30	1.23	6.74	50.63	8
14.696	2.116	9	16.5	9.0	108	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.63	0.63	125.00	2062.50	93.60	1968.90	1.25	6.57	57.19	7
14.696	2.116	8	17.5	10.0	120	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.62	0.62	125.00	2187.50	156.00	2031.50	1.27	6.39	63.59	6
14.696	2.116	7	18.5	11.0	132	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.61	0.61	125.00	2312.50	218.40	2094.10	1.28	6.22	69.81	5
14.696	2.116	6	19.5	12.0	144	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.60	0.60	125.00	2437.50	280.80	2156.70	1.30	6.05	75.85	4
14.696	2.116	5	20.5	13.0	156	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.59	0.59	125.00	2562.50	343.20	2219.30	1.31	5.87	81.73	3
14.696	2.116	4	21.5	14.0	168	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.58	0.58	125.00	2687.50	405.60	2281.90	1.33	5.70	87.43	2
14.696	2.116	3	22.5	15.0	180	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.57	0.57	125.00	2812.50	468.00	2344.50	1.34	5.53	92.96	1
14.696	2.116	2	23.5	16.0	192	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.56	0.56	125.00	2937.50	530.40	2407.10	1.35	5.36	98.32	-1
14.696	2.116	1	24.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	592.80	2469.70	1.37	5.18	103.50	-2
14.696	2.116	-1	25.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	655.20	2532.30	1.38	5.18	108.68	-3
14.696	2.116	-2	26.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	717.60	2594.90	1.39	5.18	113.87	-4
14.696	2.116	-3	27.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	780.00	2657.50	1.40	5.18	119.05	-5
14.696	2.116	-4	28.5	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.54	0.54	125.00	3562.50	842.40	2720.10	1.48	5.18	124.23	-6
14.696	2.116	-5	29.5	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.56	0.56	125.00	3687.50	904.80	2782.70	1.56	5.18	129.42	-7
14.696	2.116	-6	30.5	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.58	0.58	125.00	3812.50	967.20	2845.30	1.64	5.18	134.60	-8
14.696	2.116	-7	31.5	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.59	0.59	125.00	3937.50	1029.60	2907.90	1.72	5.18	139.79	-9
14.696	2.116	-8	32.5	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.61	0.61	125.00	4062.50	1092.00	2970.50	1.80	5.18	144.97	-10
14.696	2.116	-9	33.5	26.0	312	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13	0.62	0.62	125.00	4187.50	1154.40	3033.10	1.89	5.18	150.15	-11
14.696	2.116	-10	34.5	27.0	324	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13.5	0.63	0.63	125.00	4312.50	1216.80	3095.70	1.97	5.18	155.34	-12
14.696	2.116	-11	35.5	28.0	336	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	14	0.65	0.65	125.00	4437.50	1279.20	3158.30	2.05	5.29	160.63	-13
14.696	2.116	-12	36.5	29.0	348	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	14.5	0.66	0.66	125.00	4562.50	1341.60	3220.90	2.13	5.40	166.03	-14
14.696	2.116	-13	37.5	30.0	360	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	15	0.67	0.67	125.00	4687.50	1404.00	3283.50	2.21	5.51	171.54	-15
14.696	2.116	-14	38.5	31.0	372	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	15.5	0.66	0.66	125.00	4812.50	1466.40	3346.10	2.21	5.62	177.16	-16
14.696	2.116	-15	39.5	32.0	384	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	16	0.65	0.65	125.00	4937.50	1528.80	3408.70	2.22	5.73	182.89	-17
14.696	2.116	-16	40.5	33.0	396	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	16.5	0.64	0.64	125.00	5062.50	1591.20	3471.30	2.22	5.84	188.73	-18
14.696	2.116	-17	41.5	34.0	408	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	17	0.63	0.63	125.00	5187.50	1653.60	3533.90	2.22	5.95	194.68	-19
14.696	2.116	-18	42.5	35.0	420	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	17.5	0.62	0.62	125.00	5312.50	1716.00	3596.50	2.22	6.06	200.74	-20
14.696	2.116	-19	43.5	36.0	432	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	18	0.61	0.61	125.00	5437.50	1778.40	3659.10	2.22	6.17	206.92	-21
14.696	2.116	-20	44.5	37.0	444	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	18.5	0.60	0.60	125.00	5562.50	1840.80	3721.70	2.22	6.28	213.20	-22
14.696	2.116	-21	45.5	38.0	456	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	19	0.59	0.59	125.00	5687.50	1903.20	3784.30	2.22	6.39	219.59	-23
14.696	2.116	-22	46.5	39.0	468	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	19.5	0.58	0.58	125.00	5812.50	1965.60	3846.90	2.22	6.50	226.09	-24
14.696	2.116	-23	47.5	40.0	480	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	20	0.57	0.57	125.00	5937.50	2028.00	3909.50	2.22	6.61	232.71	-25
14.696	2.116	-24	48.5	41.0	492	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	20.5	0.56	0.56	125.00	6062.50	2090.40	3972.10	2.22	6.72	239.43	-26
14.696	2.116	-25	49.5	42.0	504	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	21	0.55	0.55	125.00	6187.50	2152.80	4034.70	2.21	6.83	246.27	-27
14.696	2.116	-26	50.5	43.0	516	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	21.5	0.54	0.54	125.00	6312.50	2215.20	4097.30	2.21	6.94	253.21	-28
14.696	2.116	-27	51.5	44.0	528	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	22	0.53	0.53	125.00	6437.50	2277.60	4159.90	2.20	7.06	260.27	-29
14.696	2.116	-28	52.5	45.0	540	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	22.5	0.52	0.52	125.00	6562.50	2340.00	4222.50	2.20	7.17	267.43	-30
14.696	2.116	-29	53.5	46.0	552	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	23	0.51	0.51	125.00	6687.50	2402.40	4285.10	2.19	7.28	274.71	-31
14.696	2.116	-30	54.5	47.0	564	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	23.5	0.50	0.50	125.00	6812.50	2464.80	4347.70	2.18	7.39	282.09	-32
14.696	2.116	-31	55.5	48.0	576	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	24	0.49	0.49	125.00	6937.50	2527.20	4410.30	2.17	7.50	289.59	-33
14.696	2.116	-32	56.5	49.0	588	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	24.5	0.48	0.48	125.00	7062.50	2589.60	4472.90	2.16	7.61	297.20	-34
14.696	2.116	-33	57.5	50.0	600	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	25	0.47	0.47	125.00	7187.50	2652.00	4535.50	2.15	7.72	304.91	-35
14.696	2.116	-34	58.5	51.0	612	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	25.5	0.47	0.47	125.00	7312.50	2714.40	4598.10	2.14	7.83	312.74	-36
14.696	2.116	-35	59.5	52.0	624	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	26	0.46	0.46	125.00	7437.50	2776.80	4660.70	2.13	7.94	320.68	-37
14.696	2.116	-36	60.5	53.0	636	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	26.5	0.45	0.45	125.00	7562.50	2839.20	4723.30	2.12	8.05	328.73	-38
14.696	2.116	-37	61.5	54.0	648	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	27	0.44	0.44	125.00	7687.50	2901.60	4785.90	2.10	8.16	336.89	-39
14.696	2.116	-38	62.5	55.0	660	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27.5	0.43	0.43	125.00	7812.50	2964.00	4848.50	2.09	8.27	345.15	-40
14.696	2.116	-39	63.5	56.0	672	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	28	0.42	0.42	125.00	7937.50	3026.40	4911.10	2.07	8.38	353.53	-41
14.696	2.116	-40	64.5	57.0	684	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	28.5	0.41	0.41	125.00	8062.50	3088.80	4973.70	2.06	8.49	362.02	-42
14.696	2.116	-41	65.5	58.0	696	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	29	0.41	0.41	125.00	8187.50	3151.20	5036.30	2.04	8.60	370.62	-43
14.696	2.116	-42	66.5	59.0	708	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	29.5	0.40	0.40	125.00	8312.50	3213.60	5098.90	2.02	8.71	379.33	-44
14.696	2.116	-43	67.5	60.0	720	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	30	0.39	0.39	125.00	8437.50	3276.00	5161.50	2.01	8.82	388.15	-45
14.696	2.116	-44	68.5	61.0	732	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	30.5	0.38	0.38	125.00	8562.50	3338.40	5224.10	1.99	8.93	397.08	-46
14.696	2.116	-45	69.5	62.0	744	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	31	0.37	0.37	125.00	8687.50	3400.80	5286.70	1.97	9.04	406.12	-47
14.696	2.116	-46	70.5	63.0	756	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	31.5	0.36	0.36	125.00	8812.50	3463.20	5349.30	1.95	9.15	415.27	-48
14.696	2.116	-47	71.5	64.0	768	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	32	0.36	0.36	125.00	8937.50	3525.60	5411.90	1.93	9.26	424.54	-49
14.696	2.116	-48	72.5	65.0	780	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	32.5	0.35	0.35	125.00	9062.50	3588.00	5474.50	1.91	9.37	433.91	-50
14.696	2.116	-49	73.5	66.0	792	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	33	0.34	0.34	125.00	9187.50	3650.40	5537.10	1.88	9.48	443.39	-51
14.696	2.116	-50	74.5	67.0	804	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	33.5	0.33	0.33	125.00	9312.50	3712.80	5599.70	1.86	9.59	452.98	-52
14.696	2.116	-51	75.5	68.0	816	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	34	0.32	0.32	125.00	9437.50	3775.20	5662.30	1.84	9.70	462.69	-53
14.696	2.116	-52	76.5	69.0	828	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	34.5	0.32	0.32	125.00	9562.50	3837.60	5724.90	1.81	9.81	472.50	-54
14.696	2.116	-53	77.5	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.31	0.31	125.00	9687.50	3900.00	5787.50	1.79	9.92	482.42	-55
14.696	2.116	-54	78.5	71.0	852	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	35.5	0.30	0.30	125.00	9812.50	3962.40	5850.10	1.76	10.03	492.46	-56
14.696	2.116	-55	79.5	72.0	864	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	36	0.29	0.29	125.00	9937.50	4024.80	5912.70	1.74	10.14	502.60	-57
14.696	2.116	-56	80.5	73.0	876	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	36.5	0.29	0.29	125.00	10062.50	4087.20	5975.30	1.71	10.25	512.86	-58
14.696	2.116	-57	81.5	74.0	888	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	37	0.28	0.28	125.00	10187.50	4149.60	6037.90	1.68	10.36	523.22	-59
14.696	2.116	-58	82.5	75.0	900	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	37.5	0.27	0.27	125.00	10312.50	4212.00	6100.50	1.66	10.48	533.70	-60
14.696	2.116	-59	83.5	76.0	912	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	38	0.26	0.26	125.00	10437.50	4274.40	6163.10	1.63	10.59	544.28	-61
14.696	2.116	-60	84.5	77.0	924	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	38.5	0.26	0.26	125.00	10562.50	4336.80	6225.70	1.60	10.70	554.98	-62
14.696	2.116	-61	85.5	78.0	936	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	39	0.25	0.25	125.00	10687.50	4399.20	6288.30	1.57	10.81	565.78	-63
14.696	2.116	-62	86.5	79.0	948	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	39.5	0.24	0.25	125.00	10812.50	4461.60	6350.90	1.59	10.92	576.70	-64
14.696	2.116	-63	87.5	80.0	960	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	40	0.23	0.25	125.00	10937.50	4524.00	6413.50	1.60	11.01	587.71	-65
14.696	2.116	-64	88.5	81.0	972	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	40.5	0.23	0.25	125.00	11062.50	4586.40	6476.10	1.62	11.09	598.80	-66
14.696	2.116	-65	89.5	82.0	984	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	41	0.22	0.25	125.00	11187.50	4648.80	6538.70	1.63	11.17	609.97	-67
14.696	2.116	-66	90.5	83.0	996	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	41.5	0.21	0.25	125.00	11312.50	4711.20	6601.30	1.65	11.25	621.22	-68
14.696	2.116	-67	91.5	84.0	1008	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	42	0.21	0.25	125.00	11437.50	4773.60	6663.90	1.67	11.33	632.55	-69
14.696	2.116	-68	92.5	85.0	1020	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	42.5	0.20	0.25	125.00	11562.50	4836.00	6726.50	1.68	11.40	643.95	-70
14.696	2.116	-69	93.5	86.0	1032	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	43	0.19	0.25	125.00	11687.50	4898.40	6789.10	1.70	11.48	655.43	-71
14.696	2.116	-70	94.5	87.0	1044	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	43.5	0.19	0.25	125.00	11812.50	4960.80	6851.70	1.71	11.56	666.98	-72
14.696	2.116	-71	95.5	88.0	1056	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	44	0.18	0.25	125.00	11937.50	5023.20	6914.30	1.73	11.63	678.62	-73
14.696	2.116	-72	96.5	89.0	1068	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	44.5	0.17	0.25	125.00	12062.50	5085.60	6976.90	1.74	11.71	690.32	-74
14.696	2.116	-73	97.5	90.0	1080	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	45	0.16	0.25	125.00	12187.50	5148.00	7039.50	1.76	11.78	702.10	-75
14.696	2.116	-74	98.5	91.0	1092	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	45.5	0.16	0.25	125.00	12312.50	5210.40	7102.10	1.78	11.85	713.96	-76
14.696	2.116	-75	99.5	92.0	1104	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	46	0.15	0.25	125.00	12437.50	5272.80	7164.70	1.79	11.93	725.88	-77
14.696	2.116	-76	100.5	93.0	1116	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	46.5	0.14	0.25	125.00	12562.50	5335.20	7227.30	1.81	12.00	737.88	-78
14.696	2.116	-77	101.5	94.0	1128	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	47	0.14	0.25	125.00	12687.50	5397.60	7289.90	1.82	12.07	749.95	-79
14.696	2.116	-78	102.5	95.0	1140	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	47.5	0.13	0.25	125.00	12812.50	5460.00	7352.50	1.84	12.14	762.09	-80
14.696	2.116	-79	103.5	96.0	1152	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	48	0.12	0.25	125.00	12937.50	5522.40	7415.10	1.85	12.21	774.31	-81
14.696	2.116	-80	104.5	97.0	1164	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	48.5	0.12	0.25	125.00	13062.50	5584.80	7477.70	1.87	12.28	786.59	-82
14.696	2.116	-81	105.5	98.0	1176	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	49	0.11	0.25	125.00	13187.50	5647.20	7540.30	1.89	12.35	798.94	-83
14.696	2.116	-82	106.5	99.0	1188	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	49.5	0.10	0.25	125.00	13312.50	5709.60	7602.90	1.90	12.42	811.36	-84
14.696	2.116	-83	107.5	100.0	1200	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	50	0.10	0.25	125.00	13437.50	5772.00	7665.50	1.92	12.49	823.85	-85
14.696	2.116	-84	108.5	101.0	1212	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	50.5	0.09	0.25	125.00	13562.50	5834.40	7728.10	1.93	12.56	836.41	-86
14.696	2.116	-85	109.5	102.0	1224	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	51	0.08	0.25	125.00	13687.50	5896.80	7790.70	1.95	12.62	849.03	-87
14.696	2.116	-86	110.5	103.0	1236	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	51.5	0.08	0.25	125.00	13812.50	5959.20	7853.30	1.96	12.69	861.72	-88
14.696	2.116	-87	111.5	104.0	1248	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	52	0.07	0.25	125.00	13937.50	6021.60	7915.90	1.98	12.76	874.47	-89
14.696	2.116	-88	112.5	105.0	1260	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	52.5	0.07	0.25	125.00	14062.50	6084.00	7978.50	1.99	12.82	887.29	-90
14.696	2.116	-89	113.5	106.0	1272	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	53	0.06	0.25	125.00	14187.50	6146.40	8041.10	2.01	12.88	900.18	-91
14.696	2.116	-90	114.5	107.0	1284	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	53.5	0.05	0.25	125.00	14312.50	6208.80	8103.70	2.03	12.95	913.13	-92
14.696	2.116	-91	115.5	108.0	1296	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	54	0.05	0.25	125.00	14437.50	6271.20	8166.30	2.04	13.01	926.14	-93
14.696	2.116	-92	116.5	109.0	1308	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	54.5	0.04	0.25	125.00	14562.50	6333.60	8228.90	2.06	13.07	939.21	-94
14.696	2.116	-93	117.5	110.0	1320	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	55	0.03	0.25	125.00	14687.50	6396.00	8291.50	2.07	13.14	952.35	-95
14.696	2.116	-94	118.5	111.0	1332	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	55.5	0.03	0.25	125.00	14812.50	6458.40	8354.10	2.09	13.20	965.55	-96
14.696	2.116	-95	119.5	112.0	1344	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	56	0.02	0.25	125.00	14937.50	6520.80	8416.70	2.10	13.26	978.81	-97
14.696	2.116	-96	120.5	113.0	1356	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	56.5	0.02	0.25	125.00	15062.50	6583.20	8479.30	2.12	13.32	992.13	-98
14.696	2.116	-97	121.5	114.0	1368	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	57	0.01	0.25	125.00	15187.50	6645.60	8541.90	2.14	13.38	1005.50	-99
14.696	2.116	-98	122.5	115.0	1380	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	57.5	0.00	0.25	125.00	15312.50	6708.00	8604.50	2.15	13.44	1018.94	-100
14.696	2.116	-99	123.5	116.0	1392	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	58	0.00	0.25	125.00	15437.50	6770.40	8667.10	2.17	13.50	1032.44	-101
14.696	2.116	-100	124.5	117.0	1404	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	58.5	-0.01	0.25	125.00	15562.50	6832.80	8729.70	2.18	13.55	1045.99	-102
14.696	2.116	-101	125.5	118.0	1416	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	59	-0.02	0.25	125.00	15687.50	6895.20	8792.30	2.20	13.61	1059.60	-103
14.696	2.116	-102	126.5	119.0	1428	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	59.5	-0.02	0.25	125.00	15812.50	6957.60	8854.90	2.21	13.67	1073.27	-104
14.696	2.116	-103	127.5	120.0	1440	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	60	-0.03	0.25	125.00	15937.50	7020.00	8917.50	2.23	13.72	1087.00	-105
14.696	2.116	-104	128.5	121.0	1452	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	60.5	-0.03	0.25	125.00	16062.50	7082.40	8980.10	2.25	13.78	1100.78	-106
14.696	2.116	-105	129.5	122.0	1464	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	61	-0.04	0.25	125.00	16187.50	7144.80	9042.70	2.26	13.83	1114.61	-107
14.696	2.116	-106	130.5	123.0	1476	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	61.5	-0.05	0.25	125.00	16312.50	7207.20	9105.30	2.28	13.89	1128.50	-108
14.696	2.116	-107	131.5	124.0	1488	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	62	-0.05	0.25	125.00	16437.50	7269.60	9167.90	2.29	13.94	1142.44	-109
14.696	2.116	-108	132.5	125.0	1500	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	62.5	-0.06	0.25	125.00	16562.50	7332.00	9230.50	2.31	14.00	1156.44	-110
14.696	2.116	-109	133.5	126.0	1512	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	63	-0.06	0.25	125.00	16687.50	7394.40	9293.10	2.32	14.05	1170.48	-111
14.696	2.116	-110	134.5	127.0	1524	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	63.5	-0.07	0.25	125.00	16812.50	7456.80	9355.70	2.34	14.10	1184.58	-112
14.696	2.116	-111	135.5	128.0	1536	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	64	-0.07	0.25	125.00	16937.50	7519.20	9418.30	2.35	14.15	1198.73	-113
14.696	2.116	-112	136.5	129.0	1548	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	64.5	-0.08	0.25	125.00	17062.50	7581.60	9480.90	2.37	14.20	1212.93	-114
14.696	2.116	-113	137.5	130.0	1560	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	65	-0.09	0.25	125.00	17187.50	7644.00	9543.50	2.39	14.25	1227.18	-115

23rd AVE. Abut 5 WW Left

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	31.00
Bottom of footing elevation / Pile top elevation (feet)	25.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-34.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	Cohesive Soil α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Cohesionless Soil Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	25	5.75	0.0	0	2.75	19.10	1.299	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	718.75	0.00	718.75	0.00	0.00	0.00	23
14.696	2.116	24	6.75	1.0	12	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	843.75	0.00	843.75	0.00	0.00	0.00	22
14.696	2.116	23	7.75	2.0	24	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.75	0.75	125.00	968.75	0.00	968.75	0.73	7.60	7.60	21
14.696	2.116	22	8.75	3.0	36	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.73	0.73	125.00	1093.75	0.00	1093.75	0.80	7.60	15.21	20
14.696	2.116	21	9.75	4.0	48	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.72	0.72	125.00	1218.75	0.00	1218.75	0.88	7.60	22.81	19
14.696	2.116	20	10.75	5.0	60	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.70	0.70	125.00	1343.75	0.00	1343.75	0.95	7.60	30.41	18
14.696	2.116	19	11.75	6.0	72	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.69	0.69	125.00	1468.75	0.00	1468.75	1.01	7.60	38.01	17
14.696	2.116	18	12.75	7.0	84	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.68	0.68	125.00	1593.75	0.00	1593.75	1.08	7.60	45.62	16
14.696	2.116	17	13.75	8.0	96	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.67	0.67	125.00	1718.75	0.00	1718.75	1.14	7.60	53.22	15
14.696	2.116	16	14.75	9.0	108	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.65	0.65	125.00	1843.75	0.00	1843.75	1.21	7.60	60.82	14
14.696	2.116	15	15.75	10.0	120	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.64	0.64	125.00	1968.75	0.00	1968.75	1.26	7.60	68.42	13
14.696	2.116	14	16.75	11.0	132	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.63	0.63	125.00	2093.75	0.00	2093.75	1.32	7.60	76.03	12
14.696	2.116	13	17.75	12.0	144	2.15	14.93	1.016	0	0.55	0.55	1.183	8.21	10	0.62	0.62	125.00	2218.75	0.00	2218.75	1.38	7.43	83.46	11
14.696	2.116	12	18.75	13.0	156	2.10	14.58	0.992	0	0.55	0.55	1.155	8.02	10	0.61	0.61	125.00	2343.75	0.00	2343.75	1.43	7.26	90.71	10
14.696	2.116	11	19.75	14.0	168	2.05	14.24	0.969	0	0.55	0.55	1.128	7.83	10	0.60	0.60	125.00	2468.75	0.00	2468.75	1.48	7.08	97.80	9
14.696	2.116	10	20.75	15.0	180	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.59	0.59	125.00	2593.75	0.00	2593.75	1.53	6.91	104.71	8
14.696	2.116	9	21.75	16.0	192	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.58	0.58	125.00	2718.75	46.80	2671.95	1.55	6.74	111.45	7
14.696	2.116	8	22.75	17.0	204	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.57	0.57	125.00	2843.75	109.20	2734.55	1.56	6.57	118.01	6
14.696	2.116	7	23.75	18.0	216	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.56	0.56	125.00	2968.75	171.60	2797.15	1.57	6.39	124.41	5
14.696	2.116	6	24.75	19.0	228	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.55	0.55	125.00	3093.75	234.00	2859.75	1.58	6.22	130.63	4
14.696	2.116	5	25.75	20.0	240	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.54	0.54	125.00	3218.75	296.40	2922.35	1.59	6.05	136.67	3
14.696	2.116	4	26.75	21.0	252	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10.5	0.56	0.56	125.00	3343.75	358.80	2984.95	1.67	5.87	142.55	2
14.696	2.116	3	27.75	22.0	264	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	11	0.58	0.58	125.00	3468.75	421.20	3047.55	1.76	5.70	148.25	1
14.696	2.116	2	28.75	23.0	276	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	11.5	0.59	0.59	125.00	3593.75	483.60	3110.15	1.85	5.53	153.78	0
14.696	2.116	1	29.75	24.0	288	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	12	0.61	0.61	125.00	3718.75	546.00	3172.75	1.93	5.36	159.14	-1
14.696	2.116	0	30.75	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.62	0.62	125.00	3843.75	608.40	3235.35	2.02	5.18	164.32	-2
14.696	2.116	-1	31.75	26.0	312	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13	0.64	0.64	125.00	3968.75	670.80	3297.95	2.11	5.18	169.50	-3
14.696	2.116	-2	32.75	27.0	324	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13.5	0.65	0.65	125.00	4093.75	733.20	3360.55	2.20	5.18	174.69	-4
14.696	2.116	-3	33.75	28.0	336	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	14	0.67	0.67	125.00	4218.75	795.60	3423.15	2.28	5.18	179.87	-5
14.696	2.116	-4	34.75	29.0	348	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	14.5	0.68	0.68	125.00	4343.75	858.00	3485.75	2.37	5.18	185.06	-6
14.696	2.116	-5	35.75	30.0	360	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	15	0.69	0.69	125.00	4468.75	920.40	3548.35	2.45	5.18	190.24	-7
14.696	2.116	-6	36.75	31.0	372	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	15.5	0.68	0.68	125.00	4593.75	982.80	3610.95	2.46	5.18	195.42	-8
14.696	2.116	-7	37.75	32.0	384	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	16	0.67	0.67	125.00	4718.75	1045.20	3673.55	2.46	5.18	200.61	-9
14.696	2.116	-8	38.75	33.0	396	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	16.5	0.66	0.66	125.00	4843.75	1107.60	3736.15	2.46	5.18	205.79	-10
14.696	2.116	-9	39.75	34.0	408	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	17	0.65	0.65	125.00	4968.75	1170.00	3798.75	2.46	5.18	210.97	-11
14.696	2.116	-10	40.75	35.0	420	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	17.5	0.64	0.64	125.00	5093.75	1232.40	3861.35	2.46	5.18	216.16	-12
14.696	2.116	-11	41.75	36.0	432	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	18	0.63	0.63	125.00	5218.75	1294.80	3923.95	2.46	5.29	221.45	-13
14.696	2.116	-12	42.75	37.0	444	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	18.5	0.62	0.62	125.00	5343.75	1357.20	3986.55	2.45	5.40	226.85	-14
14.696	2.116	-13	43.75	38.0	456	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	19	0.61	0.61	125.00	5468.75	1419.60	4049.15	2.45	5.51	232.36	-15
14.696	2.116	-14	44.75	39.0	468	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	19.5	0.60	0.60	125.00	5593.75	1482.00	4111.75	2.45	5.62	237.98	-16
14.696	2.116	-15	45.75	40.0	480	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	20	0.59	0.59	125.00	5718.75	1544.40	4174.35	2.44	5.73	243.71	-17
14.696	2.116	-16	46.75	41.0	492	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	20.5	0.58	0.58	125.00	5843.75	1606.80	4236.95	2.44	5.84	249.55	-18
14.696	2.116	-17	47.75	42.0	504	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	21	0.57	0.57	125.00	5968.75	1669.20	4299.55	2.43	5.95	255.50	-19
14.696	2.116	-18	48.75	43.0	516	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	21.5	0.56	0.56	125.00	6093.75	1731.60	4362.15	2.42	6.06	261.56	-20
14.696	2.116	-19	49.75	44.0	528	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	22	0.55	0.55	125.00	6218.75	1794.00	4424.75	2.42	6.17	267.74	-21
14.696	2.116	-20	50.75	45.0	540	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	22.5	0.54	0.54	125.00	6343.75	1856.40	4487.35	2.41	6.28	274.02	-22
14.696	2.116	-21	51.75	46.0	552	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	23	0.53	0.53	125.00	6468.75	1918.80	4549.95	2.40	6.39	280.41	-23
14.696	2.116	-22	52.75	47.0	564	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	23.5	0.52	0.52	125.00	6593.75	1981.20	4612.55	2.39	6.50	286.92	-24
14.696	2.116	-23	53.75	48.0	576	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	24	0.51	0.51	125.00	6718.75	2043.60	4675.15	2.38	6.61	293.53	-25
14.696	2.116	-24	54.75	49.0	588	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	24.5	0.50	0.50	125.00	6843.75	2106.00	4737.75	2.36	6.72	300.25	-26
14.696	2.116	-25	55.75	50.0	600	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	25	0.49	0.49	125.00	6968.75	2168.40	4800.35	2.35	6.83	307.09	-27
14.696	2.116	-26	56.75	51.0	612	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	25.5	0.48	0.48	125.00	7093.75	2230.80	4862.95	2.34	6.94	314.03	-28
14.696	2.116	-27	57.75	52.0	624	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	26	0.47	0.47	125.00	7218.75	2293.20	4925.55	2.33	7.06	321.09	-29
14.696	2.116	-28	58.75	53.0	636	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	26.5	0.46	0.46	125.00	7343.75	2355.60	4988.15	2.31	7.17	328.25	-30
14.696	2.116	-29	59.75	54.0	648	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	27	0.45	0.45	125.00	7468.75	2418.00	5050.75	2.30	7.28	335.53	-31
14.696	2.116	-30	60.75	55.0	660	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	27.5	0.45	0.45	125.00	7593.75	2480.40	5113.35	2.28	7.39	342.92	-32
14.696	2.116	-31	61.75	56.0	672	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	28	0.44	0.44	125.00	7718.75	2542.80	5175.95	2.26	7.50	350.41	-33
14.696	2.116	-32	62.75	57.0	684	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	28.5	0.43	0.43	125.00	7843.75	2605.20	5238.55	2.24	7.61	358.02	-34
14.696	2.116	-33	63.75	58.0	696	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	29	0.42	0.42	125.00	7968.75	2667.60	5301.15	2.23	7.72	365.74	-35
14.696	2.116	-34	64.75	59.0	708	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	29.5	0.41	0.41	125.00	8093.75	2730.00	5363.75	2.21	7.83	373.56	-36
14.696	2.116	-35	65.75	60.0	720	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	30	0.40	0.40	125.00	8218.75	2792.40	5426.35	2.19	7.94	381.50	-37
14.696	2.116	-36	66.75	61.0	732	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	30.5	0.39	0.39	125.00	8343.75	2854.80	5488.95	2.17	8.05	389.55	-38
14.696	2.116	-37	67.75	62.0	744	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	31	0.39	0.39	125.00	8468.75	2917.20	5551.55	2.15	8.16	397.71	-39
14.696	2.116	-38	68.75	63.0	756	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	31.5	0.38	0.38	125.00	8593.75	2979.60	5614.15	2.12	8.27	405.97	-40
14.696	2.116	-39	69.75	64.0	768	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	32	0.37	0.37	125.00	8718.75	3042.00	5676.75	2.10	8.38	414.35	-41
14.696	2.116	-40	70.75	65.0	780	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	32.5	0.36	0.36	125.00	8843.75	3104.40	5739.35	2.08	8.49	422.84	-42
14.696	2.116	-41	71.75	66.0	792	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	33	0.35	0.35	125.00	8968.75	3166.80	5801.95	2.06	8.60	431.44	-43
14.696	2.116	-42	72.75	67.0	804	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	33.5	0.35	0.35	125.00	9093.75	3229.20	5864.55	2.03	8.71	440.15	-44
14.696	2.116	-43	73.75	68.0	816	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	34	0.34	0.34	125.00	9218.75	3291.60	5927.15	2.01	8.82	448.97	-45
14.696	2.116	-44	74.75	69.0	828	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	34.5	0.33	0.33	125.00	9343.75	3354.00	5989.75	1.98	8.93	457.90	-46
14.696	2.116	-45	75.75	70.0	840	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	35	0.32	0.32	125.00	9468.75	3416.40	6052.35	1.95	9.04	466.94	-47
14.696	2.116	-46	76.75	71.0	852	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	35.5	0.32	0.32	125.00	9593.75	3478.80	6114.95	1.93	9.15	476.10	-48
14.696	2.116	-47	77.75	72.0	864	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	36	0.31	0.31	125.00	9718.75	3541.20	6177.55	1.90	9.26	485.36	-49
14.696	2.116	-48	78.75	73.0	876	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	36.5	0.30	0.30	125.00	9843.75	3603.60	6240.15	1.87	9.37	494.73	-50
14.696	2.116	-49	79.75	74.0	888	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	37	0.29	0.29	125.00	9968.75	3666.00	6302.75	1.84	9.48	504.21	-51
14.696	2.116	-50	80.75	75.0	900	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	37.5	0.28	0.28	125.00	10093.75	3728.40	6365.35	1.81	9.59	513.80	-52
14.696	2.116	-51	81.75	76.0	912	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	38	0.28	0.28	125.00	10218.75	3790.80	6427.95	1.78	9.70	523.51	-53
14.696	2.116	-52	82.75	77.0	924	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	38.5	0.27	0.27	125.00	10343.75	3853.20	6490.55	1.75	9.81	533.32	-54
14.696	2.116	-53	83.75	78.0	936	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	39	0.26	0.26	125.00	10468.75	3915.60	6553.15	1.72	9.92	543.24	-55
14.696	2.116	-54	84.75	79.0	948	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	39.5	0.25	0.25	125.00	10593.75	3978.00	6615.75	1.69	10.03	553.28	-56
14.696	2.116	-55	85.75	80.0	960	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	40	0.25	0.25	125.00	10718.75	4040.40	6678.35	1.67	10.14	563.42	-57
14.696	2.116	-56	86.75	81.0	972	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	40.5	0.24	0.25	125.00	10843.75	4102.80	6740.95	1.69	10.25	573.68	-58
14.696	2.116	-57	87.75	82.0	984	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	41	0.23	0.25	125.00	10968.75	4165.20	6803.55	1.70	10.36	584.04	-59
14.696	2.116	-58	88.75	83.0	996	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	41.5	0.23	0.25	125.00	11093.75	4227.60	6866.15	1.72	10.48	594.52	-60
14.696	2.116	-59	89.75	84.0	1008	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	42	0.22	0.25	125.00	11218.75	4290.00	6928.75	1.73	10.59	605.10	-61
14.696	2.116	-60	90.75	85.0	1020	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	42.5	0.21	0.25	125.00	11343.75	4352.40	6991.35	1.75	10.70	615.80	-62
14.696	2.116	-61	91.75	86.0	1032	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	43	0.20	0.25	125.00	11468.75	4414.80	7053.95	1.76	10.81	626.60	-63
14.696	2.116	-62	92.75	87.0	1044	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	43.5	0.20	0.25	125.00	11593.75	4477.20	7116.55	1.78	10.92	637.52	-64
14.696	2.116	-63	93.75	88.0	1056	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	44	0.19	0.25	125.00	11718.75	4539.60	7179.15	1.79	11.01	648.53	-65
14.696	2.116	-64	94.75	89.0	1068	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	44.5	0.18	0.25	125.00	11843.75	4602.00	7241.75	1.81	11.09	659.62	-66
14.696	2.116	-65	95.75	90.0	1080	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	45	0.18	0.25	125.00	11968.75	4664.40	7304.35	1.83	11.17	670.79	-67
14.696	2.116	-66	96.75	91.0	1092	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	45.5	0.17	0.25	125.00	12093.75	4726.80	7366.95	1.84	11.25	682.04	-68
14.696	2.116	-67	97.75	92.0	1104	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	46	0.16	0.25	125.00	12218.75	4789.20	7429.55	1.86	11.33	693.37	-69
14.696	2.116	-68	98.75	93.0	1116	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	46.5	0.16	0.25	125.00	12343.75	4851.60	7492.15	1.87	11.40	704.77	-70
14.696	2.116	-69	99.75	94.0	1128	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	47	0.15	0.25	125.00	12468.75	4914.00	7554.75	1.89	11.48	716.25	-71
14.696	2.116	-70	100.75	95.0	1140	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	47.5	0.14	0.25	125.00	12593.75	4976.40	7617.35	1.90	11.56	727.81	-72
14.696	2.116	-71	101.75	96.0	1152	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	48	0.14	0.25	125.00	12718.75	5038.80	7679.95	1.92	11.63	739.44	-73
14.696	2.116	-72	102.75	97.0	1164	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	48.5	0.13	0.25	125.00	12843.75	5101.20	7742.55	1.94	11.71	751.14	-74
14.696	2.116	-73	103.75	98.0	1176	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	49	0.12	0.25	125.00	12968.75	5163.60	7805.15	1.95	11.78	762.92	-75
14.696	2.116	-74	104.75	99.0	1188	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	49.5	0.12	0.25	125.00	13093.75	5226.00	7867.75	1.97	11.85	774.78	-76
14.696	2.116	-75	105.75	100.0	1200	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	50	0.11	0.25	125.00	13218.75	5288.40	7930.35	1.98	11.93	786.70	-77
14.696	2.116	-76	106.75	101.0	1212	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	50.5	0.10	0.25	125.00	13343.75	5350.80	7992.95	2.00	12.00	798.70	-78
14.696	2.116	-77	107.75	102.0	1224	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	51	0.10	0.25	125.00	13468.75	5413.20	8055.55	2.01	12.07	810.77	-79
14.696	2.116	-78	108.75	103.0	1236	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	51.5	0.09	0.25	125.00	13593.75	5475.60	8118.15	2.03	12.14	822.92	-80
14.696	2.116	-79	109.75	104.0	1248	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	52	0.08	0.25	125.00	13718.75	5538.00	8180.75	2.05	12.21	835.13	-81
14.696	2.116	-80	110.75	105.0	1260	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	52.5	0.08	0.25	125.00	13843.75	5600.40	8243.35	2.06	12.28	847.41	-82
14.696	2.116	-81	111.75	106.0	1272	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	53	0.07	0.25	125.00	13968.75	5662.80	8305.95	2.08	12.35	859.76	-83
14.696	2.116	-82	112.75	107.0	1284	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	53.5	0.06	0.25	125.00	14093.75	5725.20	8368.55	2.09	12.42	872.18	-84
14.696	2.116	-83	113.75	108.0	1296	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	54	0.06	0.25	125.00	14218.75	5787.60	8431.15	2.11	12.49	884.67	-85
14.696	2.116	-84	114.75	109.0	1308	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	54.5	0.05	0.25	125.00	14343.75	5850.00	8493.75	2.12	12.56	897.23	-86
14.696	2.116	-85	115.75	110.0	1320	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	55	0.04	0.25	125.00	14468.75	5912.40	8556.35	2.14	12.62	909.85	-87
14.696	2.116	-86	116.75	111.0	1332	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	55.5	0.04	0.25	125.00	14593.75	5974.80	8618.95	2.15	12.69	922.54	-88
14.696	2.116	-87	117.75	112.0	1344	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	56	0.03	0.25	125.00	14718.75	6037.20	8681.55	2.17	12.76	935.29	-89
14.696	2.116	-88	118.75	113.0	1356	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	56.5	0.03	0.25	125.00	14843.75	6099.60	8744.15	2.19	12.82	948.12	-90
14.696	2.116	-89	119.75	114.0	1368	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	57	0.02	0.25	125.00	14968.75	6162.00	8806.75	2.20	12.88	961.00	-91
14.696	2.116	-90	120.75	115.0	1380	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	57.5	0.01	0.25	125.00	15093.75	6224.40	8869.35	2.22	12.95	973.95	-92
14.696	2.116	-91	121.75	116.0	1392	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	58	0.01	0.25	125.00	15218.75	6286.80	8931.95	2.23	13.01	986.96	-93
14.696	2.116	-92	122.75	117.0	1404	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	58.5	0.00	0.25	125.00	15343.75	6349.20	8994.55	2.25	13.07	1000.03	-94
14.696	2.116	-93	123.75	118.0	1416	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	59	0.00	0.25	125.00	15468.75	6411.60	9057.15	2.26	13.14	1013.17	-95
14.696	2.116	-94	124.75	119.0	1428	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	59.5	-0.01	0.25	125.00	15593.75	6474.00	9119.75	2.28	13.20	1026.37	-96
14.696	2.116	-95	125.75	120.0	1440	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	60	-0.02	0.25	125.00	15718.75	6536.40	9182.35	2.30	13.26	1039.63	-97
14.696	2.116	-96	126.75	121.0	1452	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	60.5	-0.02	0.25	125.00	15843.75	6598.80	9244.95	2.31	13.32	1052.95	-98
14.696	2.116	-97	127.75	122.0	1464	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	61	-0.03	0.25	125.00	15968.75	6661.20	9307.55	2.33	13.38	1066.33	-99
14.696	2.116	-98	128.75	123.0	1476	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	61.5	-0.03	0.25	125.00	16093.75	6723.60	9370.15	2.34	13.44	1079.76	-100
14.696	2.116	-99	129.75	124.0	1488	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	62	-0.04	0.25	125.00	16218.75	6786.00	9432.75	2.36	13.50	1093.26	-101
14.696	2.116	-100	130.75	125.0	1500	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	62.5	-0.05	0.25	125.00	16343.75	6848.40	9495.35	2.37	13.55	1106.81	-102
14.696	2.116	-101	131.75	126.0	1512	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	63	-0.05	0.25	125.00	16468.75	6910.80	9557.95	2.39	13.61	1120.43	-103
14.696	2.116	-102	132.75	127.0	1524	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	63.5	-0.06	0.25	125.00	16593.75	6973.20	9620.55	2.41	13.67	1134.09	-104
14.696	2.116	-103	133.75	128.0	1536	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	64	-0.06	0.25	125.00	16718.75	7035.60	9683.15	2.42	13.72	1147.82	-105
14.696	2.116	-104	134.75	129.0	1548	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	64.5	-0.07	0.25	125.00	16843.75	7098.00	9745.75	2.44	13.78	1161.60	-106
14.696	2.116	-105	135.75	130.0	1560	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	65	-0.08	0.25	125.00	16968.75	7160.40	9808.35	2.45	13.83	1175.43	-107

23rd AVE. RW 20a

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	32.00
Bottom of footing elevation / Pile top elevation (feet)	16.00
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-44.00

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	16	16	0.0	0	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.64	0.64	125.00	2000.00	0.00	2000.00	0.00	0.00	0.00	14
14.696	2.116	15	17	1.0	12	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.63	0.63	125.00	2125.00	0.00	2125.00	0.00	0.00	0.00	13
14.696	2.116	14	18	2.0	24	2.20	15.28	1.040	0	0.55	0.55	1.210	8.40	10	0.62	0.62	125.00	2250.00	0.00	2250.00	1.39	7.60	7.60	12
14.696	2.116	13	19	3.0	36	2.15	14.93	1.016	0	0.55	0.55	1.183	8.21	10	0.61	0.61	125.00	2375.00	0.00	2375.00	1.44	7.43	15.03	11
14.696	2.116	12	20	4.0	48	2.10	14.58	0.992	0	0.55	0.55	1.155	8.02	10	0.60	0.60	125.00	2500.00	0.00	2500.00	1.49	7.26	22.29	10
14.696	2.116	11	21	5.0	60	2.05	14.24	0.969	0	0.55	0.55	1.128	7.83	10	0.59	0.59	125.00	2625.00	0.00	2625.00	1.54	7.08	29.37	9
14.696	2.116	10	22	6.0	72	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.58	0.58	125.00	2750.00	0.00	2750.00	1.59	6.91	36.29	8
14.696	2.116	9	23	7.0	84	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.57	0.57	125.00	2875.00	62.40	2812.60	1.60	6.74	43.02	7
14.696	2.116	8	24	8.0	96	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.56	0.56	125.00	3000.00	124.80	2875.20	1.61	6.57	49.59	6
14.696	2.116	7	25	9.0	108	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.55	0.55	125.00	3125.00	187.20	2937.80	1.61	6.39	55.98	5
14.696	2.116	6	26	10.0	120	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.54	0.54	125.00	3250.00	249.60	3000.40	1.62	6.22	62.20	4
14.696	2.116	5	27	11.0	132	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.53	0.53	125.00	3375.00	312.00	3063.00	1.63	6.05	68.25	3
14.696	2.116	4	28	12.0	144	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.52	0.52	125.00	3500.00	374.40	3125.60	1.63	5.87	74.13	2
14.696	2.116	3	29	13.0	156	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.51	0.51	125.00	3625.00	436.80	3188.20	1.64	5.70	79.83	1
14.696	2.116	2	30	14.0	168	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.51	0.51	125.00	3750.00	499.20	3250.80	1.65	5.53	85.36	0
14.696	2.116	1	31	15.0	180	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.50	0.50	125.00	3875.00	561.60	3313.40	1.65	5.36	90.71	-1
14.696	2.116	0	32	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.49	0.49	125.00	4000.00	624.00	3376.00	1.65	5.18	95.90	-2
14.696	2.116	-1	33	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.48	0.48	125.00	4125.00	686.40	3438.60	1.66	5.18	101.08	-3
14.696	2.116	-2	34	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.47	0.47	125.00	4250.00	748.80	3501.20	1.66	5.18	106.26	-4
14.696	2.116	-3	35	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.47	0.47	125.00	4375.00	811.20	3563.80	1.66	5.18	111.45	-5
14.696	2.116	-4	36	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.46	0.46	125.00	4500.00	873.60	3626.40	1.66	5.18	116.63	-6
14.696	2.116	-5	37	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.47	0.47	125.00	4625.00	936.00	3689.00	1.75	5.18	121.82	-7
14.696	2.116	-6	38	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.49	0.49	125.00	4750.00	998.40	3751.60	1.83	5.18	127.00	-8
14.696	2.116	-7	39	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.50	0.50	125.00	4875.00	1060.80	3814.20	1.92	5.18	132.18	-9
14.696	2.116	-8	40	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.52	0.52	125.00	5000.00	1123.20	3876.80	2.00	5.18	137.37	-10
14.696	2.116	-9	41	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.53	0.53	125.00	5125.00	1185.60	3939.40	2.08	5.18	142.55	-11
14.696	2.116	-10	42	26.0	312	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	13	0.54	0.54	125.00	5250.00	1248.00	4002.00	2.16	5.18	147.73	-12
14.696	2.116	-11	43	27.0	324	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	13.5	0.55	0.55	125.00	5375.00	1310.40	4064.60	2.24	5.29	153.02	-13
14.696	2.116	-12	44	28.0	336	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	14	0.56	0.56	125.00	5500.00	1372.80	4127.20	2.32	5.40	158.42	-14
14.696	2.116	-13	45	29.0	348	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	14.5	0.57	0.57	125.00	5625.00	1435.20	4189.80	2.40	5.51	163.93	-15
14.696	2.116	-14	46	30.0	360	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	15	0.58	0.58	125.00	5750.00	1497.60	4252.40	2.48	5.62	169.55	-16
14.696	2.116	-15	47	31.0	372	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	15.5	0.57	0.57	125.00	5875.00	1560.00	4315.00	2.47	5.73	175.29	-17
14.696	2.116	-16	48	32.0	384	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	16	0.56	0.56	125.00	6000.00	1622.40	4377.60	2.46	5.84	181.13	-18
14.696	2.116	-17	49	33.0	396	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	16.5	0.55	0.55	125.00	6125.00	1684.80	4440.20	2.46	5.95	187.08	-19
14.696	2.116	-18	50	34.0	408	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	17	0.54	0.54	125.00	6250.00	1747.20	4502.80	2.45	6.06	193.14	-20
14.696	2.116	-19	51	35.0	420	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	17.5	0.53	0.53	125.00	6375.00	1809.60	4565.40	2.44	6.17	199.31	-21
14.696	2.116	-20	52	36.0	432	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	18	0.52	0.52	125.00	6500.00	1872.00	4628.00	2.43	6.28	205.60	-22
14.696	2.116	-21	53	37.0	444	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	18.5	0.52	0.52	125.00	6625.00	1934.40	4690.60	2.42	6.39	211.99	-23
14.696	2.116	-22	54	38.0	456	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	19	0.51	0.51	125.00	6750.00	1996.80	4753.20	2.41	6.50	218.49	-24
14.696	2.116	-23	55	39.0	468	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	19.5	0.50	0.50	125.00	6875.00	2059.20	4815.80	2.39	6.61	225.11	-25
14.696	2.116	-24	56	40.0	480	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	20	0.49	0.49	125.00	7000.00	2121.60	4878.40	2.38	6.72	231.83	-26
14.696	2.116	-25	57	41.0	492	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	20.5	0.48	0.48	125.00	7125.00	2184.00	4941.00	2.37	6.83	238.66	-27
14.696	2.116	-26	58	42.0	504	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	21	0.47	0.47	125.00	7250.00	2246.40	5003.60	2.35	6.94	245.61	-28
14.696	2.116	-27	59	43.0	516	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	21.5	0.46	0.46	125.00	7375.00	2308.80	5066.20	2.34	7.06	252.66	-29
14.696	2.116	-28	60	44.0	528	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	22	0.45	0.45	125.00	7500.00	2371.20	5128.80	2.32	7.17	259.83	-30
14.696	2.116	-29	61	45.0	540	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	22.5	0.44	0.44	125.00	7625.00	2433.60	5191.40	2.30	7.28	267.11	-31
14.696	2.116	-30	62	46.0	552	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	23	0.43	0.43	125.00	7750.00	2496.00	5254.00	2.29	7.39	274.49	-32
14.696	2.116	-31	63	47.0	564	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	23.5	0.43	0.43	125.00	7875.00	2558.40	5316.60	2.27	7.50	281.99	-33
14.696	2.116	-32	64	48.0	576	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	24	0.42	0.42	125.00	8000.00	2620.80	5379.20	2.25	7.61	289.59	-34
14.696	2.116	-33	65	49.0	588	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	24.5	0.41	0.41	125.00	8125.00	2683.20	5441.80	2.23	7.72	297.31	-35
14.696	2.116	-34	66	50.0	600	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	25	0.40	0.40	125.00	8250.00	2745.60	5504.40	2.21	7.83	305.14	-36
14.696	2.116	-35	67	51.0	612	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	25.5	0.39	0.39	125.00	8375.00	2808.00	5567.00	2.19	7.94	313.08	-37
14.696	2.116	-36	68	52.0	624	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	26	0.38	0.38	125.00	8500.00	2870.40	5629.60	2.17	8.05	321.12	-38
14.696	2.116	-37	69	53.0	636	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	26.5	0.38	0.38	125.00	8625.00	2932.80	5692.20	2.14	8.16	329.28	-39
14.696	2.116	-38	70	54.0	648	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27	0.37	0.37	125.00	8750.00	2995.20	5754.80	2.12	8.27	337.55	-40
14.696	2.116	-39	71	55.0	660	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	27.5	0.36	0.36	125.00	8875.00	3057.60	5817.40	2.10	8.38	345.93	-41
14.696	2.116	-40	72	56.0	672	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	28	0.35	0.35	125.00	9000.00	3120.00	5880.00	2.07	8.49	354.42	-42
14.696	2.116	-41	73	57.0	684	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	28.5	0.34	0.34	125.00	9125.00	3182.40	5942.60	2.05	8.60	363.02	-43
14.696	2.116	-42	74	58.0	696	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	29	0.34	0.34	125.00	9250.00	3244.80	6005.20	2.02	8.71	371.73	-44
14.696	2.116	-43	75	59.0	708	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	29.5	0.33	0.33	125.00	9375.00	3307.20	6067.80	1.99	8.82	380.55	-45
14.696	2.116	-44	76	60.0	720	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	30	0.32	0.32	125.00	9500.00	3369.60	6130.40	1.97	8.93	389.48	-46
14.696	2.116	-45	77	61.0	732	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	30.5	0.31	0.31	125.00	9625.00	3432.00	6193.00	1.94	9.04	398.52	-47
14.696	2.116	-46	78	62.0	744	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	31	0.31	0.31	125.00	9750.00	3494.40	6255.60	1.91	9.15	407.67	-48
14.696	2.116	-47	79	63.0	756	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	31.5	0.30	0.30	125.00	9875.00	3556.80	6318.20	1.88	9.26	416.93	-49
14.696	2.116	-48	80	64.0	768	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	32	0.29	0.29	125.00	10000.00	3619.20	6380.80	1.85	9.37	426.31	-50
14.696	2.116	-49	81	65.0	780	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	32.5	0.28	0.28	125.00	10125.00	3681.60	6443.40	1.82	9.48	435.79	-51
14.696	2.116	-50	82	66.0	792	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	33	0.28	0.28	125.00	10250.00	3744.00	6506.00	1.79	9.59	445.38	-52
14.696	2.116	-51	83	67.0	804	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	33.5	0.27	0.27	125.00	10375.00	3806.40	6568.60	1.76	9.70	455.08	-53
14.696	2.116	-52	84	68.0	816	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	34	0.26	0.26	125.00	10500.00	3868.80	6631.20	1.73	9.81	464.90	-54
14.696	2.116	-53	85	69.0	828	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	34.5	0.25	0.25	125.00	10625.00	3931.20	6693.80	1.69	9.92	474.82	-55
14.696	2.116	-54	86	70.0	840	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	35	0.25	0.25	125.00	10750.00	3993.60	6756.40	1.69	10.03	484.85	-56
14.696	2.116	-55	87	71.0	852	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	35.5	0.24	0.25	125.00	10875.00	4056.00	6819.00	1.70	10.14	495.00	-57
14.696	2.116	-56	88	72.0	864	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	36	0.23	0.25	125.00	11000.00	4118.40	6881.60	1.72	10.25	505.25	-58
14.696	2.116	-57	89	73.0	876	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	36.5	0.22	0.25	125.00	11125.00	4180.80	6944.20	1.74	10.36	515.62	-59
14.696	2.116	-58	90	74.0	888	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	37	0.22	0.25	125.00	11250.00	4243.20	7006.80	1.75	10.48	526.09	-60
14.696	2.116	-59	91	75.0	900	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	37.5	0.21	0.25	125.00	11375.00	4305.60	7069.40	1.77	10.59	536.68	-61
14.696	2.116	-60	92	76.0	912	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	38	0.20	0.25	125.00	11500.00	4368.00	7132.00	1.78	10.70	547.37	-62
14.696	2.116	-61	93	77.0	924	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	38.5	0.20	0.25	125.00	11625.00	4430.40	7194.60	1.80	10.81	558.18	-63
14.696	2.116	-62	94	78.0	936	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	39	0.19	0.25	125.00	11750.00	4492.80	7257.20	1.81	10.92	569.10	-64
14.696	2.116	-63	95	79.0	948	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	39.5	0.18	0.25	125.00	11875.00	4555.20	7319.80	1.83	11.01	580.11	-65
14.696	2.116	-64	96	80.0	960	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	40	0.17	0.25	125.00	12000.00	4617.60	7382.40	1.85	11.09	591.20	-66
14.696	2.116	-65	97	81.0	972	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	40.5	0.17	0.25	125.00	12125.00	4680.00	7445.00	1.86	11.17	602.37	-67
14.696	2.116	-66	98	82.0	984	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	41	0.16	0.25	125.00	12250.00	4742.40	7507.60	1.88	11.25	613.62	-68
14.696	2.116	-67	99	83.0	996	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	41.5	0.15	0.25	125.00	12375.00	4804.80	7570.20	1.89	11.33	624.94	-69
14.696	2.116	-68	100	84.0	1008	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	42	0.15	0.25	125.00	12500.00	4867.20	7632.80	1.91	11.40	636.35	-70
14.696	2.116	-69	101	85.0	1020	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	42.5	0.14	0.25	125.00	12625.00	4929.60	7695.40	1.92	11.48	647.83	-71
14.696	2.116	-70	102	86.0	1032	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	43	0.13	0.25	125.00	12750.00	4992.00	7758.00	1.94	11.56	659.38	-72
14.696	2.116	-71	103	87.0	1044	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	43.5	0.13	0.25	125.00	12875.00	5054.40	7820.60	1.96	11.63	671.01	-73
14.696	2.116	-72	104	88.0	1056	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	44	0.12	0.25	125.00	13000.00	5116.80	7883.20	1.97	11.71	682.72	-74
14.696	2.116	-73	105	89.0	1068	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	44.5	0.11	0.25	125.00	13125.00	5179.20	7945.80	1.99	11.78	694.50	-75
14.696	2.116	-74	106	90.0	1080	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	45	0.11	0.25	125.00	13250.00	5241.60	8008.40	2.00	11.85	706.35	-76
14.696	2.116	-75	107	91.0	1092	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	45.5	0.10	0.25	125.00	13375.00	5304.00	8071.00	2.02	11.93	718.28	-77
14.696	2.116	-76	108	92.0	1104	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	46	0.09	0.25	125.00	13500.00	5366.40	8133.60	2.03	12.00	730.28	-78
14.696	2.116	-77	109	93.0	1116	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	46.5	0.09	0.25	125.00	13625.00	5428.80	8196.20	2.05	12.07	742.35	-79
14.696	2.116	-78	110	94.0	1128	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	47	0.08	0.25	125.00	13750.00	5491.20	8258.80	2.06	12.14	754.49	-80
14.696	2.116	-79	111	95.0	1140	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	47.5	0.07	0.25	125.00	13875.00	5553.60	8321.40	2.08	12.21	766.70	-81
14.696	2.116	-80	112	96.0	1152	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	48	0.07	0.25	125.00	14000.00	5616.00	8384.00	2.10	12.28	778.99	-82
14.696	2.116	-81	113	97.0	1164	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	48.5	0.06	0.25	125.00	14125.00	5678.40	8446.60	2.11	12.35	791.34	-83
14.696	2.116	-82	114	98.0	1176	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	49	0.06	0.25	125.00	14250.00	5740.80	8509.20	2.13	12.42	803.76	-84
14.696	2.116	-83	115	99.0	1188	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	49.5	0.05	0.25	125.00	14375.00	5803.20	8571.80	2.14	12.49	816.25	-85
14.696	2.116	-84	116	100.0	1200	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	50	0.04	0.25	125.00	14500.00	5865.60	8634.40	2.16	12.56	828.80	-86
14.696	2.116	-85	117	101.0	1212	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	50.5	0.04	0.25	125.00	14625.00	5928.00	8697.00	2.17	12.62	841.43	-87
14.696	2.116	-86	118	102.0	1224	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	51	0.03	0.25	125.00	14750.00	5990.40	8759.60	2.19	12.69	854.12	-88
14.696	2.116	-87	119	103.0	1236	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	51.5	0.02	0.25	125.00	14875.00	6052.80	8822.20	2.21	12.76	866.87	-89
14.696	2.116	-88	120	104.0	1248	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	52	0.02	0.25	125.00	15000.00	6115.20	8884.80	2.22	12.82	879.69	-90
14.696	2.116	-89	121	105.0	1260	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	52.5	0.01	0.25	125.00	15125.00	6177.60	8947.40	2.24	12.88	892.58	-91
14.696	2.116	-90	122	106.0	1272	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	53	0.01	0.25	125.00	15250.00	6240.00	9010.00	2.25	12.95	905.52	-92
14.696	2.116	-91	123	107.0	1284	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	53.5	0.00	0.25	125.00	15375.00	6302.40	9072.60	2.27	13.01	918.54	-93
14.696	2.116	-92	124	108.0	1296	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	54	-0.01	0.25	125.00	15500.00	6364.80	9135.20	2.28	13.07	931.61	-94
14.696	2.116	-93	125	109.0	1308	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	54.5	-0.01	0.25	125.00	15625.00	6427.20	9197.80	2.30	13.14	944.75	-95
14.696	2.116	-94	126	110.0	1320	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	55	-0.02	0.25	125.00	15750.00	6489.60	9260.40	2.32	13.20	957.95	-96
14.696	2.116	-95	127	111.0	1332	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	55.5	-0.02	0.25	125.00	15875.00	6552.00	9323.00	2.33	13.26	971.20	-97
14.696	2.116	-96	128	112.0	1344	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	56	-0.03	0.25	125.00	16000.00	6614.40	9385.60	2.35	13.32	984.52	-98
14.696	2.116	-97	129	113.0	1356	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	56.5	-0.04	0.25	125.00	16125.00	6676.80	9448.20	2.36	13.38	997.90	-99
14.696	2.116	-98	130	114.0	1368	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	57	-0.04	0.25	125.00	16250.00	6739.20	9510.80	2.38	13.44	1011.34	-100
14.696	2.116	-99	131	115.0	1380	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	57.5	-0.05	0.25	125.00	16375.00	6801.60	9573.40	2.39	13.50	1024.84	-101
14.696	2.116	-100	132	116.0	1392	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	58	-0.05	0.25	125.00	16500.00	6864.00	9636.00	2.41	13.55	1038.39	-102
14.696	2.116	-101	133	117.0	1404	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	58.5	-0.06	0.25	125.00	16625.00	6926.40	9698.60	2.42	13.61	1052.00	-103
14.696	2.116	-102	134	118.0	1416	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	59	-0.07	0.25	125.00	16750.00	6988.80	9761.20	2.44	13.67	1065.67	-104
14.696	2.116	-103	135	119.0	1428	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	59.5	-0.07	0.25	125.00	16875.00	7051.20	9823.80	2.46	13.72	1079.39	-105
14.696	2.116	-104	136	120.0	1440	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	60	-0.08	0.25	125.00	17000.00	7113.60	9886.40	2.47	13.78	1093.17	-106
14.696	2.116	-105	137	121.0	1452	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	60.5	-0.08	0.25	125.00	17125.00	7176.00	9949.00	2.49	13.83	1107.01	-107
14.696	2.116	-106	138	122.0	1464	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	61	-0.09	0.25	125.00	17250.00	7238.40	10011.60	2.50	13.89	1120.90	-108
14.696	2.116	-107	139	123.0	1476	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	61.5	-0.09	0.25	125.00	17375.00	7300.80	10074.20	2.52	13.94	1134.84	-109
14.696	2.116	-108	140	124.0	1488	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	62	-0.10	0.25	125.00	17500.00	7363.20	10136.80	2.53	14.00	1148.83	-110
14.696	2.116	-109	141	125.0	1500	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	62.5	-0.11	0.25	125.00	17625.00	7425.60	10199.40	2.55	14.05	1162.88	-111
14.696	2.116	-110	142	126.0	1512	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	63	-0.11	0.25	125.00	17750.00	7488.00	10262.00	2.57	14.10	1176.98	-112
14.696	2.116	-111	143	127.0	1524	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	63.5	-0.12	0.25	125.00	17875.00	7550.40	10324.60	2.58	14.15	1191.13	-113
14.696	2.116	-112	144	128.0	1536	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	64	-0.12	0.25	125.00	18000.00	7612.80	10387.20	2.60	14.20	1205.33	-114
14.696	2.116	-113	145	129.0	1548	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	64.5	-0.13	0.25	125.00	18125.00	7675.20	10449.80	2.61	14.25	1219.58	-115
14.696	2.116	-114	146	130.0	1560	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	65	-0.13	0.25	125.00	18250.00	7737.60	10512.40	2.63	14.30	1233.88	-116

23rd AVE. RW20b

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	24.00
Bottom of footing elevation / Pile top elevation (feet)	12.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-47.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	13	11.5	0.0	0	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.69	0.69	125.00	1437.50	0.00	1437.50	0.00	0.00	0.00	11
14.696	2.116	12	12.5	1.0	12	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.68	0.68	125.00	1562.50	0.00	1562.50	0.00	0.00	0.00	10
14.696	2.116	11	13.5	2.0	24	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.67	0.67	125.00	1687.50	0.00	1687.50	1.13	6.91	6.91	9
14.696	2.116	10	14.5	3.0	36	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.66	0.66	125.00	1812.50	31.20	1781.30	1.17	6.74	13.65	8
14.696	2.116	9	15.5	4.0	48	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.64	0.64	125.00	1937.50	93.60	1843.90	1.19	6.57	20.22	7
14.696	2.116	8	16.5	5.0	60	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.63	0.63	125.00	2062.50	156.00	1906.50	1.21	6.39	26.61	6
14.696	2.116	7	17.5	6.0	72	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.62	0.62	125.00	2187.50	218.40	1969.10	1.23	6.22	32.83	5
14.696	2.116	6	18.5	7.0	84	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.61	0.61	125.00	2312.50	280.80	2031.70	1.24	6.05	38.88	4
14.696	2.116	5	19.5	8.0	96	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.60	0.60	125.00	2437.50	343.20	2094.30	1.26	5.87	44.75	3
14.696	2.116	4	20.5	9.0	108	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.59	0.59	125.00	2562.50	405.60	2156.90	1.28	5.70	50.45	2
14.696	2.116	3	21.5	10.0	120	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.58	0.58	125.00	2687.50	468.00	2219.50	1.29	5.53	55.98	1
14.696	2.116	2	22.5	11.0	132	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.57	0.57	125.00	2812.50	530.40	2282.10	1.31	5.36	61.34	-1
14.696	2.116	1	23.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	592.80	2344.70	1.32	5.18	66.52	-2
14.696	2.116	-1	24.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	655.20	2407.30	1.33	5.18	71.71	-3
14.696	2.116	-2	25.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	717.60	2469.90	1.35	5.18	76.89	-4
14.696	2.116	-3	26.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	780.00	2532.50	1.36	5.18	82.07	-5
14.696	2.116	-4	27.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	842.40	2595.10	1.37	5.18	87.26	-6
14.696	2.116	-5	28.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3562.50	904.80	2657.70	1.38	5.18	92.44	-7
14.696	2.116	-6	29.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3687.50	967.20	2720.30	1.39	5.18	97.62	-8
14.696	2.116	-7	30.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.50	0.50	125.00	3812.50	1029.60	2782.90	1.40	5.18	102.81	-9
14.696	2.116	-8	31.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.49	0.49	125.00	3937.50	1092.00	2845.50	1.41	5.18	107.99	-10
14.696	2.116	-9	32.5	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.51	0.51	125.00	4062.50	1154.40	2908.10	1.48	5.18	113.18	-11
14.696	2.116	-10	33.5	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.53	0.53	125.00	4187.50	1216.80	2970.70	1.56	5.18	118.36	-12
14.696	2.116	-11	34.5	23.0	276	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	11.5	0.54	0.54	125.00	4312.50	1279.20	3033.30	1.64	5.29	123.65	-13
14.696	2.116	-12	35.5	24.0	288	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	12	0.56	0.56	125.00	4437.50	1341.60	3095.90	1.72	5.40	129.05	-14
14.696	2.116	-13	36.5	25.0	300	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	12.5	0.57	0.57	125.00	4562.50	1404.00	3158.50	1.80	5.51	134.56	-15
14.696	2.116	-14	37.5	26.0	312	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	13	0.58	0.58	125.00	4687.50	1466.40	3221.10	1.88	5.62	140.18	-16
14.696	2.116	-15	38.5	27.0	324	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	13.5	0.59	0.59	125.00	4812.50	1528.80	3283.70	1.95	5.73	145.91	-17
14.696	2.116	-16	39.5	28.0	336	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	14	0.61	0.61	125.00	4937.50	1591.20	3346.30	2.03	5.84	151.75	-18
14.696	2.116	-17	40.5	29.0	348	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	14.5	0.62	0.62	125.00	5062.50	1653.60	3408.90	2.11	5.95	157.70	-19
14.696	2.116	-18	41.5	30.0	360	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	15	0.63	0.63	125.00	5187.50	1716.00	3471.50	2.18	6.06	163.77	-20
14.696	2.116	-19	42.5	31.0	372	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	15.5	0.62	0.62	125.00	5312.50	1778.40	3534.10	2.18	6.17	169.94	-21
14.696	2.116	-20	43.5	32.0	384	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	16	0.61	0.61	125.00	5437.50	1840.80	3596.70	2.19	6.28	176.22	-22
14.696	2.116	-21	44.5	33.0	396	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	16.5	0.60	0.60	125.00	5562.50	1903.20	3659.30	2.19	6.39	182.62	-23
14.696	2.116	-22	45.5	34.0	408	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	17	0.59	0.59	125.00	5687.50	1965.60	3721.90	2.19	6.50	189.12	-24
14.696	2.116	-23	46.5	35.0	420	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	17.5	0.58	0.58	125.00	5812.50	2028.00	3784.50	2.19	6.61	195.73	-25
14.696	2.116	-24	47.5	36.0	432	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	18	0.57	0.57	125.00	5937.50	2090.40	3847.10	2.18	6.72	202.46	-26
14.696	2.116	-25	48.5	37.0	444	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	18.5	0.56	0.56	125.00	6062.50	2152.80	3909.70	2.18	6.83	209.29	-27
14.696	2.116	-26	49.5	38.0	456	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	19	0.55	0.55	125.00	6187.50	2215.20	3972.30	2.18	6.94	216.24	-28
14.696	2.116	-27	50.5	39.0	468	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	19.5	0.54	0.54	125.00	6312.50	2277.60	4034.90	2.17	7.06	223.29	-29
14.696	2.116	-28	51.5	40.0	480	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	20	0.53	0.53	125.00	6437.50	2340.00	4097.50	2.17	7.17	230.46	-30
14.696	2.116	-29	52.5	41.0	492	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	20.5	0.52	0.52	125.00	6562.50	2402.40	4160.10	2.16	7.28	237.73	-31
14.696	2.116	-30	53.5	42.0	504	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	21	0.51	0.51	125.00	6687.50	2464.80	4222.70	2.16	7.39	245.12	-32
14.696	2.116	-31	54.5	43.0	516	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	21.5	0.50	0.50	125.00	6812.50	2527.20	4285.30	2.15	7.50	252.61	-33
14.696	2.116	-32	55.5	44.0	528	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	22	0.49	0.49	125.00	6937.50	2589.60	4347.90	2.14	7.61	260.22	-34
14.696	2.116	-33	56.5	45.0	540	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	22.5	0.48	0.48	125.00	7062.50	2652.00	4410.50	2.13	7.72	267.94	-35
14.696	2.116	-34	57.5	46.0	552	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	23	0.47	0.47	125.00	7187.50	2714.40	4473.10	2.12	7.83	275.76	-36
14.696	2.116	-35	58.5	47.0	564	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	23.5	0.47	0.47	125.00	7312.50	2776.80	4535.70	2.11	7.94	283.70	-37
14.696	2.116	-36	59.5	48.0	576	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	24	0.46	0.46	125.00	7437.50	2839.20	4598.30	2.10	8.05	291.75	-38
14.696	2.116	-37	60.5	49.0	588	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	24.5	0.45	0.45	125.00	7562.50	2901.60	4660.90	2.09	8.16	299.91	-39
14.696	2.116	-38	61.5	50.0	600	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	25	0.44	0.44	125.00	7687.50	2964.00	4723.50	2.07	8.27	308.18	-40
14.696	2.116	-39	62.5	51.0	612	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	25.5	0.43	0.43	125.00	7812.50	3026.40	4786.10	2.06	8.38	316.56	-41
14.696	2.116	-40	63.5	52.0	624	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	26	0.42	0.42	125.00	7937.50	3088.80	4848.70	2.05	8.49	325.05	-42
14.696	2.116	-41	64.5	53.0	636	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	26.5	0.41	0.41	125.00	8062.50	3151.20	4911.30	2.03	8.60	333.64	-43
14.696	2.116	-42	65.5	54.0	648	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	27	0.41	0.41	125.00	8187.50	3213.60	4973.90	2.02	8.71	342.35	-44
14.696	2.116	-43	66.5	55.0	660	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	27.5	0.40	0.40	125.00	8312.50	3276.00	5036.50	2.00	8.82	351.18	-45
14.696	2.116	-44	67.5	56.0	672	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	28	0.39	0.39	125.00	8437.50	3338.40	5099.10	1.98	8.93	360.11	-46
14.696	2.116	-45	68.5	57.0	684	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	28.5	0.38	0.38	125.00	8562.50	3400.80	5161.70	1.96	9.04	369.15	-47
14.696	2.116	-46	69.5	58.0	696	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	29	0.37	0.37	125.00	8687.50	3463.20	5224.30	1.95	9.15	378.30	-48
14.696	2.116	-47	70.5	59.0	708	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	29.5	0.36	0.36	125.00	8812.50	3525.60	5286.90	1.93	9.26	387.56	-49
14.696	2.116	-48	71.5	60.0	720	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	30	0.36	0.36	125.00	8937.50	3588.00	5349.50	1.91	9.37	396.93	-50
14.696	2.116	-49	72.5	61.0	732	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	30.5	0.35	0.35	125.00	9062.50	3650.40	5412.10	1.88	9.48	406.41	-51
14.696	2.116	-50	73.5	62.0	744	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	31	0.34	0.34	125.00	9187.50	3712.80	5474.70	1.86	9.59	416.01	-52
14.696	2.116	-51	74.5	63.0	756	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	31.5	0.33	0.33	125.00	9312.50	3775.20	5537.30	1.84	9.70	425.71	-53
14.696	2.116	-52	75.5	64.0	768	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	32	0.32	0.32	125.00	9437.50	3837.60	5599.90	1.82	9.81	435.52	-54
14.696	2.116	-53	76.5	65.0	780	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	32.5	0.32	0.32	125.00	9562.50	3900.00	5662.50	1.79	9.92	445.45	-55
14.696	2.116	-54	77.5	66.0	792	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	33	0.31	0.31	125.00	9687.50	3962.40	5725.10	1.77	10.03	455.48	-56
14.696	2.116	-55	78.5	67.0	804	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	33.5	0.30	0.30	125.00	9812.50	4024.80	5787.70	1.75	10.14	465.62	-57
14.696	2.116	-56	79.5	68.0	816	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	34	0.29	0.29	125.00	9937.50	4087.20	5850.30	1.72	10.25	475.88	-58
14.696	2.116	-57	80.5	69.0	828	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	34.5	0.29	0.29	125.00	10062.50	4149.60	5912.90	1.69	10.36	486.24	-59
14.696	2.116	-58	81.5	70.0	840	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	35	0.28	0.28	125.00	10187.50	4212.00	5975.50	1.67	10.48	496.72	-60
14.696	2.116	-59	82.5	71.0	852	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	35.5	0.27	0.27	125.00	10312.50	4274.40	6038.10	1.64	10.59	507.30	-61
14.696	2.116	-60	83.5	72.0	864	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	36	0.26	0.26	125.00	10437.50	4336.80	6100.70	1.61	10.70	518.00	-62
14.696	2.116	-61	84.5	73.0	876	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	36.5	0.26	0.26	125.00	10562.50	4399.20	6163.30	1.58	10.81	528.81	-63
14.696	2.116	-62	85.5	74.0	888	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	37	0.25	0.25	125.00	10687.50	4461.60	6225.90	1.56	10.92	539.72	-64
14.696	2.116	-63	86.5	75.0	900	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	37.5	0.24	0.25	125.00	10812.50	4524.00	6288.50	1.57	11.01	550.73	-65
14.696	2.116	-64	87.5	76.0	912	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	38	0.23	0.25	125.00	10937.50	4586.40	6351.10	1.59	11.09	561.82	-66
14.696	2.116	-65	88.5	77.0	924	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	38.5	0.23	0.25	125.00	11062.50	4648.80	6413.70	1.60	11.17	572.99	-67
14.696	2.116	-66	89.5	78.0	936	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	39	0.22	0.25	125.00	11187.50	4711.20	6476.30	1.62	11.25	584.24	-68
14.696	2.116	-67	90.5	79.0	948	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	39.5	0.21	0.25	125.00	11312.50	4773.60	6538.90	1.63	11.33	595.57	-69
14.696	2.116	-68	91.5	80.0	960	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	40	0.21	0.25	125.00	11437.50	4836.00	6601.50	1.65	11.40	606.97	-70
14.696	2.116	-69	92.5	81.0	972	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	40.5	0.20	0.25	125.00	11562.50	4898.40	6664.10	1.67	11.48	618.45	-71
14.696	2.116	-70	93.5	82.0	984	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	41	0.19	0.25	125.00	11687.50	4960.80	6726.70	1.68	11.56	630.01	-72
14.696	2.116	-71	94.5	83.0	996	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	41.5	0.19	0.25	125.00	11812.50	5023.20	6789.30	1.70	11.63	641.64	-73
14.696	2.116	-72	95.5	84.0	1008	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	42	0.18	0.25	125.00	11937.50	5085.60	6851.90	1.71	11.71	653.35	-74
14.696	2.116	-73	96.5	85.0	1020	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	42.5	0.17	0.25	125.00	12062.50	5148.00	6914.50	1.73	11.78	665.13	-75
14.696	2.116	-74	97.5	86.0	1032	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	43	0.16	0.25	125.00	12187.50	5210.40	6977.10	1.74	11.85	676.98	-76
14.696	2.116	-75	98.5	87.0	1044	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	43.5	0.16	0.25	125.00	12312.50	5272.80	7039.70	1.76	11.93	688.91	-77
14.696	2.116	-76	99.5	88.0	1056	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	44	0.15	0.25	125.00	12437.50	5335.20	7102.30	1.78	12.00	700.90	-78
14.696	2.116	-77	100.5	89.0	1068	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	44.5	0.14	0.25	125.00	12562.50	5397.60	7164.90	1.79	12.07	712.98	-79
14.696	2.116	-78	101.5	90.0	1080	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	45	0.14	0.25	125.00	12687.50	5460.00	7227.50	1.81	12.14	725.12	-80
14.696	2.116	-79	102.5	91.0	1092	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	45.5	0.13	0.25	125.00	12812.50	5522.40	7290.10	1.82	12.21	737.33	-81
14.696	2.116	-80	103.5	92.0	1104	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	46	0.12	0.25	125.00	12937.50	5584.80	7352.70	1.84	12.28	749.61	-82
14.696	2.116	-81	104.5	93.0	1116	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	46.5	0.12	0.25	125.00	13062.50	5647.20	7415.30	1.85	12.35	761.96	-83
14.696	2.116	-82	105.5	94.0	1128	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	47	0.11	0.25	125.00	13187.50	5709.60	7477.90	1.87	12.42	774.38	-84
14.696	2.116	-83	106.5	95.0	1140	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	47.5	0.10	0.25	125.00	13312.50	5772.00	7540.50	1.89	12.49	786.87	-85
14.696	2.116	-84	107.5	96.0	1152	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	48	0.10	0.25	125.00	13437.50	5834.40	7603.10	1.90	12.56	799.43	-86
14.696	2.116	-85	108.5	97.0	1164	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	48.5	0.09	0.25	125.00	13562.50	5896.80	7665.70	1.92	12.62	812.05	-87
14.696	2.116	-86	109.5	98.0	1176	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	49	0.08	0.25	125.00	13687.50	5959.20	7728.30	1.93	12.69	824.74	-88
14.696	2.116	-87	110.5	99.0	1188	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	49.5	0.08	0.25	125.00	13812.50	6021.60	7790.90	1.95	12.76	837.50	-89
14.696	2.116	-88	111.5	100.0	1200	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	50	0.07	0.25	125.00	13937.50	6084.00	7853.50	1.96	12.82	850.32	-90
14.696	2.116	-89	112.5	101.0	1212	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	50.5	0.07	0.25	125.00	14062.50	6146.40	7916.10	1.98	12.88	863.20	-91
14.696	2.116	-90	113.5	102.0	1224	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	51	0.06	0.25	125.00	14187.50	6208.80	7978.70	1.99	12.95	876.15	-92
14.696	2.116	-91	114.5	103.0	1236	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	51.5	0.05	0.25	125.00	14312.50	6271.20	8041.30	2.01	13.01	889.16	-93
14.696	2.116	-92	115.5	104.0	1248	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	52	0.05	0.25	125.00	14437.50	6333.60	8103.90	2.03	13.07	902.24	-94
14.696	2.116	-93	116.5	105.0	1260	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	52.5	0.04	0.25	125.00	14562.50	6396.00	8166.50	2.04	13.14	915.37	-95
14.696	2.116	-94	117.5	106.0	1272	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	53	0.03	0.25	125.00	14687.50	6458.40	8229.10	2.06	13.20	928.57	-96
14.696	2.116	-95	118.5	107.0	1284	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	53.5	0.03	0.25	125.00	14812.50	6520.80	8291.70	2.07	13.26	941.83	-97
14.696	2.116	-96	119.5	108.0	1296	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	54	0.02	0.25	125.00	14937.50	6583.20	8354.30	2.09	13.32	955.15	-98
14.696	2.116	-97	120.5	109.0	1308	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	54.5	0.02	0.25	125.00	15062.50	6645.60	8416.90	2.10	13.38	968.53	-99
14.696	2.116	-98	121.5	110.0	1320	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	55	0.01	0.25	125.00	15187.50	6708.00	8479.50	2.12	13.44	981.97	-100
14.696	2.116	-99	122.5	111.0	1332	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	55.5	0.00	0.25	125.00	15312.50	6770.40	8542.10	2.14	13.50	995.46	-101
14.696	2.116	-100	123.5	112.0	1344	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	56	0.00	0.25	125.00	15437.50	6832.80	8604.70	2.15	13.55	1009.02	-102
14.696	2.116	-101	124.5	113.0	1356	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	56.5	-0.01	0.25	125.00	15562.50	6895.20	8667.30	2.17	13.61	1022.63	-103
14.696	2.116	-102	125.5	114.0	1368	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	57	-0.02	0.25	125.00	15687.50	6957.60	8729.90	2.18	13.67	1036.30	-104
14.696	2.116	-103	126.5	115.0	1380	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	57.5	-0.02	0.25	125.00	15812.50	7020.00	8792.50	2.20	13.72	1050.02	-105
14.696	2.116	-104	127.5	116.0	1392	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	58	-0.03	0.25	125.00	15937.50	7082.40	8855.10	2.21	13.78	1063.80	-106
14.696	2.116	-105	128.5	117.0	1404	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	58.5	-0.03	0.25	125.00	16062.50	7144.80	8917.70	2.23	13.83	1077.63	-107
14.696	2.116	-106	129.5	118.0	1416	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	59	-0.04	0.25	125.00	16187.50	7207.20	8980.30	2.25	13.89	1091.52	-108
14.696	2.116	-107	130.5	119.0	1428	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	59.5	-0.05	0.25	125.00	16312.50	7269.60	9042.90	2.26	13.94	1105.46	-109
14.696	2.116	-108	131.5	120.0	1440	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	60	-0.05	0.25	125.00	16437.50	7332.00	9105.50	2.28	14.00	1119.46	-110
14.696	2.116	-109	132.5	121.0	1452	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	60.5	-0.06	0.25	125.00	16562.50	7394.40	9168.10	2.29	14.05	1133.51	-111
14.696	2.116	-110	133.5	122.0	1464	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	61	-0.06	0.25	125.00	16687.50	7456.80	9230.70	2.31	14.10	1147.61	-112
14.696	2.116	-111	134.5	123.0	1476	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	61.5	-0.07	0.25	125.00	16812.50	7519.20	9293.30	2.32	14.15	1161.76	-113
14.696	2.116	-112	135.5	124.0	1488	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	62	-0.07	0.25	125.00	16937.50	7581.60	9355.90	2.34	14.20	1175.96	-114
14.696	2.116	-113	136.5	125.0	1500	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	62.5	-0.08	0.25	125.00	17062.50	7644.00	9418.50	2.35	14.25	1190.21	-115
14.696	2.116	-114	137.5	126.0	1512	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	63	-0.09	0.25	125.00	17187.50	7706.40	9481.10	2.37	14.30	1204.51	-116
14.696	2.116	-115	138.5	127.0	1524	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	63.5	-0.09	0.25	125.00	17312.50	7768.80	9543.70	2.39	14.35	1218.86	-117
14.696	2.116	-116	139.5	128.0	1536	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	64	-0.10	0.25	125.00	17437.50	7831.20	9606.30	2.40	14.40	1233.25	-118
14.696	2.116	-117	140.5	129.0	1548	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	64.5	-0.10	0.25	125.00	17562.50	7893.60	9668.90	2.42	14.44	1247.70	-119
14.696	2.116	-118	141.5	130.0	1560	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	65	-0.11	0.25	125.00	17687.50	7956.00	9731.50	2.43	14.49	1262.19	-120

23rd AVE. RW 20c

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	18.00	
Bottom of footing elevation / Pile top elevation (feet)	8.50	
GWT elevation (feet)	10.00	
Maximum tip elev for L/d < 30	-51.50	

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	Cohesive Soil α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Cohesionless Soil Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	9	9.5	0.0	0	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.72	0.72	125.00	1187.50	93.60	1093.90	0.00	0.00	0.00	7
14.696	2.116	8	10.5	1.0	12	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.71	0.71	125.00	1312.50	156.00	1156.50	0.00	0.00	0.00	6
14.696	2.116	7	11.5	2.0	24	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.69	0.69	125.00	1437.50	218.40	1219.10	0.85	6.22	6.22	5
14.696	2.116	6	12.5	3.0	36	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1562.50	280.80	1281.70	0.87	6.05	12.27	4
14.696	2.116	5	13.5	4.0	48	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1687.50	343.20	1344.30	0.90	5.87	18.14	3
14.696	2.116	4	14.5	5.0	60	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.66	0.66	125.00	1812.50	405.60	1406.90	0.92	5.70	23.84	2
14.696	2.116	3	15.5	6.0	72	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.64	0.64	125.00	1937.50	468.00	1469.50	0.95	5.53	29.37	1
14.696	2.116	2	16.5	7.0	84	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.63	0.63	125.00	2062.50	530.40	1532.10	0.97	5.36	34.73	-1
14.696	2.116	1	17.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	592.80	1594.70	0.99	5.18	39.91	-2
14.696	2.116	-1	18.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	655.20	1657.30	1.01	5.18	45.10	-3
14.696	2.116	-2	19.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	717.60	1719.90	1.04	5.18	50.28	-4
14.696	2.116	-3	20.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	780.00	1782.50	1.05	5.18	55.46	-5
14.696	2.116	-4	21.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	842.40	1845.10	1.07	5.18	60.65	-6
14.696	2.116	-5	22.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	904.80	1907.70	1.09	5.18	65.83	-7
14.696	2.116	-6	23.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	967.20	1970.30	1.11	5.18	71.02	-8
14.696	2.116	-7	24.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	1029.60	2032.90	1.13	5.18	76.20	-9
14.696	2.116	-8	25.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	1092.00	2095.50	1.14	5.18	81.38	-10
14.696	2.116	-9	26.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3312.50	1154.40	2158.10	1.16	5.18	86.57	-11
14.696	2.116	-10	27.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3437.50	1216.80	2220.70	1.17	5.18	91.75	-12
14.696	2.116	-11	28.5	19.0	228	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.52	0.52	125.00	3562.50	1279.20	2283.30	1.18	5.29	97.04	-13
14.696	2.116	-12	29.5	20.0	240	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.51	0.51	125.00	3687.50	1341.60	2345.90	1.20	5.40	102.44	-14
14.696	2.116	-13	30.5	21.0	252	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10.5	0.53	0.53	125.00	3812.50	1404.00	2408.50	1.27	5.51	107.95	-15
14.696	2.116	-14	31.5	22.0	264	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	11	0.54	0.54	125.00	3937.50	1466.40	2471.10	1.34	5.62	113.57	-16
14.696	2.116	-15	32.5	23.0	276	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	11.5	0.56	0.56	125.00	4062.50	1528.80	2533.70	1.42	5.73	119.30	-17
14.696	2.116	-16	33.5	24.0	288	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	12	0.57	0.57	125.00	4187.50	1591.20	2596.30	1.49	5.84	125.14	-18
14.696	2.116	-17	34.5	25.0	300	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	12.5	0.59	0.59	125.00	4312.50	1653.60	2658.90	1.56	5.95	131.10	-19
14.696	2.116	-18	35.5	26.0	312	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	13	0.60	0.60	125.00	4437.50	1716.00	2721.50	1.64	6.06	137.16	-20
14.696	2.116	-19	36.5	27.0	324	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	13.5	0.61	0.61	125.00	4562.50	1778.40	2784.10	1.71	6.17	143.33	-21
14.696	2.116	-20	37.5	28.0	336	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	14	0.63	0.63	125.00	4687.50	1840.80	2846.70	1.78	6.28	149.61	-22
14.696	2.116	-21	38.5	29.0	348	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	14.5	0.64	0.64	125.00	4812.50	1903.20	2909.30	1.86	6.39	156.01	-23
14.696	2.116	-22	39.5	30.0	360	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	15	0.65	0.65	125.00	4937.50	1965.60	2971.90	1.93	6.50	162.51	-24
14.696	2.116	-23	40.5	31.0	372	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	15.5	0.64	0.64	125.00	5062.50	2028.00	3034.50	1.94	6.61	169.12	-25
14.696	2.116	-24	41.5	32.0	384	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	16	0.63	0.63	125.00	5187.50	2090.40	3097.10	1.95	6.72	175.85	-26
14.696	2.116	-25	42.5	33.0	396	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	16.5	0.62	0.62	125.00	5312.50	2152.80	3159.70	1.95	6.83	182.68	-27
14.696	2.116	-26	43.5	34.0	408	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	17	0.61	0.61	125.00	5437.50	2215.20	3222.30	1.96	6.94	189.63	-28
14.696	2.116	-27	44.5	35.0	420	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	17.5	0.60	0.60	125.00	5562.50	2277.60	3284.90	1.96	7.06	196.68	-29
14.696	2.116	-28	45.5	36.0	432	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	18	0.59	0.59	125.00	5687.50	2340.00	3347.50	1.97	7.17	203.85	-30
14.696	2.116	-29	46.5	37.0	444	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	18.5	0.58	0.58	125.00	5812.50	2402.40	3410.10	1.97	7.28	211.12	-31
14.696	2.116	-30	47.5	38.0	456	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	19	0.57	0.57	125.00	5937.50	2464.80	3472.70	1.97	7.39	218.51	-32
14.696	2.116	-31	48.5	39.0	468	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	19.5	0.56	0.56	125.00	6062.50	2527.20	3535.30	1.97	7.50	226.00	-33
14.696	2.116	-32	49.5	40.0	480	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	20	0.55	0.55	125.00	6187.50	2589.60	3597.90	1.97	7.61	233.61	-34
14.696	2.116	-33	50.5	41.0	492	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	20.5	0.54	0.54	125.00	6312.50	2652.00	3660.50	1.97	7.72	241.33	-35
14.696	2.116	-34	51.5	42.0	504	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	21	0.53	0.53	125.00	6437.50	2714.40	3723.10	1.97	7.83	249.16	-36
14.696	2.116	-35	52.5	43.0	516	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	21.5	0.52	0.52	125.00	6562.50	2776.80	3785.70	1.97	7.94	257.09	-37
14.696	2.116	-36	53.5	44.0	528	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	22	0.51	0.51	125.00	6687.50	2839.20	3848.30	1.97	8.05	265.14	-38
14.696	2.116	-37	54.5	45.0	540	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	22.5	0.50	0.50	125.00	6812.50	2901.60	3910.90	1.96	8.16	273.30	-39
14.696	2.116	-38	55.5	46.0	552	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	23	0.49	0.49	125.00	6937.50	2964.00	3973.50	1.96	8.27	281.57	-40
14.696	2.116	-39	56.5	47.0	564	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	23.5	0.48	0.48	125.00	7062.50	3026.40	4036.10	1.95	8.38	289.95	-41
14.696	2.116	-40	57.5	48.0	576	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	24	0.47	0.47	125.00	7187.50	3088.80	4098.70	1.94	8.49	298.44	-42
14.696	2.116	-41	58.5	49.0	588	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	24.5	0.47	0.47	125.00	7312.50	3151.20	4161.30	1.94	8.60	307.04	-43
14.696	2.116	-42	59.5	50.0	600	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	25	0.46	0.46	125.00	7437.50	3213.60	4223.90	1.93	8.71	315.75	-44
14.696	2.116	-43	60.5	51.0	612	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	25.5	0.45	0.45	125.00	7562.50	3276.00	4286.50	1.92	8.82	324.57	-45
14.696	2.116	-44	61.5	52.0	624	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	26	0.44	0.44	125.00	7687.50	3338.40	4349.10	1.91	8.93	333.50	-46
14.696	2.116	-45	62.5	53.0	636	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	26.5	0.43	0.43	125.00	7812.50	3400.80	4411.70	1.90	9.04	342.54	-47
14.696	2.116	-46	63.5	54.0	648	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	27	0.42	0.42	125.00	7937.50	3463.20	4474.30	1.89	9.15	351.69	-48
14.696	2.116	-47	64.5	55.0	660	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	27.5	0.41	0.41	125.00	8062.50	3525.60	4536.90	1.88	9.26	360.95	-49
14.696	2.116	-48	65.5	56.0	672	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	28	0.41	0.41	125.00	8187.50	3588.00	4599.50	1.86	9.37	370.32	-50
14.696	2.116	-49	66.5	57.0	684	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	28.5	0.40	0.40	125.00	8312.50	3650.40	4662.10	1.85	9.48	379.80	-51
14.696	2.116	-50	67.5	58.0	696	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	29	0.39	0.39	125.00	8437.50	3712.80	4724.70	1.84	9.59	389.40	-52
14.696	2.116	-51	68.5	59.0	708	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	29.5	0.38	0.38	125.00	8562.50	3775.20	4787.30	1.82	9.70	399.10	-53
14.696	2.116	-52	69.5	60.0	720	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	30	0.37	0.37	125.00	8687.50	3837.60	4849.90	1.81	9.81	408.91	-54
14.696	2.116	-53	70.5	61.0	732	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	30.5	0.36	0.36	125.00	8812.50	3900.00	4912.50	1.79	9.92	418.84	-55
14.696	2.116	-54	71.5	62.0	744	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	31	0.36	0.36	125.00	8937.50	3962.40	4975.10	1.77	10.03	428.87	-56
14.696	2.116	-55	72.5	63.0	756	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	31.5	0.35	0.35	125.00	9062.50	4024.80	5037.70	1.75	10.14	439.01	-57
14.696	2.116	-56	73.5	64.0	768	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	32	0.34	0.34	125.00	9187.50	4087.20	5100.30	1.74	10.25	449.27	-58
14.696	2.116	-57	74.5	65.0	780	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	32.5	0.33	0.33	125.00	9312.50	4149.60	5162.90	1.72	10.36	459.63	-59
14.696	2.116	-58	75.5	66.0	792	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	33	0.32	0.32	125.00	9437.50	4212.00	5225.50	1.70	10.48	470.11	-60
14.696	2.116	-59	76.5	67.0	804	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	33.5	0.32	0.32	125.00	9562.50	4274.40	5288.10	1.68	10.59	480.69	-61
14.696	2.116	-60	77.5	68.0	816	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	34	0.31	0.31	125.00	9687.50	4336.80	5350.70	1.65	10.70	491.39	-62
14.696	2.116	-61	78.5	69.0	828	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	34.5	0.30	0.30	125.00	9812.50	4399.20	5413.30	1.63	10.81	502.20	-63
14.696	2.116	-62	79.5	70.0	840	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	35	0.29	0.29	125.00	9937.50	4461.60	5475.90	1.61	10.92	513.11	-64
14.696	2.116	-63	80.5	71.0	852	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	35.5	0.29	0.29	125.00	10062.50	4524.00	5538.50	1.59	11.01	524.12	-65
14.696	2.116	-64	81.5	72.0	864	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	36	0.28	0.28	125.00	10187.50	4586.40	5601.10	1.56	11.09	535.22	-66
14.696	2.116	-65	82.5	73.0	876	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	36.5	0.27	0.27	125.00	10312.50	4648.80	5663.70	1.54	11.17	546.39	-67
14.696	2.116	-66	83.5	74.0	888	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	37	0.26	0.26	125.00	10437.50	4711.20	5726.30	1.51	11.25	557.63	-68
14.696	2.116	-67	84.5	75.0	900	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	37.5	0.26	0.26	125.00	10562.50	4773.60	5788.90	1.49	11.33	568.96	-69
14.696	2.116	-68	85.5	76.0	912	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	38	0.25	0.25	125.00	10687.50	4836.00	5851.50	1.46	11.40	580.36	-70
14.696	2.116	-69	86.5	77.0	924	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	38.5	0.24	0.25	125.00	10812.50	4898.40	5914.10	1.48	11.48	591.84	-71
14.696	2.116	-70	87.5	78.0	936	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	39	0.23	0.25	125.00	10937.50	4960.80	5976.70	1.49	11.56	603.40	-72
14.696	2.116	-71	88.5	79.0	948	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	39.5	0.23	0.25	125.00	11062.50	5023.20	6039.30	1.51	11.63	615.03	-73
14.696	2.116	-72	89.5	80.0	960	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	40	0.22	0.25	125.00	11187.50	5085.60	6101.90	1.53	11.71	626.74	-74
14.696	2.116	-73	90.5	81.0	972	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	40.5	0.21	0.25	125.00	11312.50	5148.00	6164.50	1.54	11.78	638.52	-75
14.696	2.116	-74	91.5	82.0	984	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	41	0.21	0.25	125.00	11437.50	5210.40	6227.10	1.56	11.85	650.37	-76
14.696	2.116	-75	92.5	83.0	996	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	41.5	0.20	0.25	125.00	11562.50	5272.80	6289.70	1.57	11.93	662.30	-77
14.696	2.116	-76	93.5	84.0	1008	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	42	0.19	0.25	125.00	11687.50	5335.20	6352.30	1.59	12.00	674.30	-78
14.696	2.116	-77	94.5	85.0	1020	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	42.5	0.19	0.25	125.00	11812.50	5397.60	6414.90	1.60	12.07	686.37	-79
14.696	2.116	-78	95.5	86.0	1032	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	43	0.18	0.25	125.00	11937.50	5460.00	6477.50	1.62	12.14	698.51	-80
14.696	2.116	-79	96.5	87.0	1044	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	43.5	0.17	0.25	125.00	12062.50	5522.40	6540.10	1.64	12.21	710.72	-81
14.696	2.116	-80	97.5	88.0	1056	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	44	0.16	0.25	125.00	12187.50	5584.80	6602.70	1.65	12.28	723.00	-82
14.696	2.116	-81	98.5	89.0	1068	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	44.5	0.16	0.25	125.00	12312.50	5647.20	6665.30	1.67	12.35	735.35	-83
14.696	2.116	-82	99.5	90.0	1080	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	45	0.15	0.25	125.00	12437.50	5709.60	6727.90	1.68	12.42	747.78	-84
14.696	2.116	-83	100.5	91.0	1092	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	45.5	0.14	0.25	125.00	12562.50	5772.00	6790.50	1.70	12.49	760.26	-85
14.696	2.116	-84	101.5	92.0	1104	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	46	0.14	0.25	125.00	12687.50	5834.40	6853.10	1.71	12.56	772.82	-86
14.696	2.116	-85	102.5	93.0	1116	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	46.5	0.13	0.25	125.00	12812.50	5896.80	6915.70	1.73	12.62	785.44	-87
14.696	2.116	-86	103.5	94.0	1128	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	47	0.12	0.25	125.00	12937.50	5959.20	6978.30	1.74	12.69	798.13	-88
14.696	2.116	-87	104.5	95.0	1140	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	47.5	0.12	0.25	125.00	13062.50	6021.60	7040.90	1.76	12.76	810.89	-89
14.696	2.116	-88	105.5	96.0	1152	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	48	0.11	0.25	125.00	13187.50	6084.00	7103.50	1.78	12.82	823.71	-90
14.696	2.116	-89	106.5	97.0	1164	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	48.5	0.10	0.25	125.00	13312.50	6146.40	7166.10	1.79	12.88	836.59	-91
14.696	2.116	-90	107.5	98.0	1176	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	49	0.10	0.25	125.00	13437.50	6208.80	7228.70	1.81	12.95	849.54	-92
14.696	2.116	-91	108.5	99.0	1188	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	49.5	0.09	0.25	125.00	13562.50	6271.20	7291.30	1.82	13.01	862.55	-93
14.696	2.116	-92	109.5	100.0	1200	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	50	0.08	0.25	125.00	13687.50	6333.60	7353.90	1.84	13.07	875.63	-94
14.696	2.116	-93	110.5	101.0	1212	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	50.5	0.08	0.25	125.00	13812.50	6396.00	7416.50	1.85	13.14	888.76	-95
14.696	2.116	-94	111.5	102.0	1224	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	51	0.07	0.25	125.00	13937.50	6458.40	7479.10	1.87	13.20	901.96	-96
14.696	2.116	-95	112.5	103.0	1236	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	51.5	0.07	0.25	125.00	14062.50	6520.80	7541.70	1.89	13.26	915.22	-97
14.696	2.116	-96	113.5	104.0	1248	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	52	0.06	0.25	125.00	14187.50	6583.20	7604.30	1.90	13.32	928.54	-98
14.696	2.116	-97	114.5	105.0	1260	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	52.5	0.05	0.25	125.00	14312.50	6645.60	7666.90	1.92	13.38	941.92	-99
14.696	2.116	-98	115.5	106.0	1272	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	53	0.05	0.25	125.00	14437.50	6708.00	7729.50	1.93	13.44	955.36	-100
14.696	2.116	-99	116.5	107.0	1284	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	53.5	0.04	0.25	125.00	14562.50	6770.40	7792.10	1.95	13.50	968.85	-101
14.696	2.116	-100	117.5	108.0	1296	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	54	0.03	0.25	125.00	14687.50	6832.80	7854.70	1.96	13.55	982.41	-102
14.696	2.116	-101	118.5	109.0	1308	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	54.5	0.03	0.25	125.00	14812.50	6895.20	7917.30	1.98	13.61	996.02	-103
14.696	2.116	-102	119.5	110.0	1320	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	55	0.02	0.25	125.00	14937.50	6957.60	7979.90	1.99	13.67	1009.69	-104
14.696	2.116	-103	120.5	111.0	1332	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	55.5	0.02	0.25	125.00	15062.50	7020.00	8042.50	2.01	13.72	1023.41	-105
14.696	2.116	-104	121.5	112.0	1344	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	56	0.01	0.25	125.00	15187.50	7082.40	8105.10	2.03	13.78	1037.19	-106
14.696	2.116	-105	122.5	113.0	1356	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	56.5	0.00	0.25	125.00	15312.50	7144.80	8167.70	2.04	13.83	1051.02	-107
14.696	2.116	-106	123.5	114.0	1368	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	57	0.00	0.25	125.00	15437.50	7207.20	8230.30	2.06	13.89	1064.91	-108
14.696	2.116	-107	124.5	115.0	1380	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	57.5	-0.01	0.25	125.00	15562.50	7269.60	8292.90	2.07	13.94	1078.85	-109
14.696	2.116	-108	125.5	116.0	1392	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	58	-0.02	0.25	125.00	15687.50	7332.00	8355.50	2.09	14.00	1092.85	-110
14.696	2.116	-109	126.5	117.0	1404	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	58.5	-0.02	0.25	125.00	15812.50	7394.40	8418.10	2.10	14.05	1106.90	-111
14.696	2.116	-110	127.5	118.0	1416	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	59	-0.03	0.25	125.00	15937.50	7456.80	8480.70	2.12	14.10	1121.00	-112
14.696	2.116	-111	128.5	119.0	1428	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	59.5	-0.03	0.25	125.00	16062.50	7519.20	8543.30	2.14	14.15	1135.15	-113
14.696	2.116	-112	129.5	120.0	1440	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	60	-0.04	0.25	125.00	16187.50	7581.60	8605.90	2.15	14.20	1149.35	-114
14.696	2.116	-113	130.5	121.0	1452	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	60.5	-0.05	0.25	125.00	16312.50	7644.00	8668.50	2.17	14.25	1163.60	-115
14.696	2.116	-114	131.5	122.0	1464	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	61	-0.05	0.25	125.00	16437.50	7706.40	8731.10	2.18	14.30	1177.90	-116
14.696	2.116	-115	132.5	123.0	1476	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	61.5	-0.06	0.25	125.00	16562.50	7768.80	8793.70	2.20	14.35	1192.25	-117
14.696	2.116	-116	133.5	124.0	1488	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	62	-0.06	0.25	125.00	16687.50	7831.20	8856.30	2.21	14.40	1206.64	-118
14.696	2.116	-117	134.5	125.0	1500	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	62.5	-0.07	0.25	125.00	16812.50	7893.60	8918.90	2.23	14.44	1221.09	-119
14.696	2.116	-118	135.5	126.0	1512	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	63	-0.07	0.25	125.00	16937.50	7956.00	8981.50	2.25	14.49	1235.58	-120
14.696	2.116	-119	136.5	127.0	1524	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	63.5	-0.08	0.25	125.00	17062.50	8018.40	9044.10	2.26	14.54	1250.12	-121
14.696	2.116	-120	137.5	128.0	1536	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	64	-0.09	0.25	125.00	17187.50	8080.80	9106.70	2.28	14.58	1264.70	-122
14.696	2.116	-121	138.5	129.0	1548	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	64.5	-0.09	0.25	125.00	17312.50	8143.20	9169.30	2.29	14.63	1279.33	-123
14.696	2.116	-122	139.5	130.0	1560	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	65	-0.10	0.25	125.00	17437.50	8205.60	9231.90	2.31	14.67	1294.00	-124

23rd AVE. RW 21

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	16.00
Bottom of footing elevation / Pile top elevation (feet)	8.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-51.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	9	7.5	0.0	0	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.75	0.75	125.00	937.50	93.60	843.90	0.00	0.00	0.00	7
14.696	2.116	8	8.5	1.0	12	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1062.50	156.00	906.50	0.00	0.00	0.00	6
14.696	2.116	7	9.5	2.0	24	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.72	0.72	125.00	1187.50	218.40	969.10	0.70	6.22	6.22	5
14.696	2.116	6	10.5	3.0	36	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.71	0.71	125.00	1312.50	280.80	1031.70	0.73	6.05	12.27	4
14.696	2.116	5	11.5	4.0	48	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.69	0.69	125.00	1437.50	343.20	1094.30	0.76	5.87	18.14	3
14.696	2.116	4	12.5	5.0	60	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.68	0.68	125.00	1562.50	405.60	1156.90	0.79	5.70	23.84	2
14.696	2.116	3	13.5	6.0	72	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.67	0.67	125.00	1687.50	468.00	1219.50	0.82	5.53	29.37	1
14.696	2.116	2	14.5	7.0	84	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.66	0.66	125.00	1812.50	530.40	1282.10	0.84	5.36	34.73	-1
14.696	2.116	1	15.5	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	1937.50	592.80	1344.70	0.87	5.18	39.91	-2
14.696	2.116	-1	16.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	655.20	1407.30	0.89	5.18	45.10	-3
14.696	2.116	-2	17.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	717.60	1469.90	0.92	5.18	50.28	-4
14.696	2.116	-3	18.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	780.00	1532.50	0.94	5.18	55.46	-5
14.696	2.116	-4	19.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	842.40	1595.10	0.96	5.18	60.65	-6
14.696	2.116	-5	20.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	904.80	1657.70	0.98	5.18	65.83	-7
14.696	2.116	-6	21.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	967.20	1720.30	1.00	5.18	71.02	-8
14.696	2.116	-7	22.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	1029.60	1782.90	1.02	5.18	76.20	-9
14.696	2.116	-8	23.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	1092.00	1845.50	1.04	5.18	81.38	-10
14.696	2.116	-9	24.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	1154.40	1908.10	1.06	5.18	86.57	-11
14.696	2.116	-10	25.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	1216.80	1970.70	1.07	5.18	91.75	-12
14.696	2.116	-11	26.5	19.0	228	1.53	10.63	0.723	0	0.55	0.55	0.842	5.85	10	0.54	0.54	125.00	3312.50	1279.20	2033.30	1.09	5.29	97.04	-13
14.696	2.116	-12	27.5	20.0	240	1.56	10.85	0.738	0	0.55	0.55	0.859	5.97	10	0.53	0.53	125.00	3437.50	1341.60	2095.90	1.10	5.40	102.44	-14
14.696	2.116	-13	28.5	21.0	252	1.59	11.07	0.753	0	0.55	0.55	0.877	6.09	10.5	0.54	0.54	125.00	3562.50	1404.00	2158.50	1.18	5.51	107.95	-15
14.696	2.116	-14	29.5	22.0	264	1.63	11.30	0.769	0	0.55	0.55	0.895	6.21	11	0.56	0.56	125.00	3687.50	1466.40	2221.10	1.25	5.62	113.57	-16
14.696	2.116	-15	30.5	23.0	276	1.66	11.52	0.784	0	0.55	0.55	0.912	6.33	11.5	0.58	0.58	125.00	3812.50	1528.80	2283.70	1.32	5.73	119.30	-17
14.696	2.116	-16	31.5	24.0	288	1.69	11.74	0.799	0	0.55	0.55	0.930	6.46	12	0.59	0.59	125.00	3937.50	1591.20	2346.30	1.39	5.84	125.14	-18
14.696	2.116	-17	32.5	25.0	300	1.72	11.96	0.814	0	0.55	0.55	0.947	6.58	12.5	0.61	0.61	125.00	4062.50	1653.60	2408.90	1.46	5.95	131.10	-19
14.696	2.116	-18	33.5	26.0	312	1.75	12.18	0.829	0	0.55	0.55	0.965	6.70	13	0.62	0.62	125.00	4187.50	1716.00	2471.50	1.54	6.06	137.16	-20
14.696	2.116	-19	34.5	27.0	324	1.79	12.40	0.844	0	0.55	0.55	0.982	6.82	13.5	0.63	0.63	125.00	4312.50	1778.40	2534.10	1.61	6.17	143.33	-21
14.696	2.116	-20	35.5	28.0	336	1.82	12.63	0.859	0	0.55	0.55	1.000	6.94	14	0.65	0.65	125.00	4437.50	1840.80	2596.70	1.68	6.28	149.61	-22
14.696	2.116	-21	36.5	29.0	348	1.85	12.85	0.874	0	0.55	0.55	1.017	7.07	14.5	0.66	0.66	125.00	4562.50	1903.20	2659.30	1.76	6.39	156.01	-23
14.696	2.116	-22	37.5	30.0	360	1.88	13.07	0.889	0	0.55	0.55	1.035	7.19	15	0.67	0.67	125.00	4687.50	1965.60	2721.90	1.83	6.50	162.51	-24
14.696	2.116	-23	38.5	31.0	372	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	15.5	0.66	0.66	125.00	4812.50	2028.00	2784.50	1.84	6.61	169.12	-25
14.696	2.116	-24	39.5	32.0	384	1.95	13.51	0.919	0	0.55	0.55	1.070	7.43	16	0.65	0.65	125.00	4937.50	2090.40	2847.10	1.85	6.72	175.85	-26
14.696	2.116	-25	40.5	33.0	396	1.98	13.73	0.935	0	0.55	0.55	1.088	7.55	16.5	0.64	0.64	125.00	5062.50	2152.80	2909.70	1.86	6.83	182.68	-27
14.696	2.116	-26	41.5	34.0	408	2.01	13.96	0.950	0	0.55	0.55	1.105	7.68	17	0.63	0.63	125.00	5187.50	2215.20	2972.30	1.87	6.94	189.63	-28
14.696	2.116	-27	42.5	35.0	420	2.04	14.18	0.965	0	0.55	0.55	1.123	7.80	17.5	0.62	0.62	125.00	5312.50	2277.60	3034.90	1.88	7.06	196.68	-29
14.696	2.116	-28	43.5	36.0	432	2.07	14.40	0.980	0	0.55	0.55	1.140	7.92	18	0.61	0.61	125.00	5437.50	2340.00	3097.50	1.88	7.17	203.85	-30
14.696	2.116	-29	44.5	37.0	444	2.11	14.62	0.995	0	0.55	0.55	1.158	8.04	18.5	0.60	0.60	125.00	5562.50	2402.40	3160.10	1.89	7.28	211.12	-31
14.696	2.116	-30	45.5	38.0	456	2.14	14.84	1.010	0	0.55	0.55	1.176	8.16	19	0.59	0.59	125.00	5687.50	2464.80	3222.70	1.89	7.39	218.51	-32
14.696	2.116	-31	46.5	39.0	468	2.17	15.06	1.025	0	0.55	0.55	1.193	8.29	19.5	0.58	0.58	125.00	5812.50	2527.20	3285.30	1.90	7.50	226.00	-33
14.696	2.116	-32	47.5	40.0	480	2.20	15.29	1.040	0	0.55	0.55	1.211	8.41	20	0.57	0.57	125.00	5937.50	2589.60	3347.90	1.90	7.61	233.61	-34
14.696	2.116	-33	48.5	41.0	492	2.23	15.51	1.055	0	0.55	0.55	1.228	8.53	20.5	0.56	0.56	125.00	6062.50	2652.00	3410.50	1.90	7.72	241.33	-35
14.696	2.116	-34	49.5	42.0	504	2.27	15.73	1.070	0	0.55	0.55	1.246	8.65	21	0.55	0.55	125.00	6187.50	2714.40	3473.10	1.90	7.83	249.16	-36
14.696	2.116	-35	50.5	43.0	516	2.30	15.95	1.085	0	0.55	0.55	1.263	8.77	21.5	0.54	0.54	125.00	6312.50	2776.80	3535.70	1.90	7.94	257.09	-37
14.696	2.116	-36	51.5	44.0	528	2.33	16.17	1.100	0	0.55	0.55	1.281	8.89	22	0.53	0.53	125.00	6437.50	2839.20	3598.30	1.90	8.05	265.14	-38
14.696	2.116	-37	52.5	45.0	540	2.36	16.39	1.116	0	0.55	0.55	1.298	9.02	22.5	0.52	0.52	125.00	6562.50	2901.60	3660.90	1.90	8.16	273.30	-39
14.696	2.116	-38	53.5	46.0	552	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	23	0.51	0.51	125.00	6687.50	2964.00	3723.50	1.90	8.27	281.57	-40
14.696	2.116	-39	54.5	47.0	564	2.42	16.84	1.146	0	0.55	0.55	1.334	9.26	23.5	0.50	0.50	125.00	6812.50	3026.40	3786.10	1.90	8.38	289.95	-41
14.696	2.116	-40	55.5	48.0	576	2.46	17.06	1.161	0	0.55	0.55	1.351	9.38	24	0.49	0.49	125.00	6937.50	3088.80	3848.70	1.89	8.49	298.44	-42
14.696	2.116	-41	56.5	49.0	588	2.49	17.28	1.176	0	0.55	0.55	1.369	9.50	24.5	0.48	0.48	125.00	7062.50	3151.20	3911.30	1.89	8.60	307.04	-43
14.696	2.116	-42	57.5	50.0	600	2.52	17.50	1.191	0	0.55	0.55	1.386	9.63	25	0.47	0.47	125.00	7187.50	3213.60	3973.90	1.88	8.71	315.75	-44
14.696	2.116	-43	58.5	51.0	612	2.55	17.72	1.206	0	0.55	0.55	1.404	9.75	25.5	0.47	0.47	125.00	7312.50	3276.00	4036.50	1.88	8.82	324.57	-45
14.696	2.116	-44	59.5	52.0	624	2.58	17.95	1.221	0	0.55	0.55	1.421	9.87	26	0.46	0.46	125.00	7437.50	3338.40	4099.10	1.87	8.93	333.50	-46
14.696	2.116	-45	60.5	53.0	636	2.62	18.17	1.236	0	0.55	0.55	1.439	9.99	26.5	0.45	0.45	125.00	7562.50	3400.80	4161.70	1.86	9.04	342.54	-47
14.696	2.116	-46	61.5	54.0	648	2.65	18.39	1.251	0	0.55	0.55	1.456	10.11	27	0.44	0.44	125.00	7687.50	3463.20	4224.30	1.86	9.15	351.69	-48
14.696	2.116	-47	62.5	55.0	660	2.68	18.61	1.266	0	0.55	0.55	1.474	10.24	27.5	0.43	0.43	125.00	7812.50	3525.60	4286.90	1.85	9.26	360.95	-49
14.696	2.116	-48	63.5	56.0	672	2.71	18.83	1.282	0	0.55	0.55	1.492	10.36	28	0.42	0.42	125.00	7937.50	3588.00	4349.50	1.84	9.37	370.32	-50
14.696	2.116	-49	64.5	57.0	684	2.74	19.05	1.297	0	0.55	0.55	1.509	10.48	28.5	0.41	0.41	125.00	8062.50	3650.40	4412.10	1.83	9.48	379.80	-51
14.696	2.116	-50	65.5	58.0	696	2.78	19.28	1.312	0	0.55	0.55	1.527	10.60	29	0.41	0.41	125.00	8187.50	3712.80	4474.70	1.81	9.59	389.40	-52
14.696	2.116	-51	66.5	59.0	708	2.81	19.50	1.327	0	0.55	0.55	1.544	10.72	29.5	0.40	0.40	125.00	8312.50	3775.20	4537.30	1.80	9.70	399.10	-53
14.696	2.116	-52	67.5	60.0	720	2.84	19.72	1.342	0	0.55	0.55	1.562	10.85	30	0.39	0.39	125.00	8437.50	3837.60	4599.90	1.79	9.81	408.91	-54
14.696	2.116	-53	68.5	61.0	732	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	30.5	0.38	0.38	125.00	8562.50	3900.00	4662.50	1.77	9.92	418.84	-55
14.696	2.116	-54	69.5	62.0	744	2.90	20.16	1.372	0	0.55	0.55	1.597	11.09	31	0.37	0.37	125.00	8687.50	3962.40	4725.10	1.76	10.03	428.87	-56
14.696	2.116	-55	70.5	63.0	756	2.94	20.39	1.387	0	0.55	0.55	1.615	11.21	31.5	0.36	0.36	125.00	8812.50	4024.80	4787.70	1.74	10.14	439.01	-57
14.696	2.116	-56	71.5	64.0	768	2.97	20.61	1.402	0	0.55	0.55	1.632	11.33	32	0.36	0.36	125.00	8937.50	4087.20	4850.30	1.73	10.25	449.27	-58
14.696	2.116	-57	72.5	65.0	780	3.00	20.83	1.417	0	0.55	0.55	1.650	11.46	32.5	0.35	0.35	125.00	9062.50	4149.60	4912.90	1.71	10.36	459.63	-59
14.696	2.116	-58	73.5	66.0	792	3.03	21.05	1.432	0	0.55	0.55	1.667	11.58	33	0.34	0.34	125.00	9187.50	4212.00	4975.50	1.69	10.48	470.11	-60
14.696	2.116	-59	74.5	67.0	804	3.06	21.27	1.447	0	0.55	0.55	1.685	11.70	33.5	0.33	0.33	125.00	9312.50	4274.40	5038.10	1.68	10.59	480.69	-61
14.696	2.116	-60	75.5	68.0	816	3.10	21.49	1.463	0	0.55	0.55	1.702	11.82	34	0.32	0.32	125.00	9437.50	4336.80	5100.70	1.66	10.70	491.39	-62
14.696	2.116	-61	76.5	69.0	828	3.13	21.72	1.478	0	0.55	0.55	1.720	11.94	34.5	0.32	0.32	125.00	9562.50	4399.20	5163.30	1.64	10.81	502.20	-63
14.696	2.116	-62	77.5	70.0	840	3.16	21.94	1.493	0	0.55	0.55	1.737	12.07	35	0.31	0.31	125.00	9687.50	4461.60	5225.90	1.62	10.92	513.11	-64
14.696	2.116	-63	78.5	71.0	852	3.19	22.16	1.508	0	0.55	0.55	1.752	12.17	35.5	0.30	0.30	125.00	9812.50	4524.00	5288.50	1.59	11.01	524.12	-65
14.696	2.116	-64	79.5	72.0	864	3.22	22.38	1.523	0	0.55	0.55	1.765	12.26	36	0.29	0.29	125.00	9937.50	4586.40	5351.10	1.57	11.09	535.22	-66
14.696	2.116	-65	80.5	73.0	876	3.25	22.60	1.538	0	0.55	0.55	1.778	12.35	36.5	0.29	0.29	125.00	10062.50	4648.80	5413.70	1.55	11.17	546.39	-67
14.696	2.116	-66	81.5	74.0	888	3.29	22.82	1.553	0	0.54	0.54	1.790	12.43	37	0.28	0.28	125.00	10187.50	4711.20	5476.30	1.53	11.25	557.63	-68
14.696	2.116	-67	82.5	75.0	900	3.32	23.05	1.568	0	0.54	0.54	1.803	12.52	37.5	0.27	0.27	125.00	10312.50	4773.60	5538.90	1.50	11.33	568.96	-69
14.696	2.116	-68	83.5	76.0	912	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	38	0.26	0.26	125.00	10437.50	4836.00	5601.50	1.48	11.40	580.36	-70
14.696	2.116	-69	84.5	77.0	924	3.38	23.49	1.598	0	0.54	0.54	1.827	12.69	38.5	0.26	0.26	125.00	10562.50	4898.40	5664.10	1.45	11.48	591.84	-71
14.696	2.116	-70	85.5	78.0	936	3.41	23.71	1.613	0	0.54	0.54	1.839	12.77	39	0.25	0.25	125.00	10687.50	4960.80	5726.70	1.43	11.56	603.40	-72
14.696	2.116	-71	86.5	79.0	948	3.45	23.93	1.629	0	0.54	0.54	1.851	12.86	39.5	0.24	0.25	125.00	10812.50	5023.20	5789.30	1.45	11.63	615.03	-73
14.696	2.116	-72	87.5	80.0	960	3.48	24.15	1.644	0	0.54	0.54	1.863	12.94	40	0.23	0.25	125.00	10937.50	5085.60	5851.90	1.46	11.71	626.74	-74
14.696	2.116	-73	88.5	81.0	972	3.51	24.38	1.659	0	0.53	0.53	1.875	13.02	40.5	0.23	0.25	125.00	11062.50	5148.00	5914.50	1.48	11.78	638.52	-75
14.696	2.116	-74	89.5	82.0	984	3.54	24.60	1.674	0	0.53	0.53	1.887	13.10	41	0.22	0.25	125.00	11187.50	5210.40	5977.10	1.49	11.85	650.37	-76
14.696	2.116	-75	90.5	83.0	996	3.57	24.82	1.689	0	0.53	0.53	1.898	13.18	41.5	0.21	0.25	125.00	11312.50	5272.80	6039.70	1.51	11.93	662.30	-77
14.696	2.116	-76	91.5	84.0	1008	3.61	25.04	1.704	0	0.53	0.53	1.910	13.26	42	0.21	0.25	125.00	11437.50	5335.20	6102.30	1.53	12.00	674.30	-78
14.696	2.116	-77	92.5	85.0	1020	3.64	25.26	1.719	0	0.53	0.53	1.921	13.34	42.5	0.20	0.25	125.00	11562.50	5397.60	6164.90	1.54	12.07	686.37	-79
14.696	2.116	-78	93.5	86.0	1032	3.67	25.48	1.734	0	0.53	0.53	1.932	13.42	43	0.19	0.25	125.00	11687.50	5460.00	6227.50	1.56	12.14	698.51	-80
14.696	2.116	-79	94.5	87.0	1044	3.70	25.71	1.749	0	0.53	0.53	1.944	13.50	43.5	0.19	0.25	125.00	11812.50	5522.40	6290.10	1.57	12.21	710.72	-81
14.696	2.116	-80	95.5	88.0	1056	3.73	25.93	1.764	0	0.52	0.52	1.955	13.58	44	0.18	0.25	125.00	11937.50	5584.80	6352.70	1.59	12.28	723.00	-82
14.696	2.116	-81	96.5	89.0	1068	3.77	26.15	1.779	0	0.52	0.52	1.966	13.65	44.5	0.17	0.25	125.00	12062.50	5647.20	6415.30	1.60	12.35	735.35	-83
14.696	2.116	-82	97.5	90.0	1080	3.80	26.37	1.794	0	0.52	0.52	1.977	13.73	45	0.16	0.25	125.00	12187.50	5709.60	6477.90	1.62	12.42	747.78	-84
14.696	2.116	-83	98.5	91.0	1092	3.83	26.59	1.810	0	0.52	0.52	1.988	13.80	45.5	0.16	0.25	125.00	12312.50	5772.00	6540.50	1.64	12.49	760.26	-85
14.696	2.116	-84	99.5	92.0	1104	3.86	26.81	1.825	0	0.52	0.52	1.998	13.88	46	0.15	0.25	125.00	12437.50	5834.40	6603.10	1.65	12.56	772.82	-86
14.696	2.116	-85	100.5	93.0	1116	3.89	27.04	1.840	0	0.52	0.52	2.009	13.95	46.5	0.14	0.25	125.00	12562.50	5896.80	6665.70	1.67	12.62	785.44	-87
14.696	2.116	-86	101.5	94.0	1128	3.93	27.26	1.855	0	0.51	0.51	2.020	14.02	47	0.14	0.25	125.00	12687.50	5959.20	6728.30	1.68	12.69	798.13	-88
14.696	2.116	-87	102.5	95.0	1140	3.96	27.48	1.870	0	0.51	0.51	2.030	14.10	47.5	0.13	0.25	125.00	12812.50	6021.60	6790.90	1.70	12.76	810.89	-89
14.696	2.116	-88	103.5	96.0	1152	3.99	27.70	1.885	0	0.51	0.51	2.040	14.17	48	0.12	0.25	125.00	12937.50	6084.00	6853.50	1.71	12.82	823.71	-90
14.696	2.116	-89	104.5	97.0	1164	4.02	27.92	1.900	0	0.51	0.51	2.051	14.24	48.5	0.12	0.25	125.00	13062.50	6146.40	6916.10	1.73	12.88	836.59	-91
14.696	2.116	-90	105.5	98.0	1176	4.05	28.14	1.915	0	0.51	0.51	2.061	14.31	49	0.11	0.25	125.00	13187.50	6208.80	6978.70	1.74	12.95	849.54	-92
14.696	2.116	-91	106.5	99.0	1188	4.08	28.37	1.930	0	0.51	0.51	2.071	14.38	49.5	0.10	0.25	125.00	13312.50	6271.20	7041.30	1.76	13.01	862.55	-93
14.696	2.116	-92	107.5	100.0	1200	4.12	28.59	1.945	0	0.51	0.51	2.081	14.45	50	0.10	0.25	125.00	13437.50	6333.60	7103.90	1.78	13.07	875.63	-94
14.696	2.116	-93	108.5	101.0	1212	4.15	28.81	1.960	0	0.50	0.50	2.091	14.52	50.5	0.09	0.25	125.00	13562.50	6396.00	7166.50	1.79	13.14	888.76	-95
14.696	2.116	-94	109.5	102.0	1224	4.18	29.03	1.975	0	0.50	0.50	2.101	14.59	51	0.08	0.25	125.00	13687.50	6458.40	7229.10	1.81	13.20	901.96	-96
14.696	2.116	-95	110.5	103.0	1236	4.21	29.25	1.991	0	0.50	0.50	2.110	14.65	51.5	0.08	0.25	125.00	13812.50	6520.80	7291.70	1.82	13.26	915.22	-97
14.696	2.116	-96	111.5	104.0	1248	4.24	29.48	2.006	0	0.50	0.50	2.120	14.72	52	0.07	0.25	125.00	13937.50	6583.20	7354.30	1.84	13.32	928.54	-98
14.696	2.116	-97	112.5	105.0	1260	4.28	29.70	2.021	0	0.50	0.50	2.129	14.79	52.5	0.07	0.25	125.00	14062.50	6645.60	7416.90	1.85	13.38	941.92	-99
14.696	2.116	-98	113.5	106.0	1272	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	53	0.06	0.25	125.00	14187.50	6708.00	7479.50	1.87	13.44	955.36	-100
14.696	2.116	-99	114.5	107.0	1284	4.34	30.14	2.051	0	0.49	0.49	2.148	14.92	53.5	0.05	0.25	125.00	14312.50	6770.40	7542.10	1.89	13.50	968.85	-101
14.696	2.116	-100	115.5	108.0	1296	4.37	30.36	2.066	0	0.49	0.49	2.157	14.98	54	0.05	0.25	125.00	14437.50	6832.80	7604.70	1.90	13.55	982.41	-102
14.696	2.116	-101	116.5	109.0	1308	4.40	30.58	2.081	0	0.49	0.49	2.166	15.04	54.5	0.04	0.25	125.00	14562.50	6895.20	7667.30	1.92	13.61	996.02	-103
14.696	2.116	-102	117.5	110.0	1320	4.44	30.81	2.096	0	0.49	0.49	2.175	15.11	55	0.03	0.25	125.00	14687.50	6957.60	7729.90	1.93	13.67	1009.69	-104
14.696	2.116	-103	118.5	111.0	1332	4.47	31.03	2.111	0	0.49	0.49	2.184	15.17	55.5	0.03	0.25	125.00	14812.50	7020.00	7792.50	1.95	13.72	1023.41	-105
14.696	2.116	-104	119.5	112.0	1344	4.50	31.25	2.126	0	0.49	0.49	2.193	15.23	56	0.02	0.25	125.00	14937.50	7082.40	7855.10	1.96	13.78	1037.19	-106
14.696	2.116	-105	120.5	113.0	1356	4.53	31.47	2.141	0	0.49	0.49	2.202	15.29	56.5	0.02	0.25	125.00	15062.50	7144.80	7917.70	1.98	13.83	1051.02	-107
14.696	2.116	-106	121.5	114.0	1368	4.56	31.69	2.157	0	0.48	0.48	2.210	15.35	57	0.01	0.25	125.00	15187.50	7207.20	7980.30	2.00	13.89	1064.91	-108
14.696	2.116	-107	122.5	115.0	1380	4.60	31.91	2.172	0	0.48	0.48	2.219	15.41	57.5	0.00	0.25	125.00	15312.50	7269.60	8042.90	2.01	13.94	1078.85	-109
14.696	2.116	-108	123.5	116.0	1392	4.63	32.14	2.187	0	0.48	0.48	2.227	15.47	58	0.00	0.25	125.00	15437.50	7332.00	8105.50	2.03	14.00	1092.85	-110
14.696	2.116	-109	124.5	117.0	1404	4.66	32.36	2.202	0	0.48	0.48	2.236	15.53	58.5	-0.01	0.25	125.00	15562.50	7394.40	8168.10	2.04	14.05	1106.90	-111
14.696	2.116	-110	125.5	118.0	1416	4.69	32.58	2.217	0	0.48	0.48	2.244	15.58	59	-0.02	0.25	125.00	15687.50	7456.80	8230.70	2.06	14.10	1121.00	-112
14.696	2.116	-111	126.5	119.0	1428	4.72	32.80	2.232	0	0.48	0.48	2.252	15.64	59.5	-0.02	0.25	125.00	15812.50	7519.20	8293.30	2.07	14.15	1135.15	-113
14.696	2.116	-112	127.5	120.0	1440	4.76	33.02	2.247	0	0.48	0.48	2.260	15.70	60	-0.03	0.25	125.00	15937.50	7581.60	8355.90	2.09	14.20	1149.35	-114
14.696	2.116	-113	128.5	121.0	1452	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	60.5	-0.03	0.25	125.00	16062.50	7644.00	8418.50	2.10	14.25	1163.60	-115
14.696	2.116	-114	129.5	122.0	1464	4.82	33.47	2.277	0	0.47	0.47	2.276	15.81	61	-0.04	0.25	125.00	16187.50	7706.40	8481.10	2.12	14.30	1177.90	-116
14.696	2.116	-115	130.5	123.0	1476	4.85	33.69	2.292	0	0.47	0.47	2.284	15.86	61.5	-0.05	0.25	125.00	16312.50	7768.80	8543.70	2.14	14.35	1192.25	-117
14.696	2.116	-116	131.5	124.0	1488	4.88	33.91	2.307	0	0.47	0.47	2.291	15.91	62	-0.05	0.25	125.00	16437.50	7831.20	8606.30	2.15	14.40	1206.64	-118
14.696	2.116	-117	132.5	125.0	1500	4.91	34.13	2.322	0	0.47	0.47	2.299	15.96	62.5	-0.06	0.25	125.00	16562.50	7893.60	8668.90	2.17	14.44	1221.09	-119
14.696	2.116	-118	133.5	126.0	1512	4.95	34.35	2.338	0	0.47	0.47	2.306	16.02	63	-0.06	0.25	125.00	16687.50	7956.00	8731.50	2.18	14.49	1235.58	-120
14.696	2.116	-119	134.5	127.0	1524	4.98	34.57	2.353	0	0.46	0.46	2.314	16.07	63.5	-0.07	0.25	125.00	16812.50	8018.40	8794.10	2.20	14.54	1250.12	-121
14.696	2.116	-120	135.5	128.0	1536	5.01	34.80	2.368	0	0.46	0.46	2.321	16.12	64	-0.07	0.25	125.00	16937.50	8080.80	8856.70	2.21	14.58	1264.70	-122
14.696	2.116	-121	136.5	129.0	1548	5.04	35.02	2.383	0	0.46	0.46	2.328	16.17	64.5	-0.08	0.25	125.00	17062.50	8143.20	8919.30	2.23	14.63	1279.33	-123
14.696	2.116	-122	137.5	130.0	1560	5.07	35.24	2.398	0	0.46	0.46	2.335	16.22	65	-0.09	0.25	125.00	17187.50	8205.60	8981.90	2.25	14.67	1294.00	-124

```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=8.5 (Abut1)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  3.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.92500000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.50000000000000E+0000  8.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        8.50000000000000E+0000  2.10000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.10000000000000E+0001  3.85000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.85000000000000E+0001  9.95000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
6 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       5        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC5:Displ (in), Slope (rad);             Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=14.25 (Abut 5A)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  4.25000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.21250000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.25000000000000E+0000  1.42500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.42500000000000E+0001  2.67500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.67500000000000E+0001  4.42500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.42500000000000E+0001  1.04250000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
7 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
7       1        2.98600000000000E+0004  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=17.75 (Abut 5B and 5 RW Right)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      300
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  7.75000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.38750000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        7.75000000000000E+0000  1.77500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.77500000000000E+0001  3.02500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.02500000000000E+0001  4.77500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.77500000000000E+0001  1.07750000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
6 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=17.75 (Abut 5B)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      300
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  1.52500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.76250000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.52500000000000E+0001  2.52500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.52500000000000E+0001  3.77500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.77500000000000E+0001  5.52500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        5.52500000000000E+0001  1.15250000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
7 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
7       1        8.69000000000000E+0004  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=16.25 (RW 20a)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      300
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  6.25000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.31250000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        6.25000000000000E+0000  1.62500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.62500000000000E+0001  2.87500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.87500000000000E+0001  4.62500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.62500000000000E+0001  1.06250000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
7 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
7       1        2.05000000000000E+0004  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=12.75 (RW 20b)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      300
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  2.75000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.13750000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.75000000000000E+0000  1.27500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.27500000000000E+0001  2.52500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```

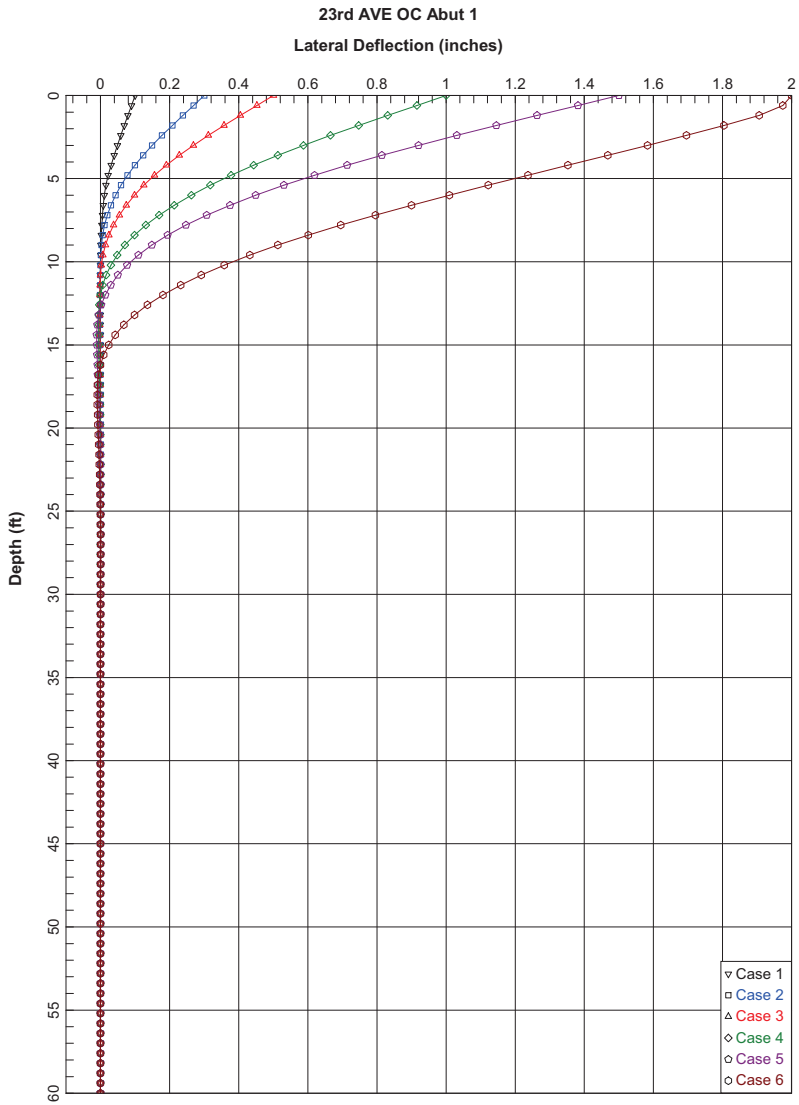


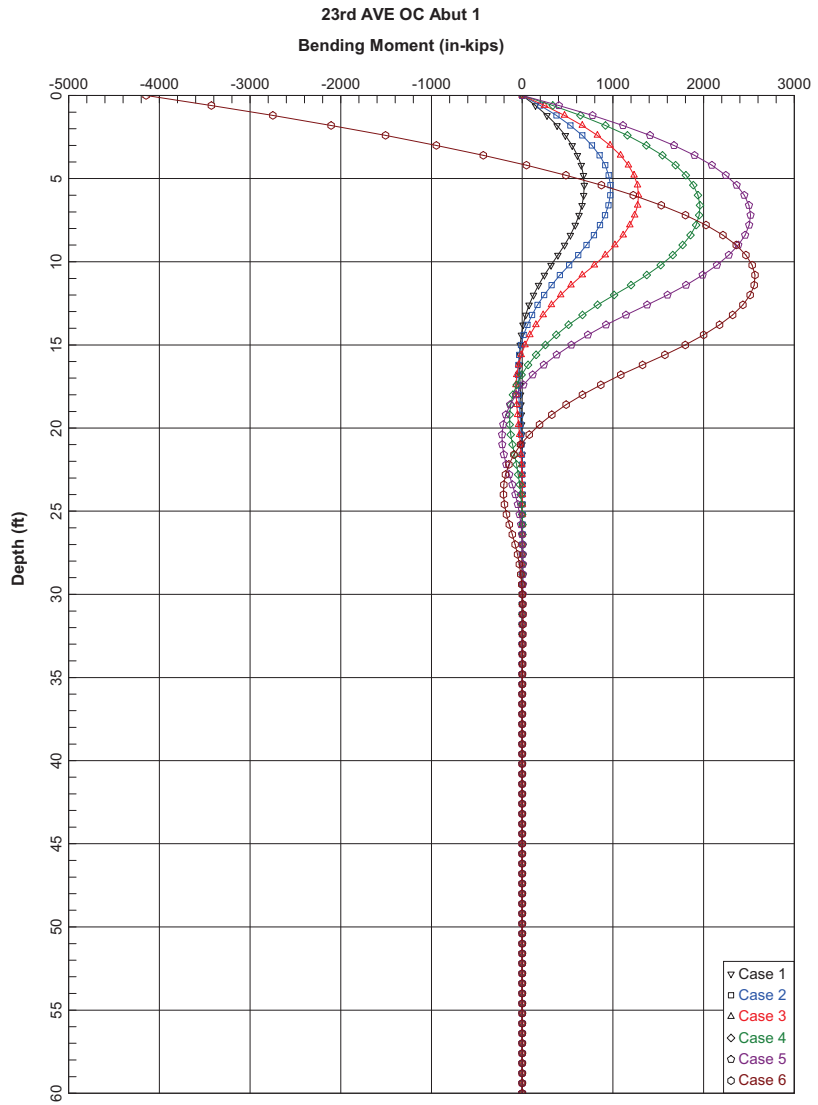
```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.52500000000000E+0001  4.27500000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.27500000000000E+0001  1.02750000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
6 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

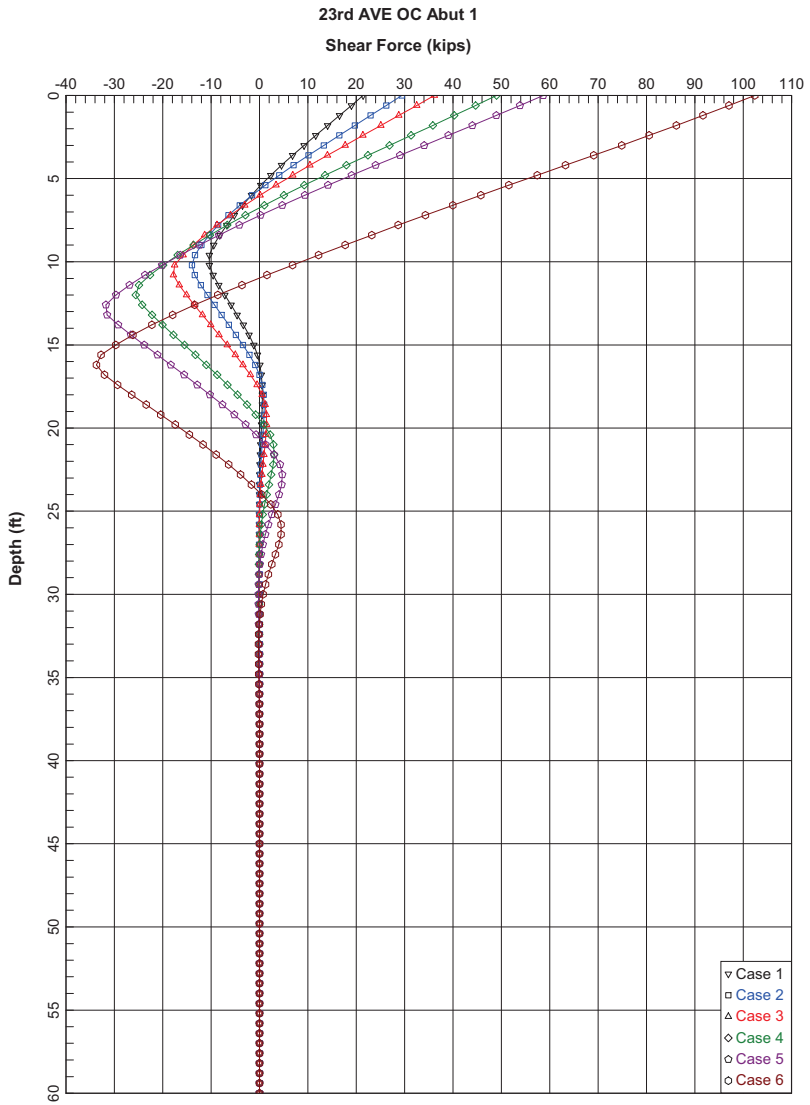
```
LPILEP6
TITLE
2.0ft CIDH_60ft_abut_EL=8.5 (RW 20c and 21)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  3.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.92500000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.50000000000000E+0000  8.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        8.50000000000000E+0000  2.10000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```

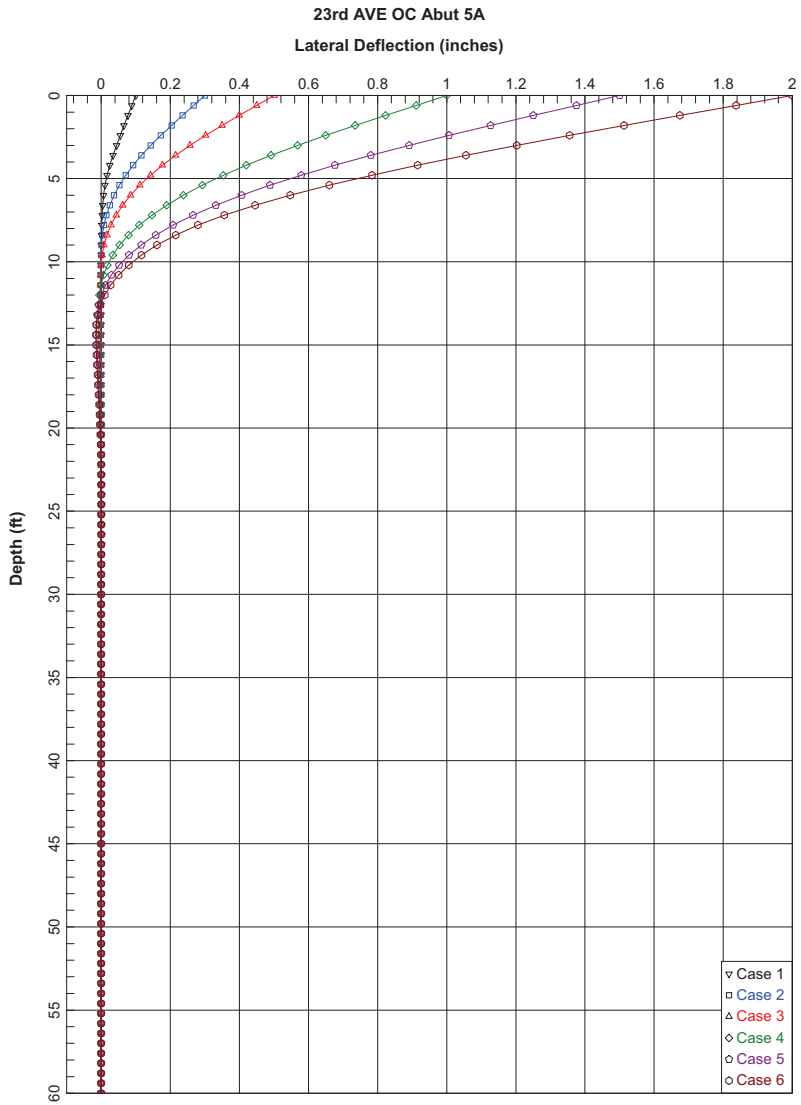


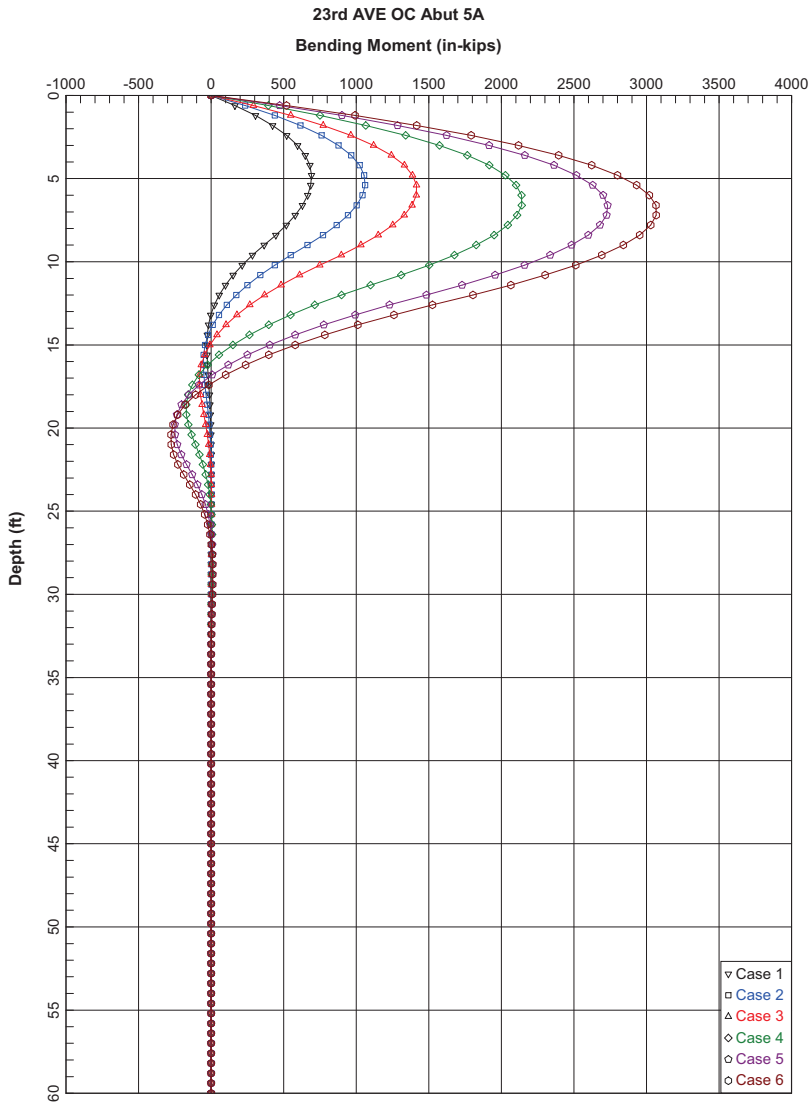
```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.10000000000000E+0001  3.85000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.85000000000000E+0001  9.95000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.70000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
6 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       5        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC5:Displ (in), Slope (rad);             Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

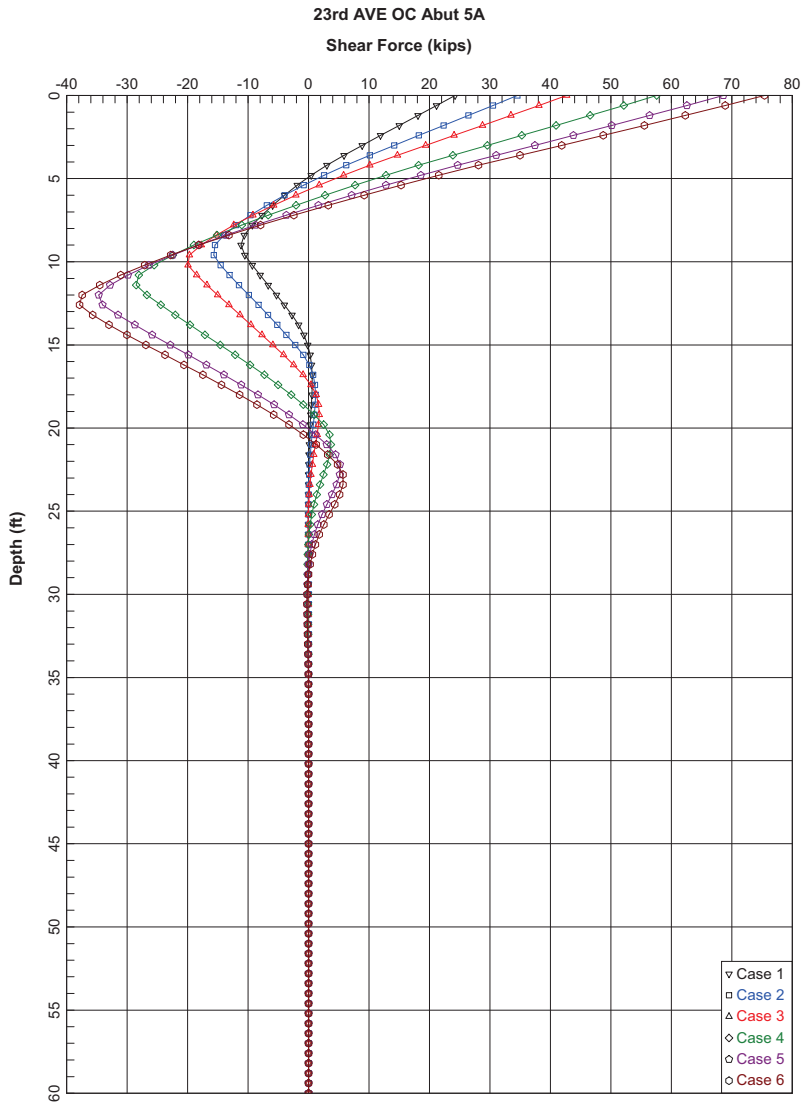

23rd AVE OC Abut 1
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

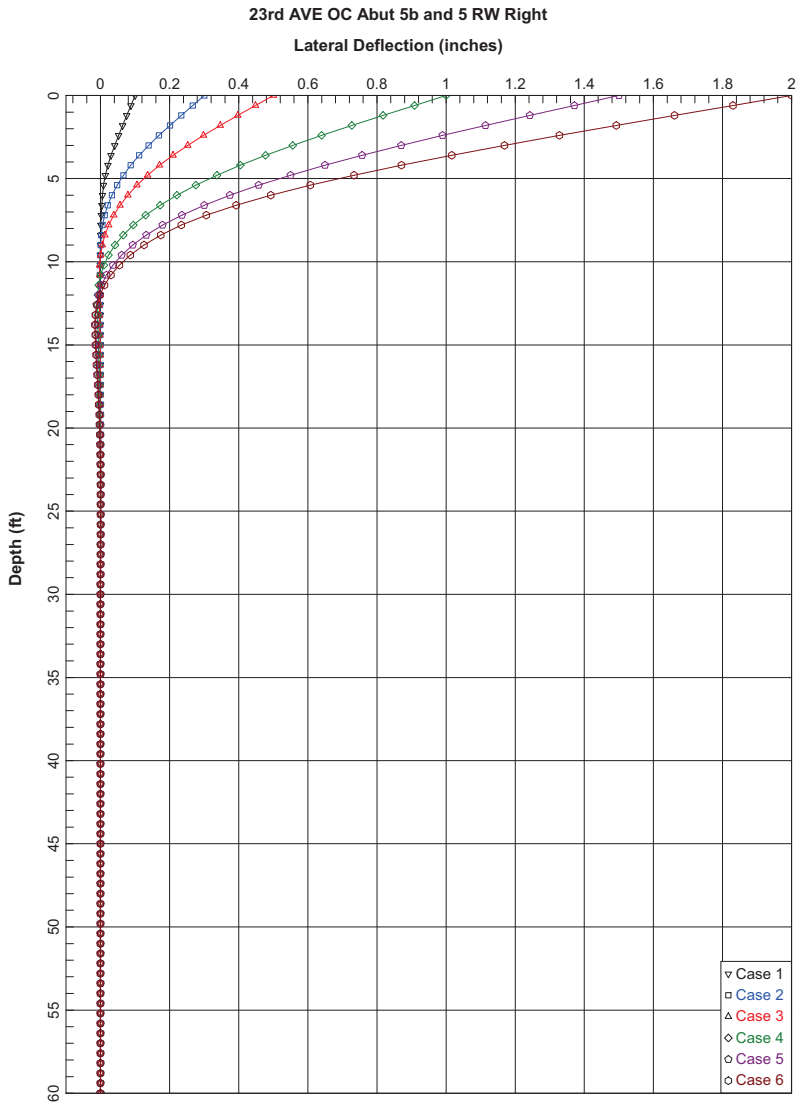

23rd AVE OC Abut 1
Bending Moment (in-kips)
Depth (ft)
-5000
-4000
-3000
-2000
-1000
0
1000
2000
3000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

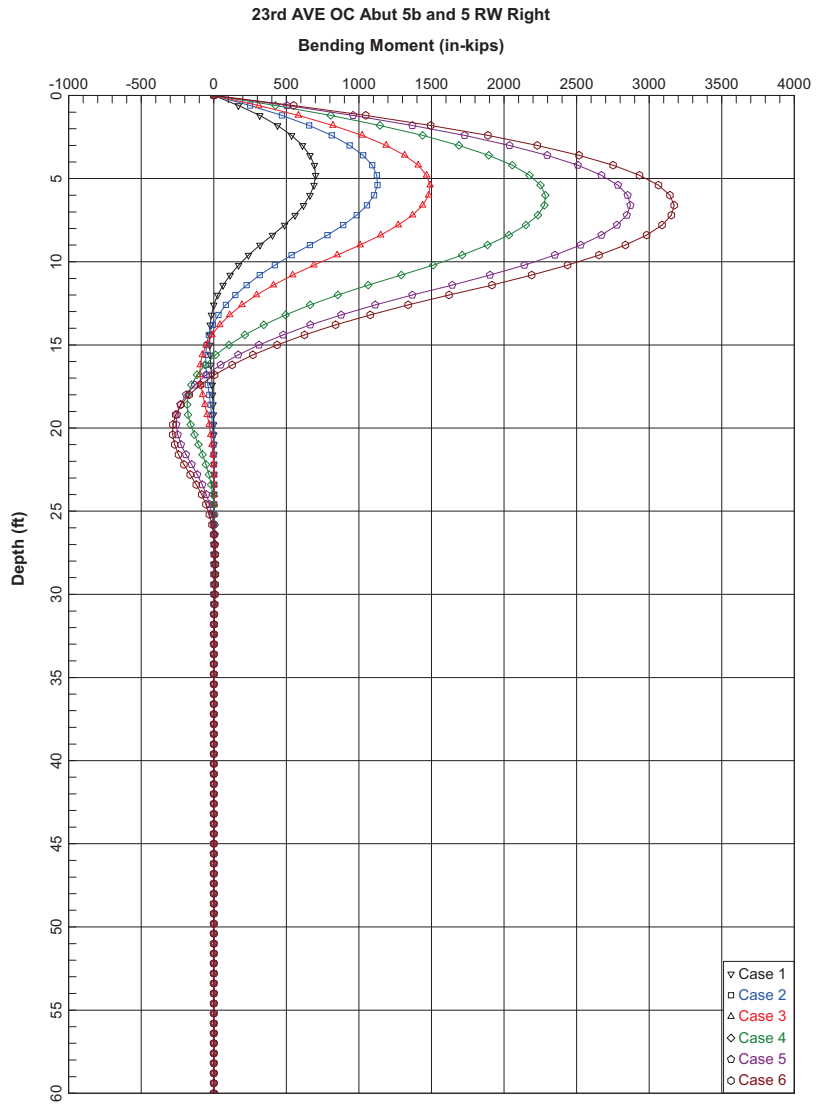

23rd AVE OC Abut 1
Shear Force (kips)
Depth (ft)
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

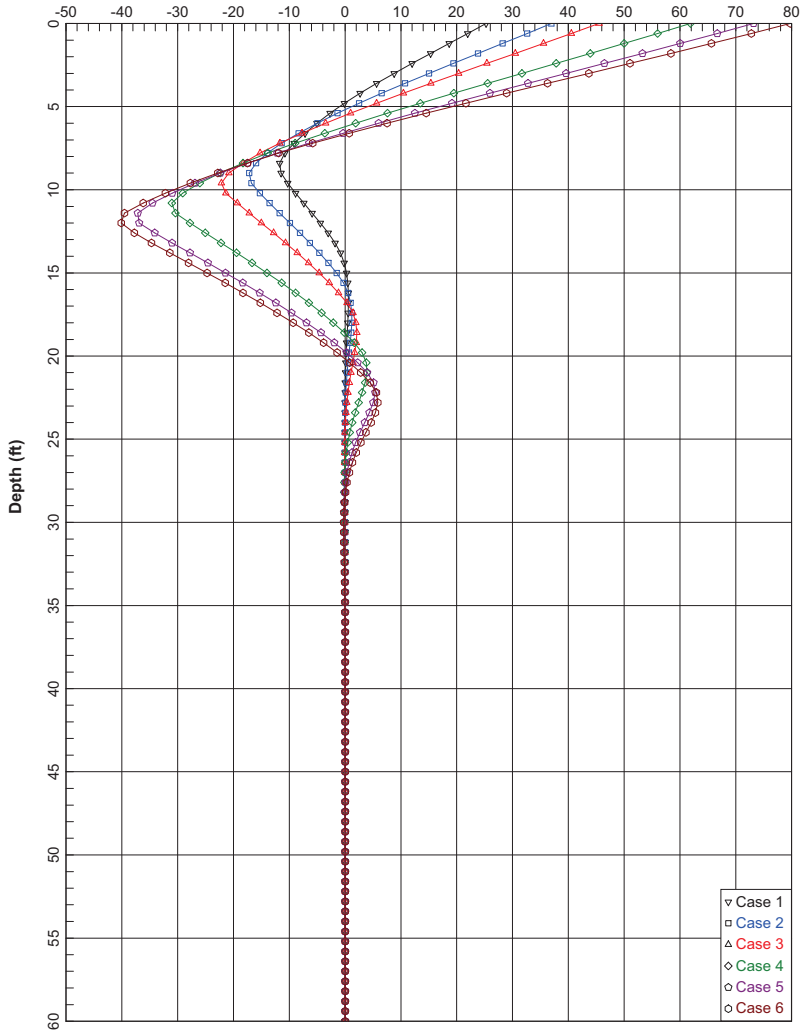

23rd AVE OC Abut 5A
Lateral Deflection (inches)
Depth (ft)
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

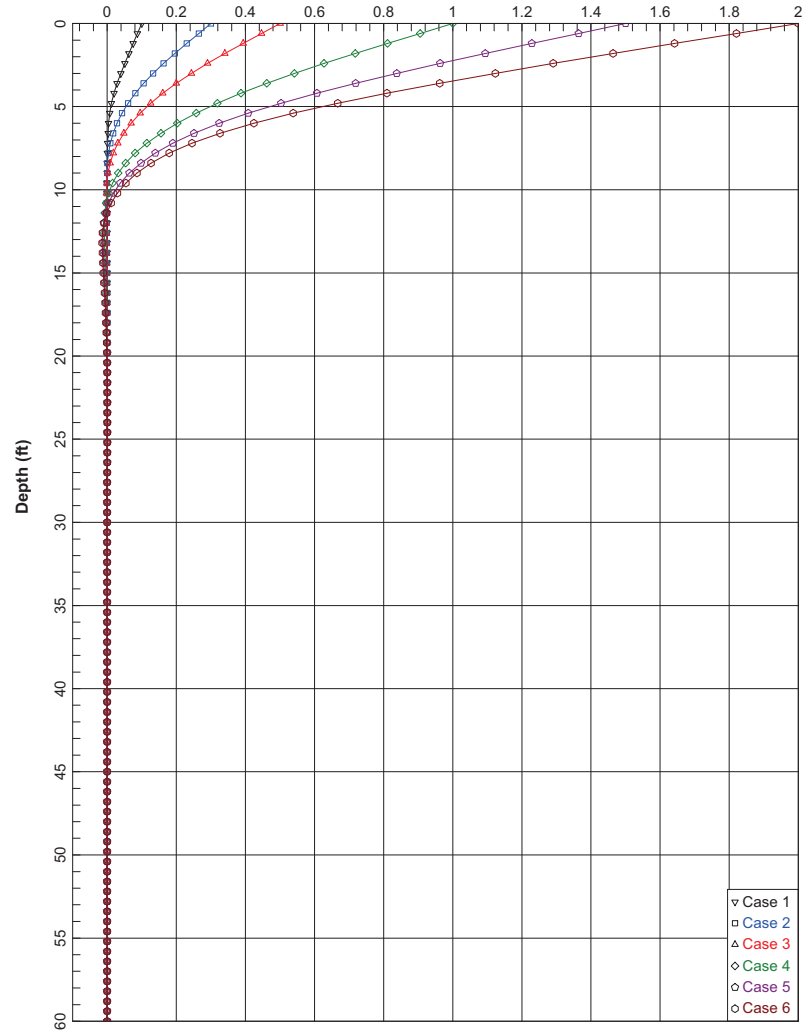

23rd AVE OC Abut 5A
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

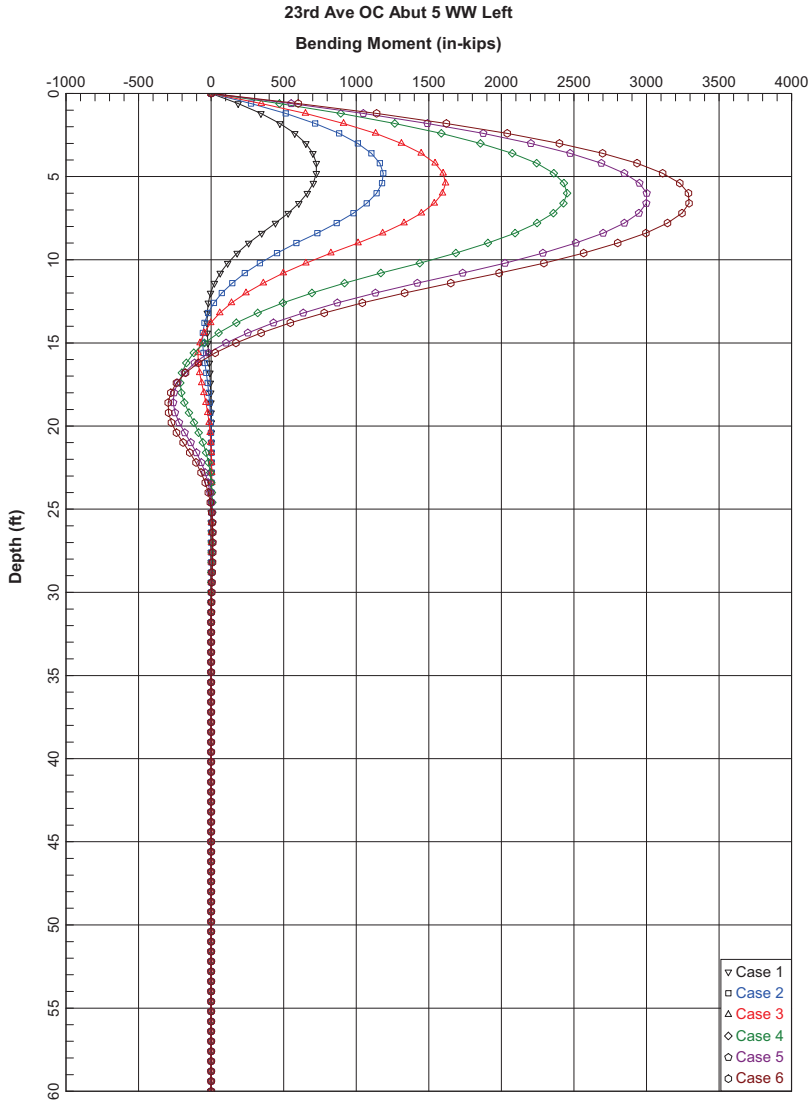

23rd AVE OC Abut 5A
Shear Force (kips)
Depth (ft)
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

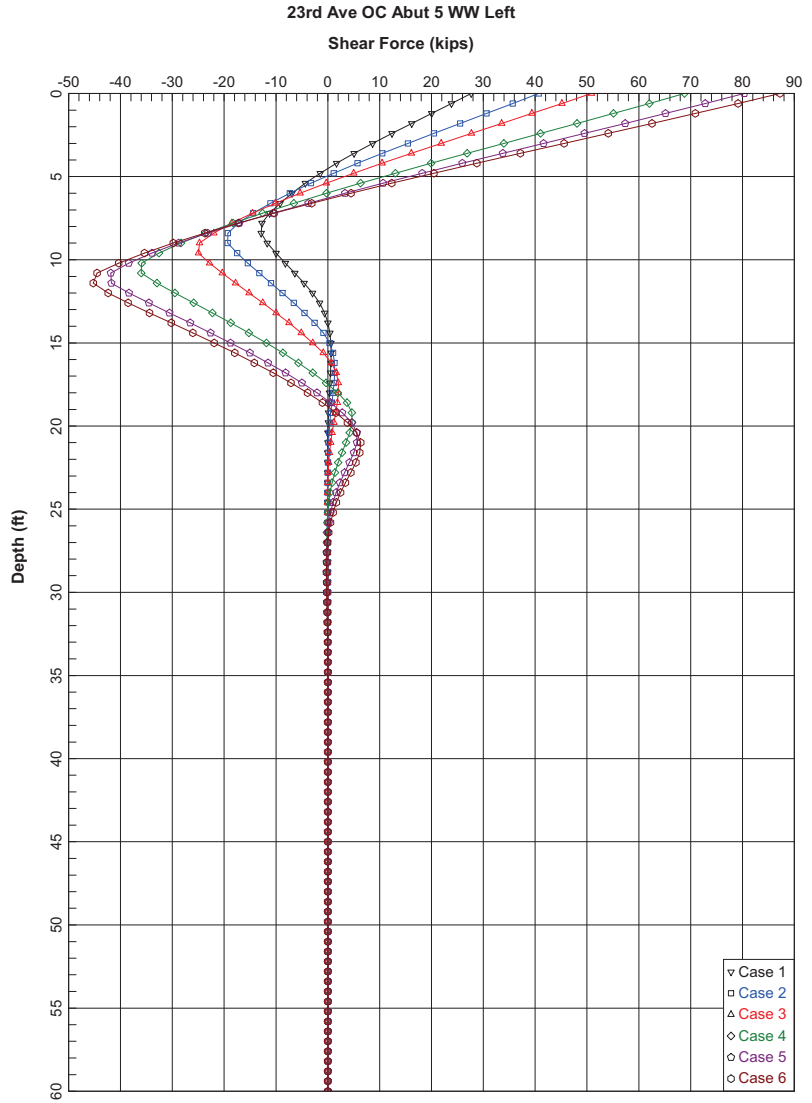

23rd AVE OC Abut 5b and 5 RW Right
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

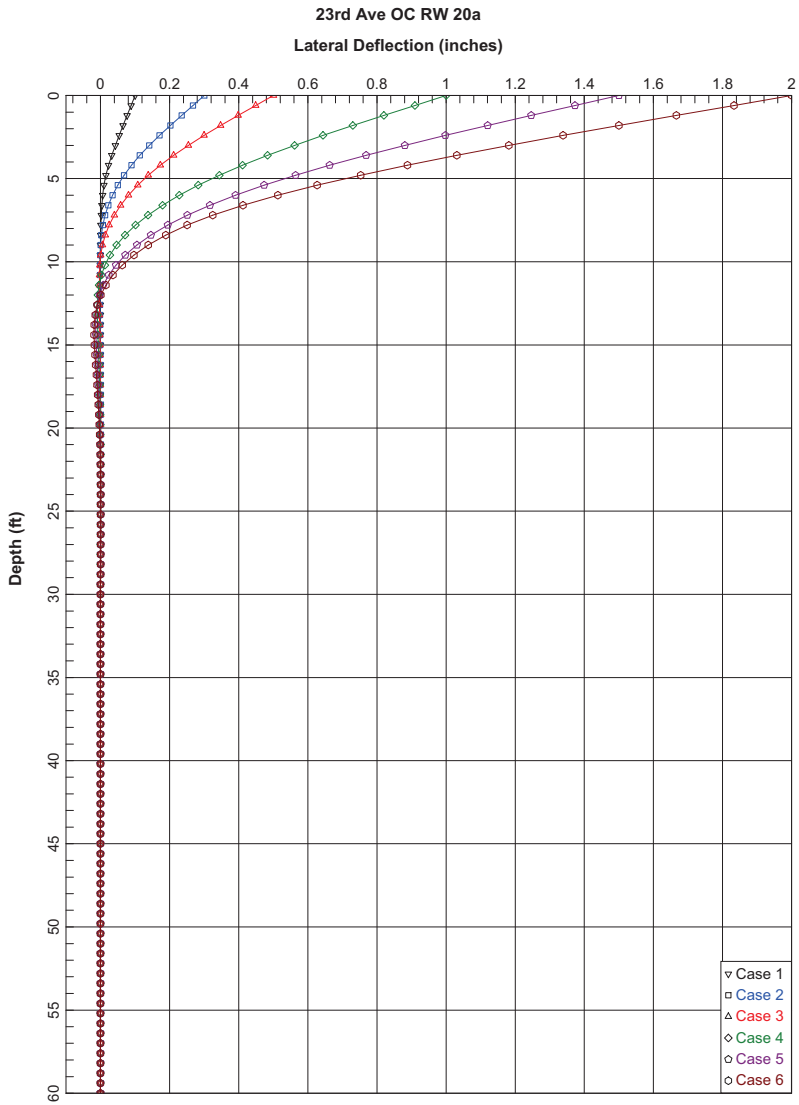

23rd AVE OC Abut 5b and 5 RW Right
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

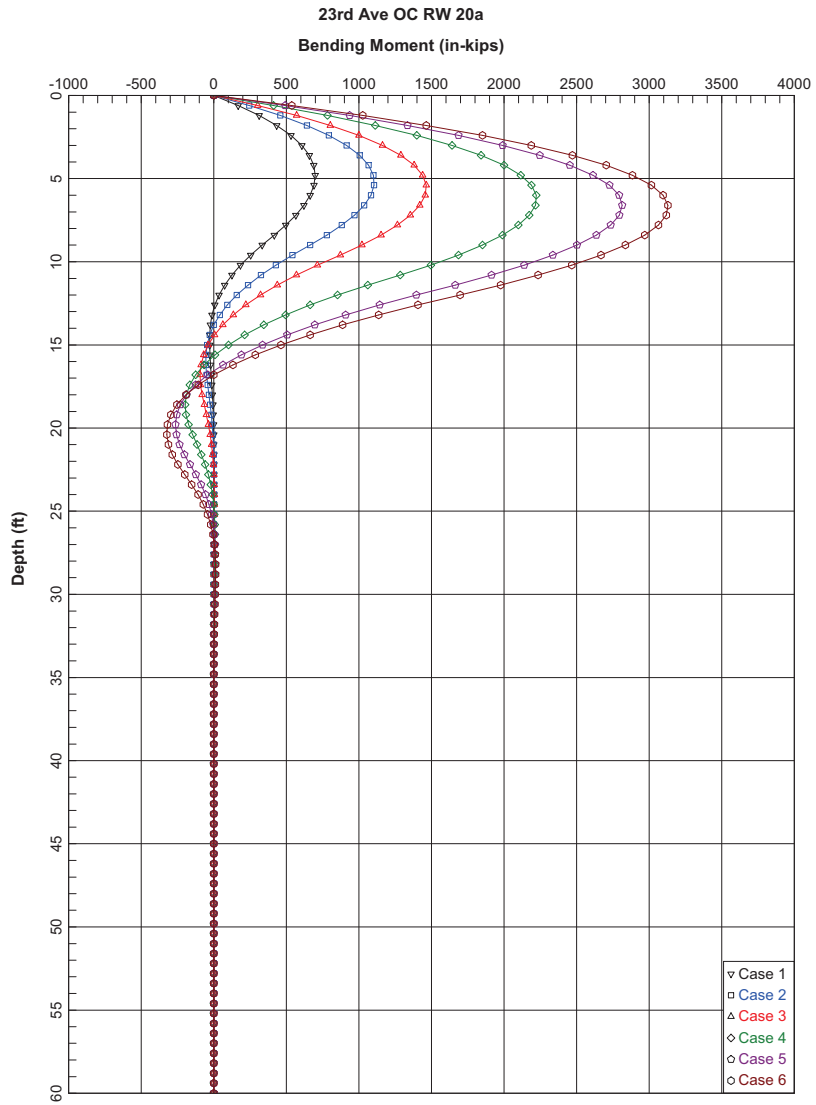

23rd AVE OC Abut 5b and 5 RW Right
Shear Force (kips)
Depth (ft)
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

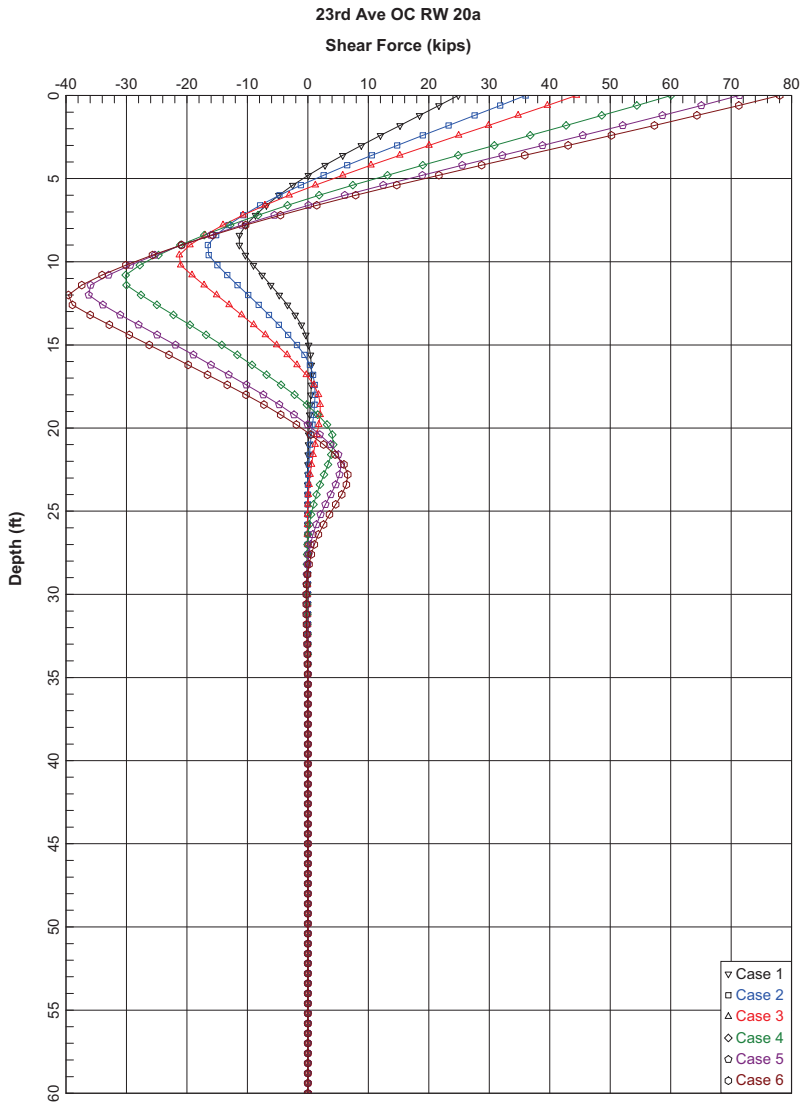

23rd Ave OC Abut 5 WW Left
Lateral Deflection (inches)
Depth (ft)
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

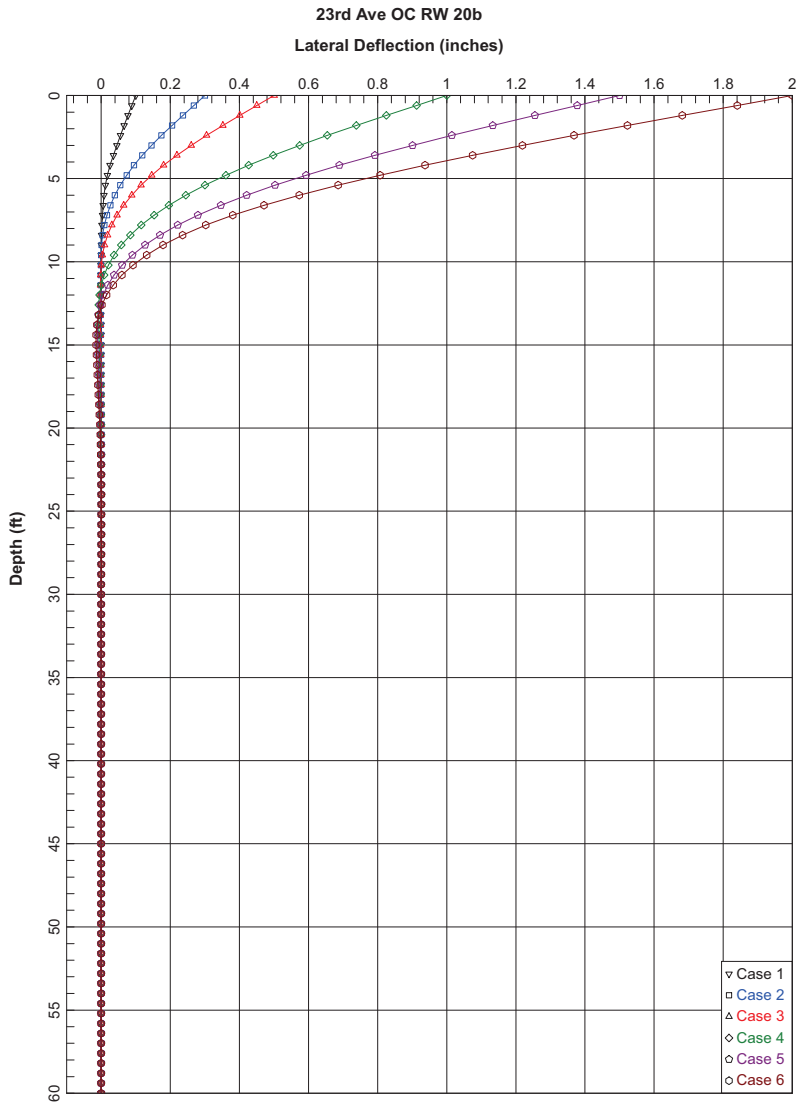

23rd Ave OC Abut 5 WW Left
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

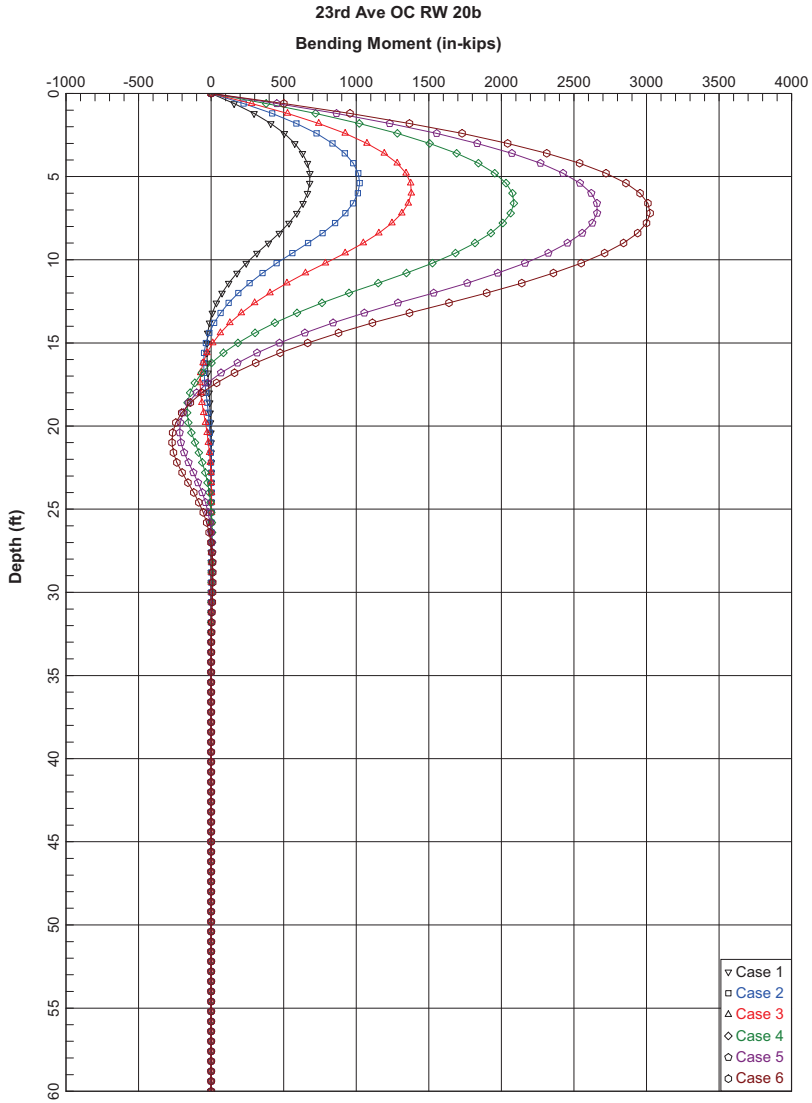

23rd Ave OC Abut 5 WW Left
Shear Force (kips)
Depth (ft)
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

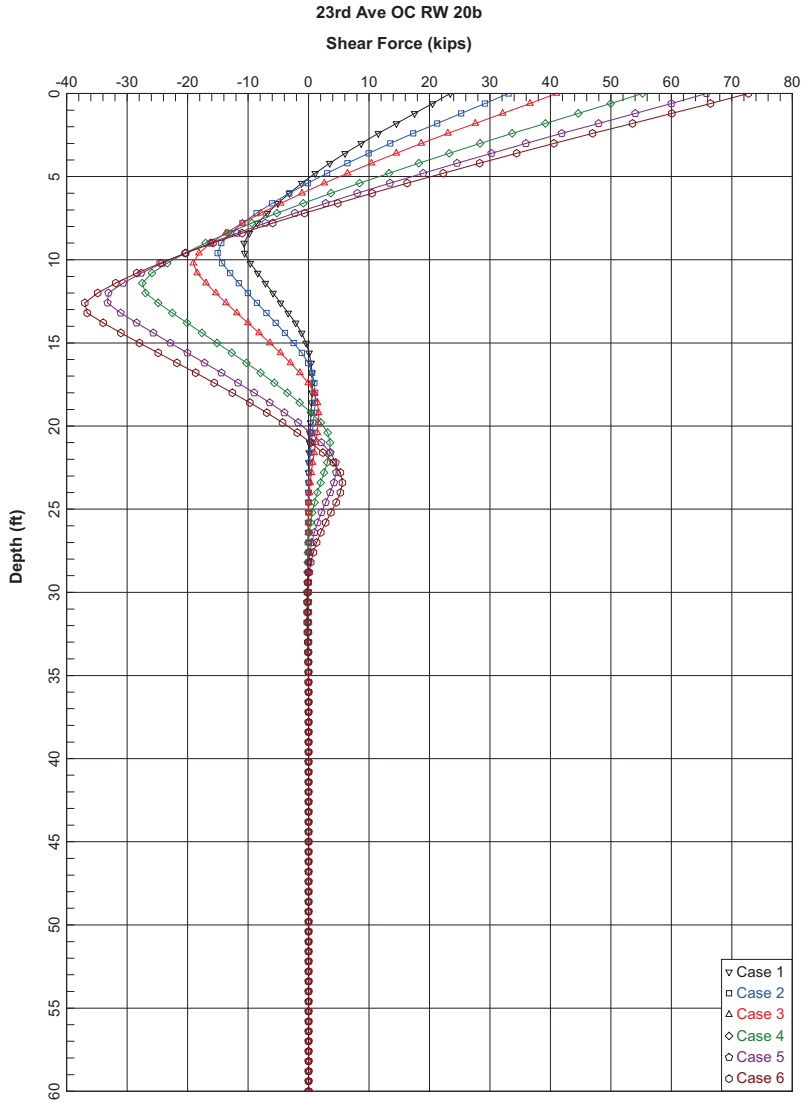

23rd Ave OC RW 20a
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

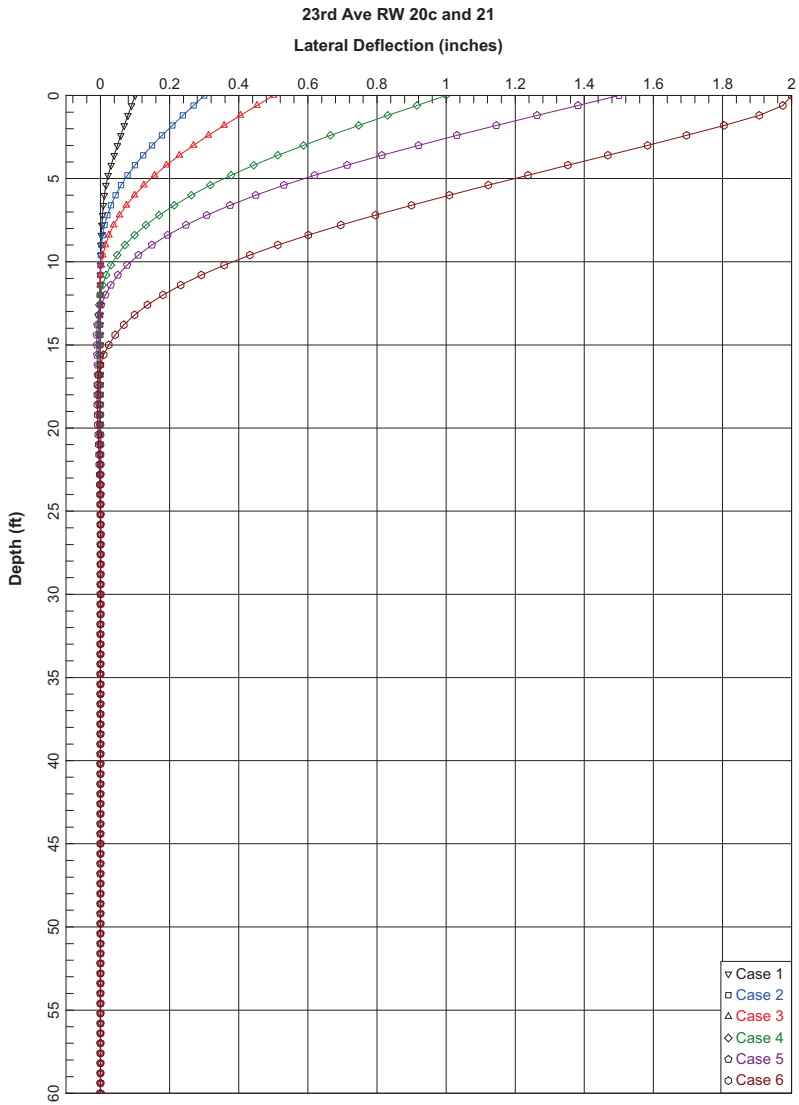

23rd Ave OC RW 20a
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

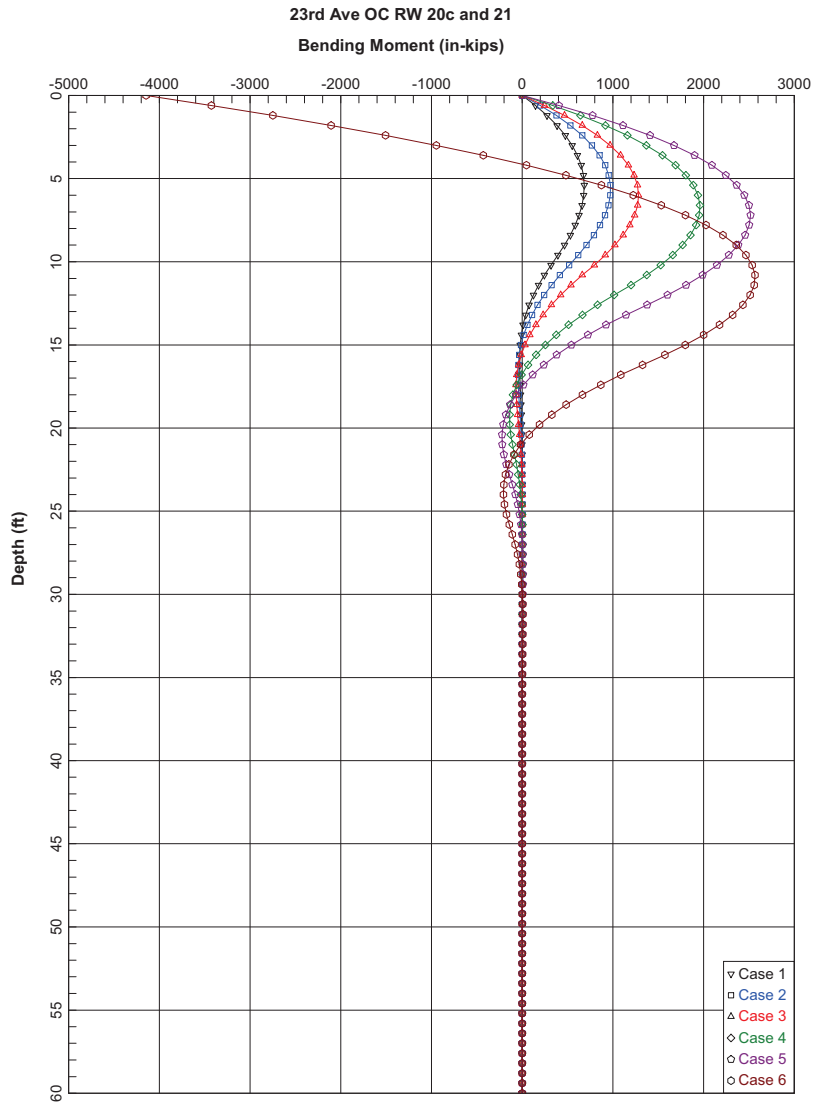

23rd Ave OC RW 20a
Shear Force (kips)
Depth (ft)
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

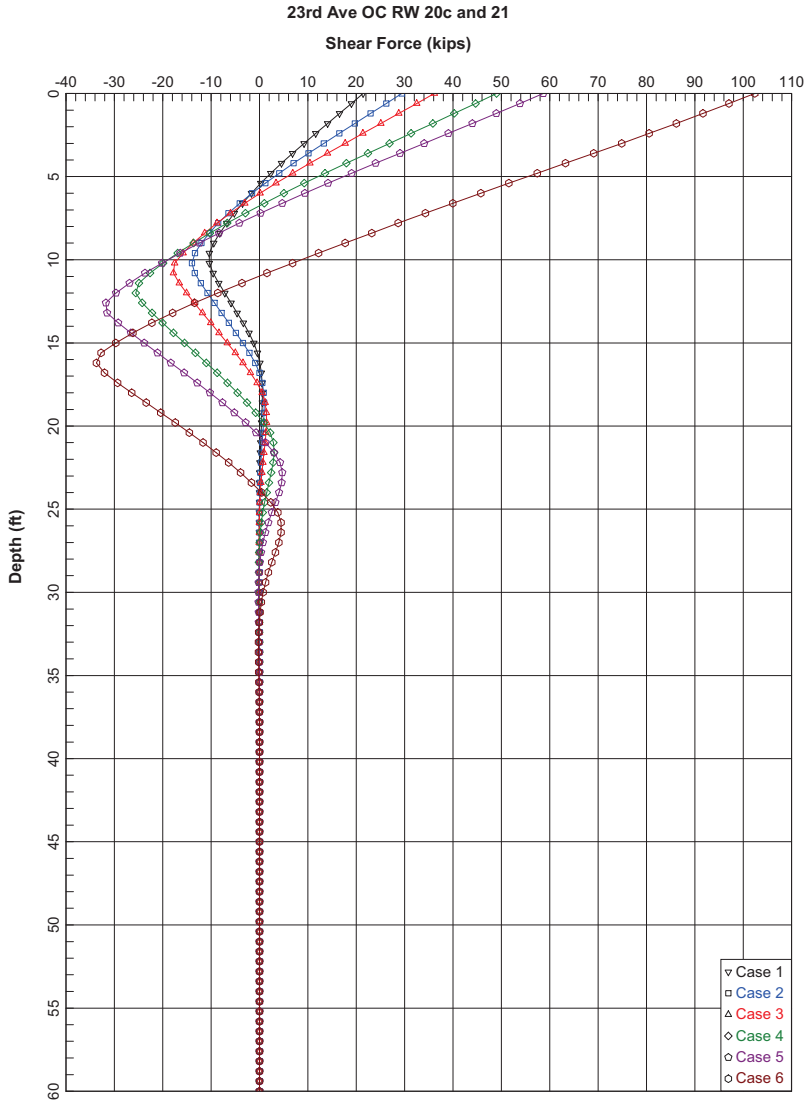

23rd Ave OC RW 20b
Lateral Deflection (inches)
Depth (ft)
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


23rd Ave OC RW 20b
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


23rd Ave OC RW 20b
Shear Force (kips)
Depth (ft)
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


23rd Ave RW 20c and 21
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


23rd Ave OC RW 20c and 21
Bending Moment (in-kips)
Depth (ft)
-5000
-4000
-3000
-2000
-1000
0
1000
2000
3000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


23rd Ave OC RW 20c and 21
Shear Force (kips)
Depth (ft)
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

```
Bent 2
GROUP8.0.11
* Analysis Parameters
1 3 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
1.2720000E+03 2.4000000E+02 6.6000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 4 0 0
2 1 1 0
4
2050000 -657000 0 -520000 0 0 -66 -456 0
1872000 -600000 0 -450000 0 0 -66 -168 0
2082000 -541000 0 -419000 0 0 -66 144 0
2336000 -511000 0 -401000 0 0 -66 432 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
1
1
0 0
* Pile Group Configuration
18
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -600 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -600 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -456 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -456 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -312 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -312 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -168 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -168 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 0 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 0 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 144 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
```



```
0 144 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 288 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 288 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 432 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 432 72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 576 -72 0 90 -114
1 1 1 0 0 0
0 0 1 1 1 1 1
0 576 72 0 90 -114
* Pile Properties
1
0 1
100 1200 3834000 2
0 1200 1 1 1
* Pile Cross Sections
1
0 0 0
Section
48 0 1 1 0 0 0.1 0.1
1 1810 39760.78 39760.78 79521.56 1.390673E11 0 0 0 0
* Soil Layers
6
0 3
-114 6
2 10
0.072 17.36 0 0 0 0.005 0 0 0 0
0.072 13.9 0 0 0 0.005 0 0 0 0
1 3
6 66
2 10
0.036 13.9 0 0 0 0.007 0 0 0 0
0.036 12.2 0 0 0 0.007 0 0 0 0
2 3
66 126
2 10
0.036 12.2 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
126 276
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.4 0 0 0 0.007 0 0 0 0
4 3
276 486
2 10
0.036 10.4 0 0 0 0.007 0 0 0 0
0.036 13.9 0 0 0 0.007 0 0 0 0
5 3
486 1206
2 10
0.036 13.89 0 0 0 0.005 0 0 0 0
0.036 25.69 0 0 0 0.005 0 0 0 0
* User defined MC curves
```

```
1
1 1
0
1 9
0 0
5431331.2 4.75446E-6
5511269 1.77041E-5
22129455 6.94401E-5
25970912 0.000100031
28893083 0.000171786
29896747 0.000305849
30065505 0.000364717
30145442 0.000396434
* End of file
```



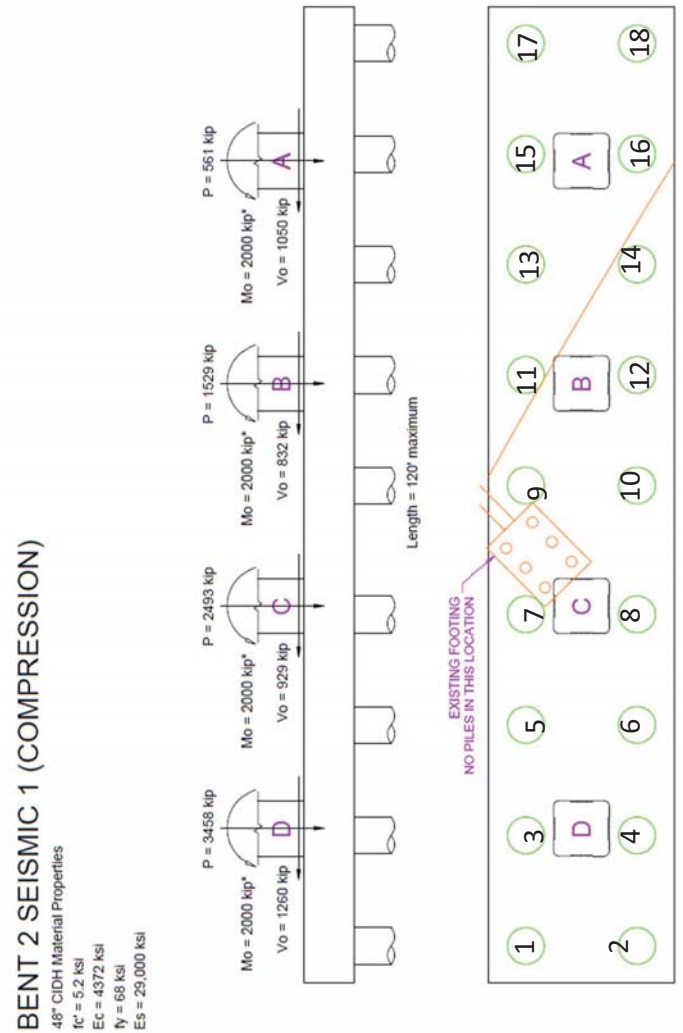
```
Bent 3
GROUP8.0.11
* Analysis Parameters
1 3 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
1.1040000E+03 2.4000000E+02 6.6000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 4 0 0
2 1 1 0
4
2639000 -38000 0 -148000 0 0 -66 -384 0
1639000 -57000 0 -100000 0 0 -66 -132 0
1680000 -93000 0 -59000 0 0 -66 132 0
2145000 -124000 0 -61000 0 0 -66 384 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
16
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -504 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -504 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -360 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -360 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -216 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -216 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -72 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -72 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 72 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 72 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 216 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 216 72 0 90 -102
1 1 1 0 0 0
```

```
0 0 1 1 1 1
0 360 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1
0 360 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1
0 504 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1
0 504 72 0 90 -102
* Pile Properties
1
0 1
100 1140 4372000 2
0 1140 1 1 1
* Pile Cross Sections
1
0 0 0
Section
48 0 1 1 0 0 0.1 0.1
1 1810 39760.78 39760.78 79521.56 1.390673E11 0 0 0 0
* Soil Layers
4
0 3
-102 102
2 10
0.036 16.3 0 0 0 0.005 0 0 0 0
0.036 10.4 0 0 0 0.007 0 0 0 0
1 3
102 252
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.4 0 0 0 0.007 0 0 0 0
2 3
252 462
2 10
0.036 10.4 0 0 0 0.007 0 0 0 0
0.036 13.9 0 0 0 0.007 0 0 0 0
3 3
462 1182
2 10
0.036 13.89 0 0 0 0.005 0 0 0 0
0.036 25.69 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 9
0 0
5431331.2 4.75446E-6
5511269 1.77041E-5
22129455 6.94401E-5
25970912 0.000100031
28893083 0.000171786
29896747 0.000305849
30065505 0.000364717
30145442 0.000396434
* End of file
```

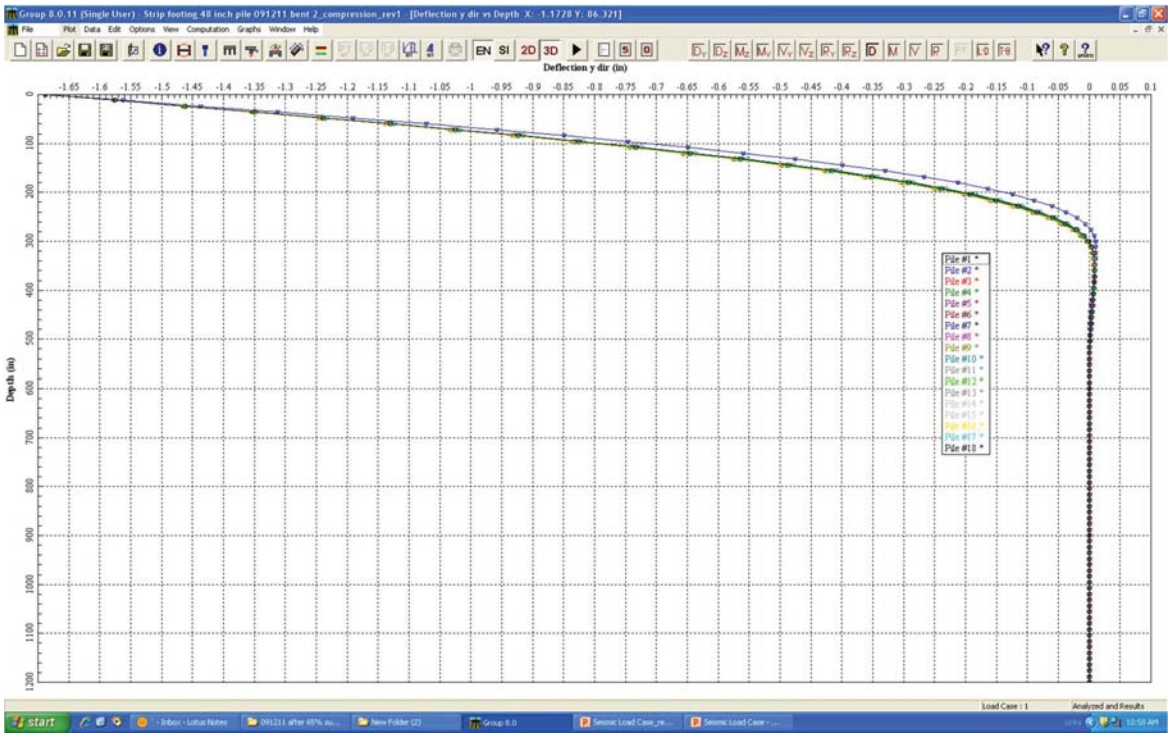


```
Bent 4
GROUP8.0.11
* Analysis Parameters
1 3 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
1.1040000E+03 2.4000000E+02 6.6000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 4 0 0
2 1 1 0
4
2303000 -477000 0 -328000 0 0 -66 -408 0
1823000 -547000 0 -390000 0 0 -66 -136 0
1732000 -600000 0 -416000 0 0 -66 136 0
2937000 -646000 0 -507000 0 0 -66 408 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
16
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -504 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -504 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -360 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -360 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -216 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -216 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -72 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 -72 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 72 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 72 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 216 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 216 72 0 90 -102
1 1 1 0 0 0
```

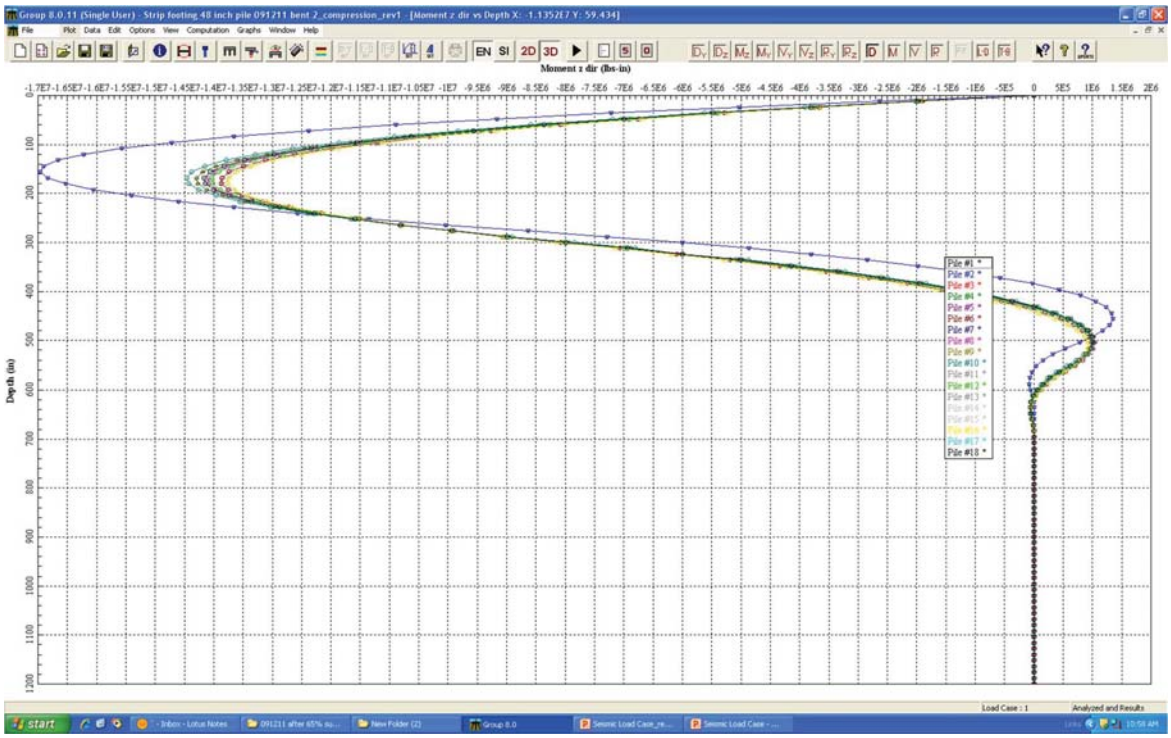
```
                Strip footing 48 inch pile 121111 bent 4_compression
0 0 1 1 1 1
0 360 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 360 72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 504 -72 0 90 -102
1 1 1 0 0 0
0 0 1 1 1 1 1
0 504 72 0 90 -102
* Pile Properties
1
0 1
100 1140 4372000 2
0 1140 1 1 1
* Pile Cross Sections
1
0 0 0
Section
48 0 1 1 0 0 0.1 0.1
1 1810 39760.78 39760.78 79521.56 1.390673E11 0 0 0 0
* Soil Layers
4
0 3
-102 78
2 10
0.036 15.6 0 0 0 0.005 0 0 0 0
0.036 10.4 0 0 0 0.007 0 0 0 0
1 3
78 228
2 10
0.036 10.4 0 0 0 0.007 0 0 0 0
0.036 10.4 0 0 0 0.007 0 0 0 0
2 3
228 438
2 10
0.036 10.4 0 0 0 0.007 0 0 0 0
0.036 13.9 0 0 0 0.007 0 0 0 0
3 3
438 1158
2 10
0.036 13.9 0 0 0 0.005 0 0 0 0
0.036 25.7 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 9
0 0
5431331.2 4.75446E-6
5511269 1.77041E-5
22129455 6.94401E-5
25970912 0.000100031
28893083 0.000171786
29896747 0.000305849
30065505 0.000364717
30145442 0.000396434
* End of file
```

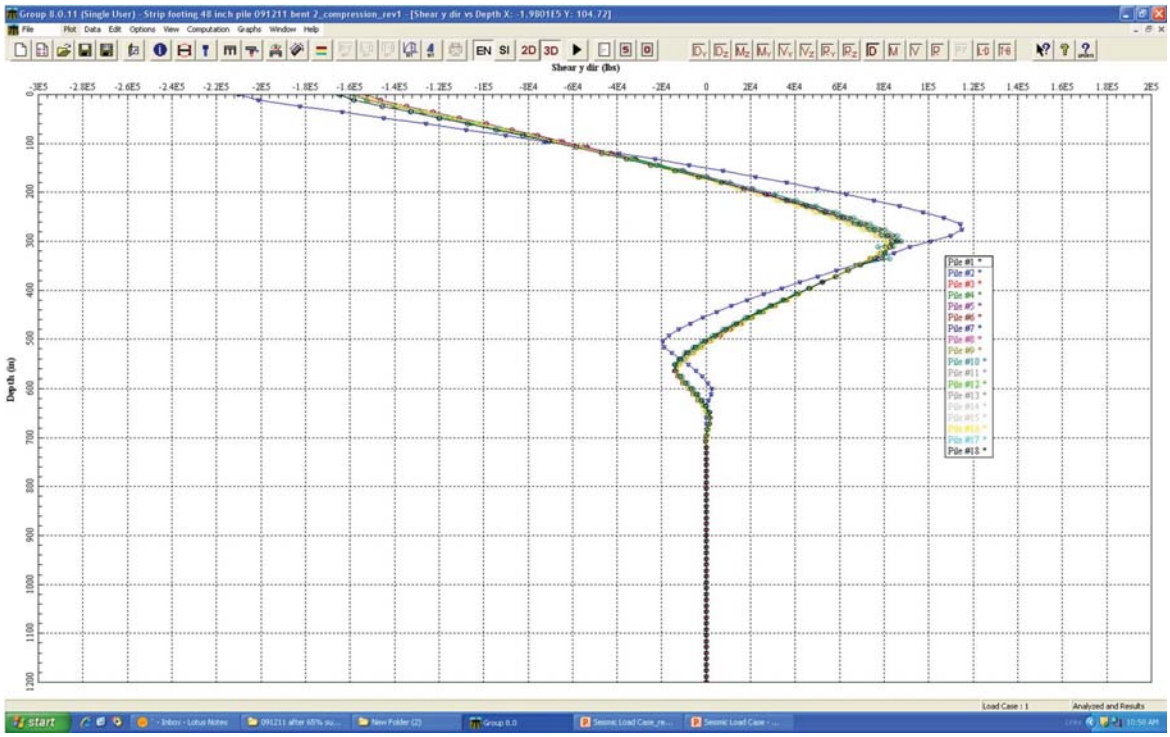
23rd Avenue – Bent 2 Displacement (Pinned Head)



23rd Avenue – Bent 2 Moment (Pinned Head)

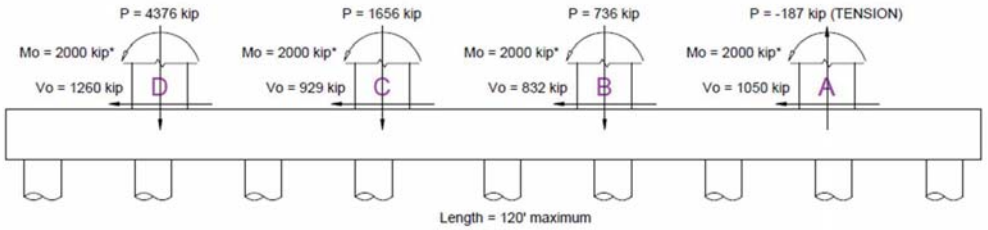


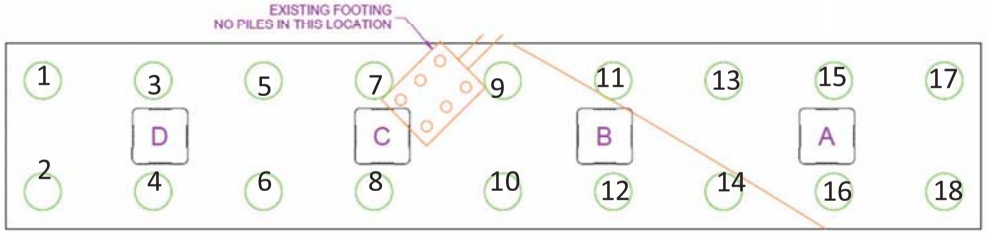
23rd Avenue – Bent 2 Shear (Pinned Head)



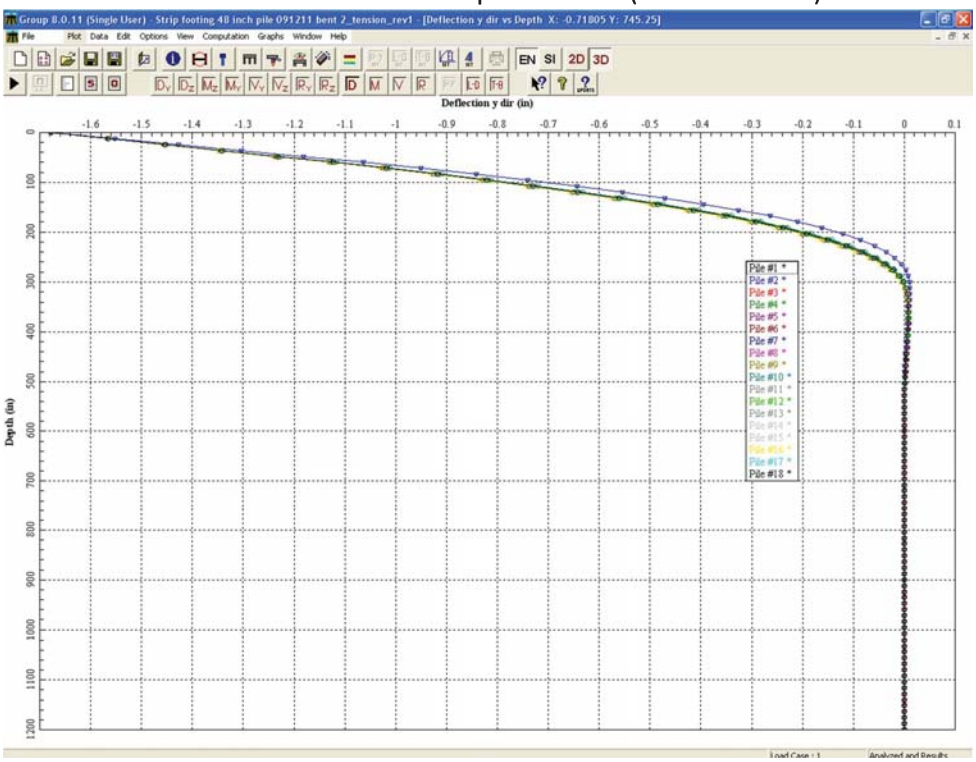
BENT 2 SEISMIC 2 (TENSION)

48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi

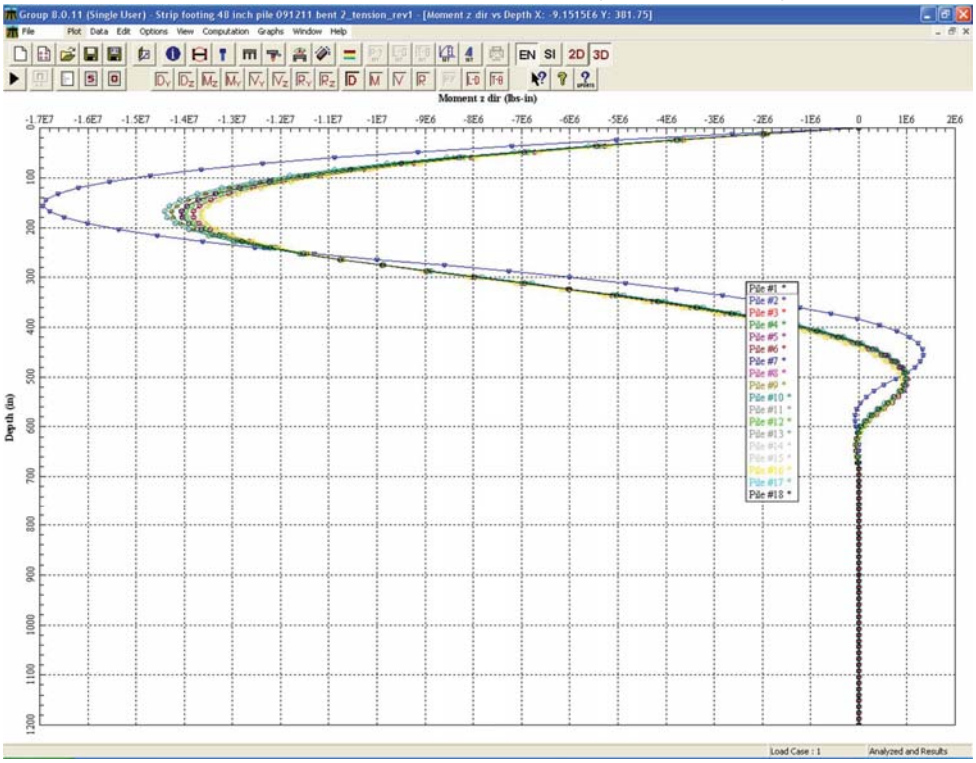




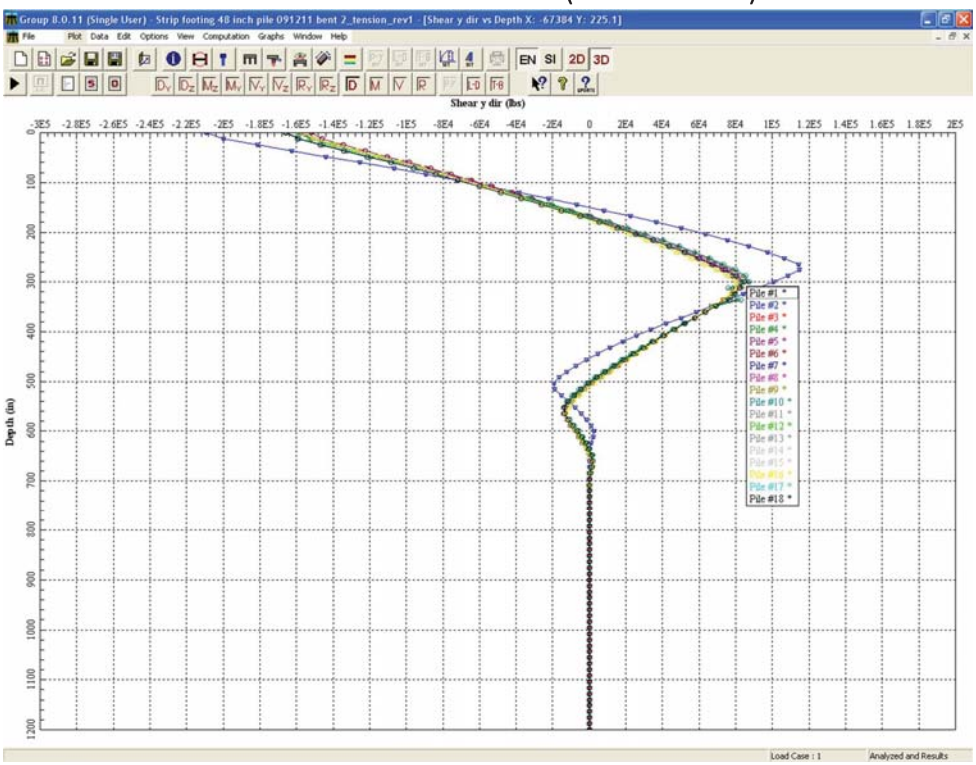
23rd Avenue – Bent 2 Displacement (Pinned Head)



23rd Avenue – Bent 2 Moment (Pinned Head)

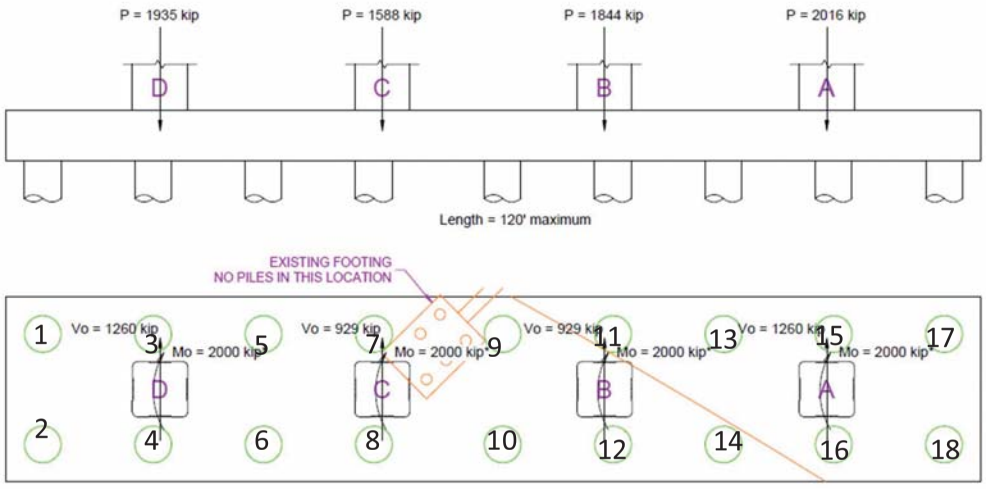


23rd Avenue – Bent 2 Shear (Pinned Head)

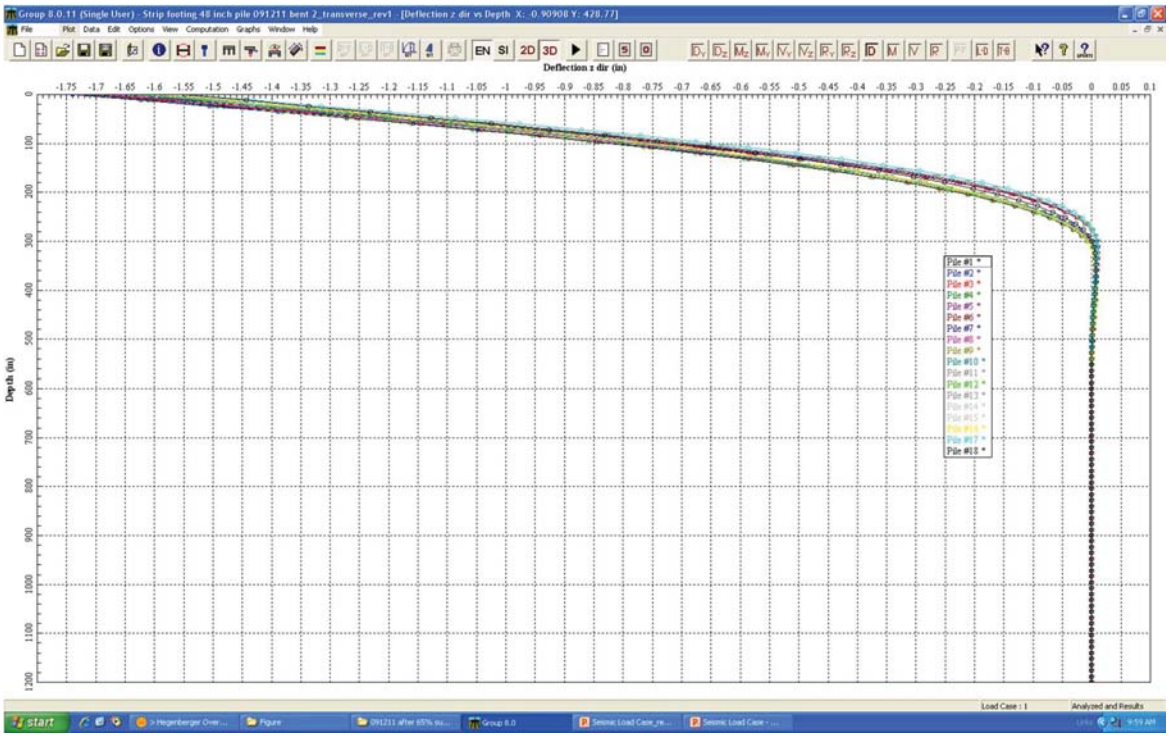


BENT 2 SEISMIC 3 (TRANSVERSE)

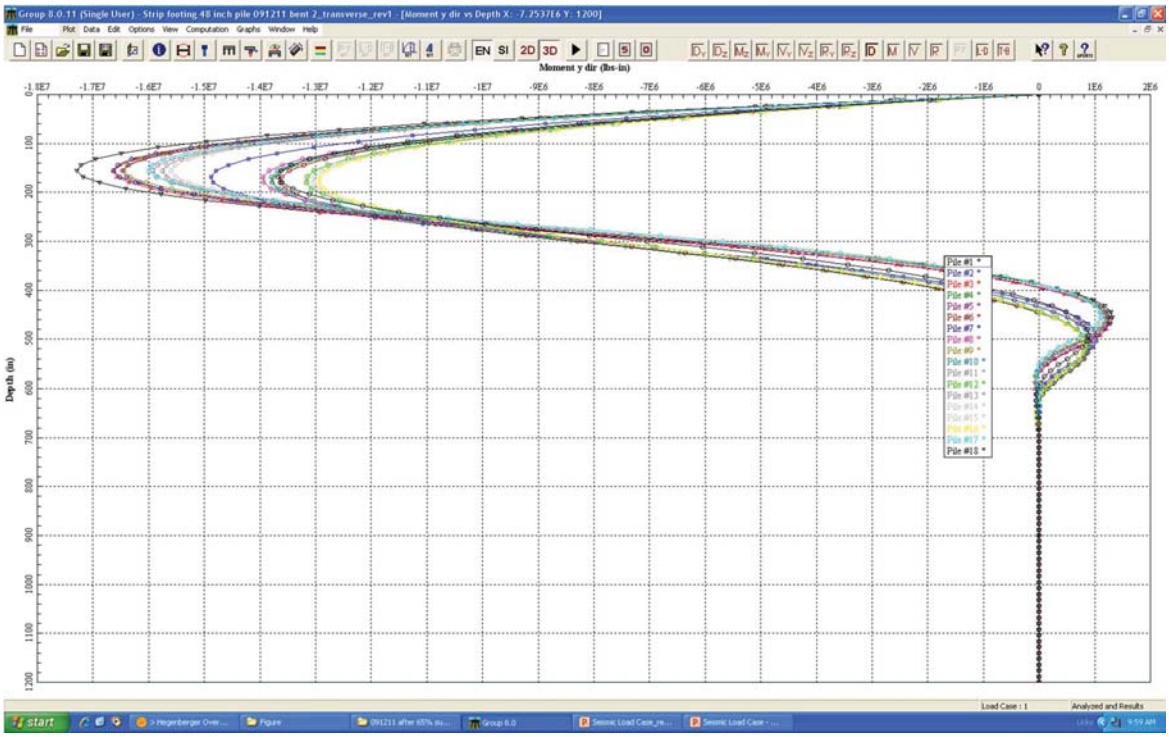
48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi



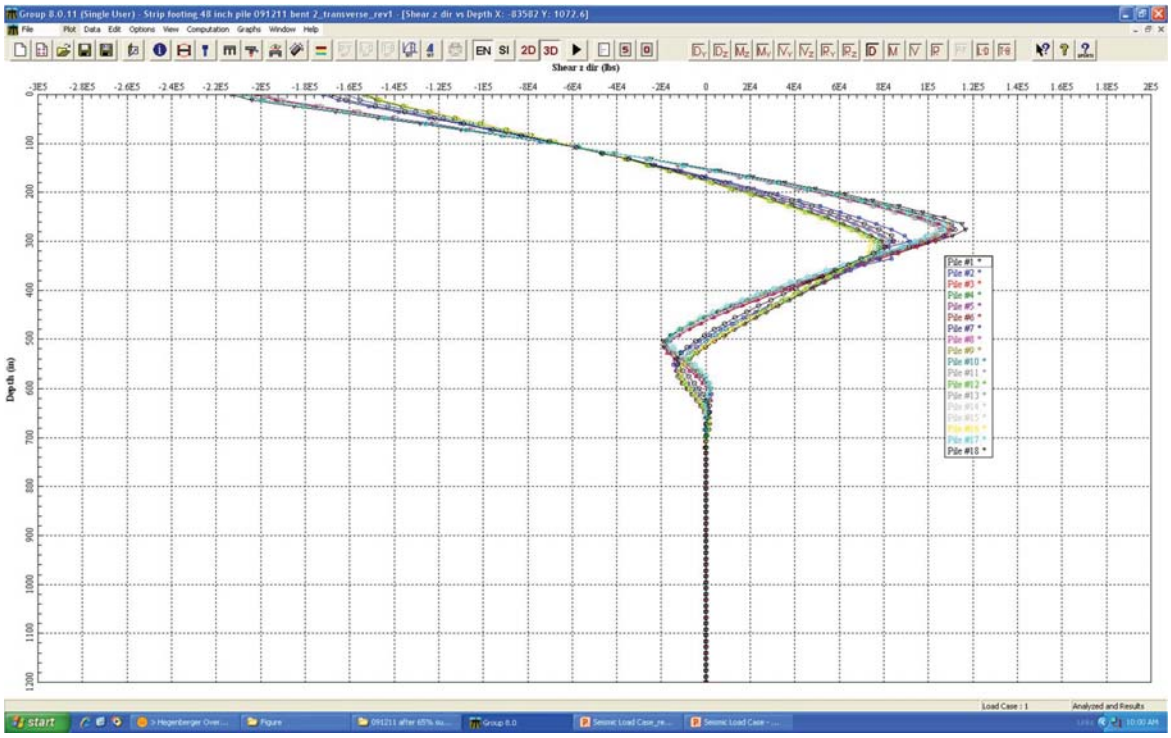
23rd Avenue – Bent 2 Displacement (Pinned Head)



23rd Avenue – Bent 2 Moment (Pinned Head)

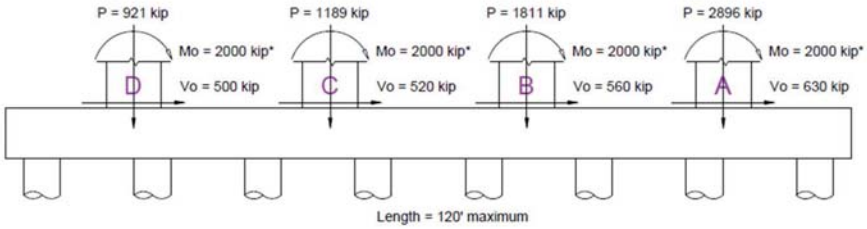


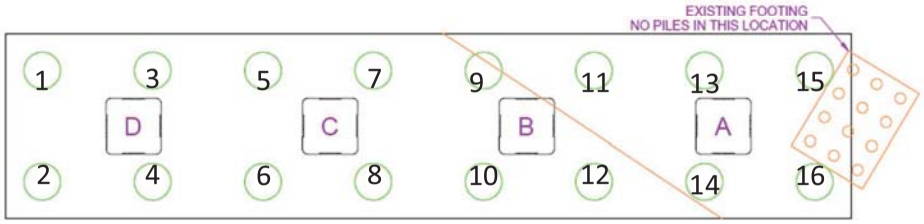
23rd Avenue – Bent 2 Shear (Pinned Head)



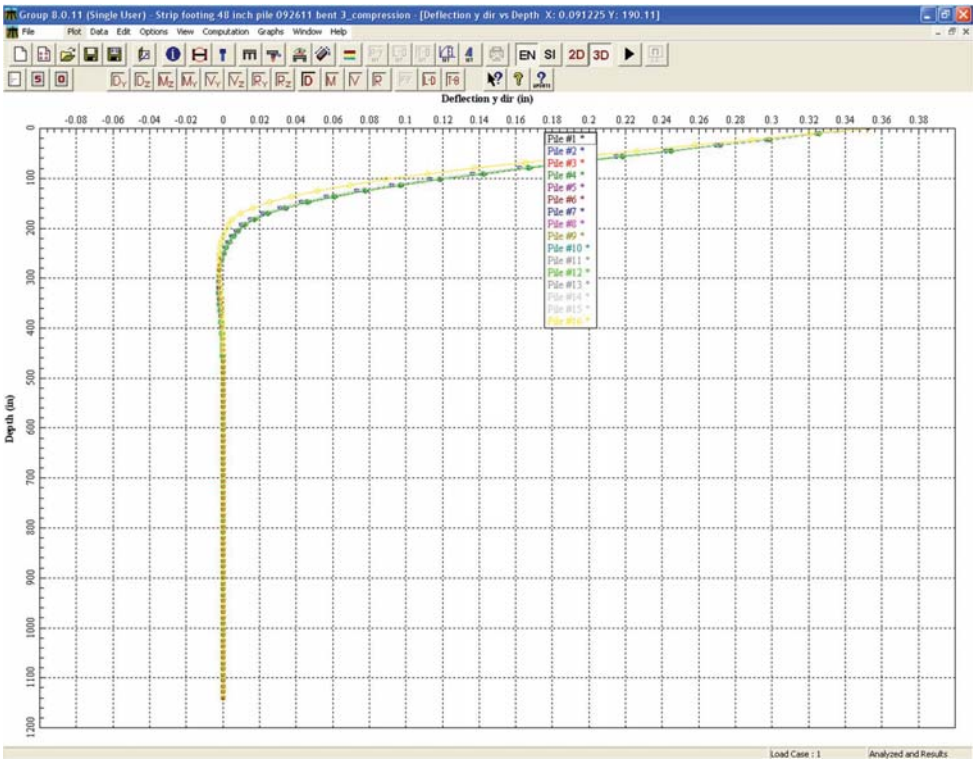
BENT 3 SEISMIC 1 (COMPRESSION)

48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi

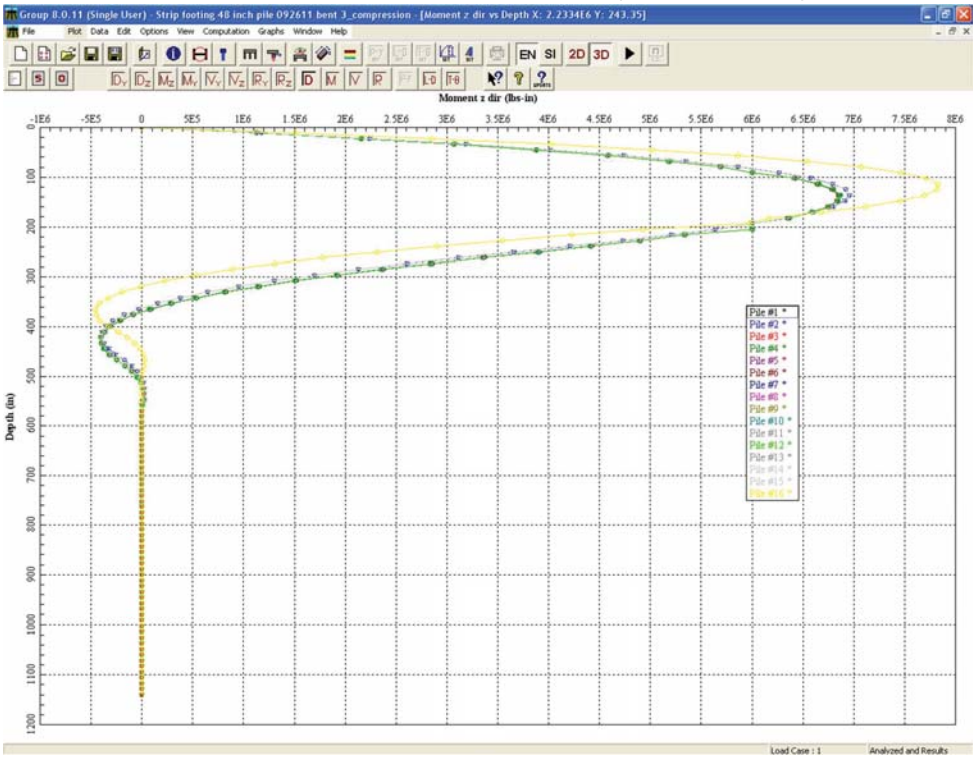




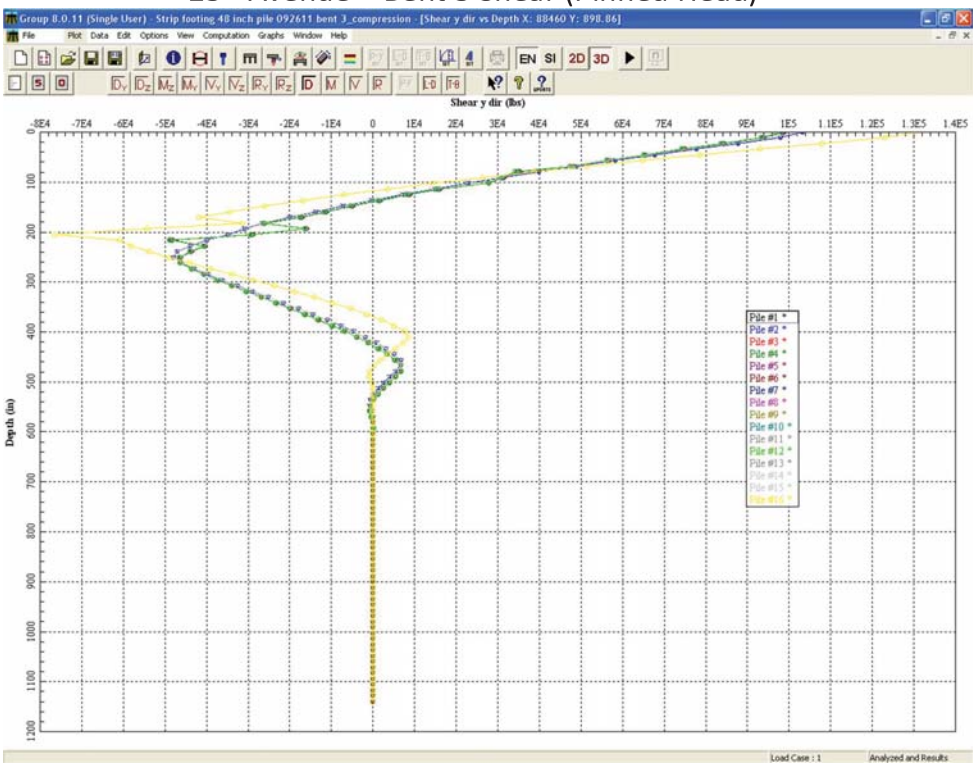
23rd Avenue – Bent 3 Displacement (Pinned Head)



23rd Avenue – Bent 3 Moment (Pinned Head)

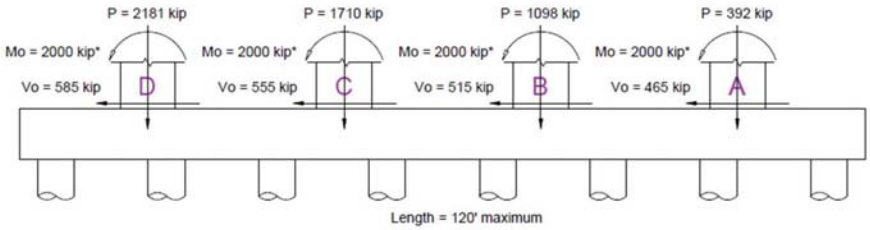


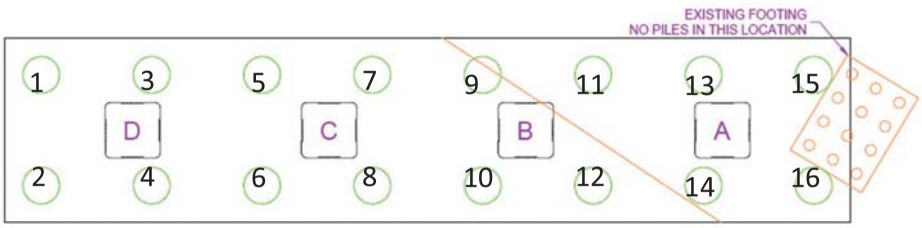
23rd Avenue – Bent 3 Shear (Pinned Head)



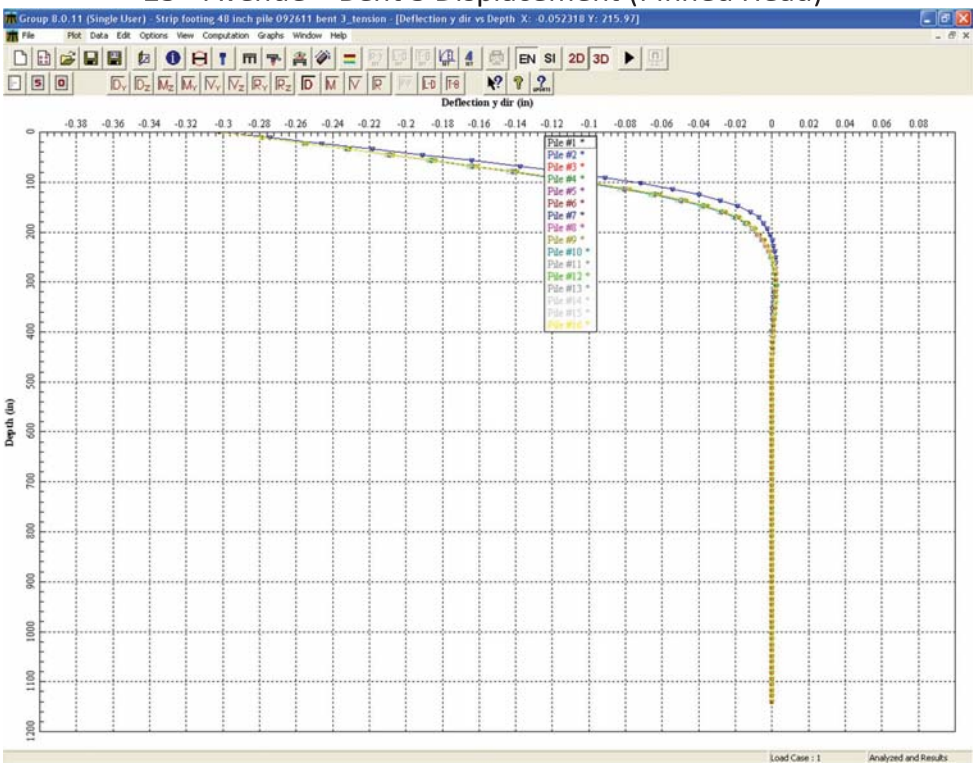
BENT 3 SEISMIC 2 (TENSION)

48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi

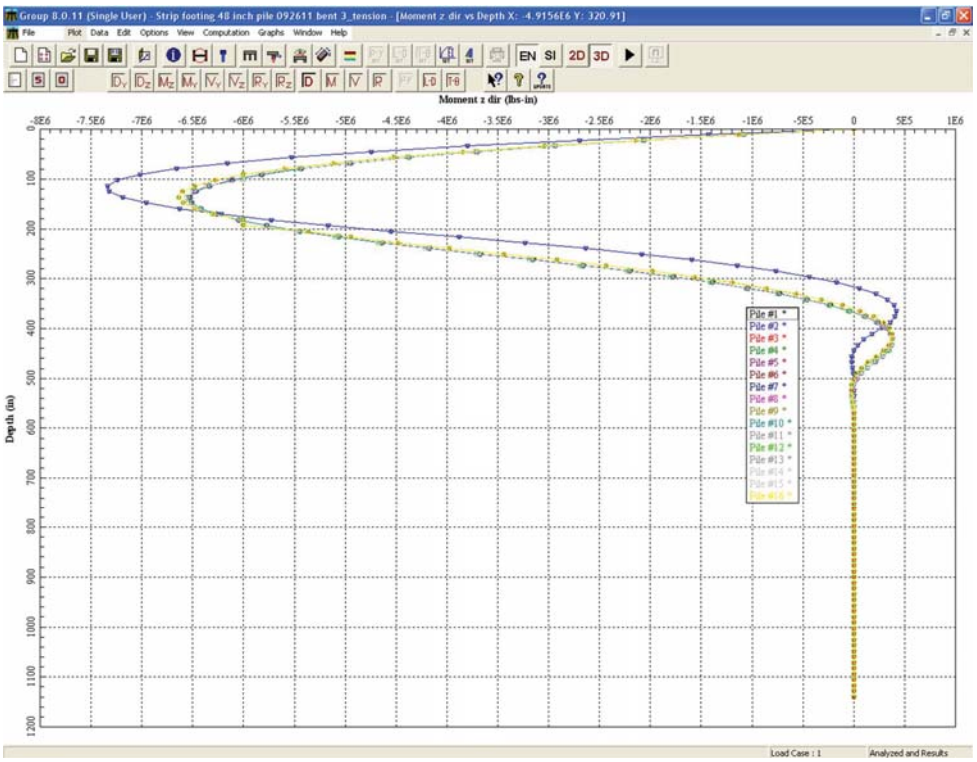




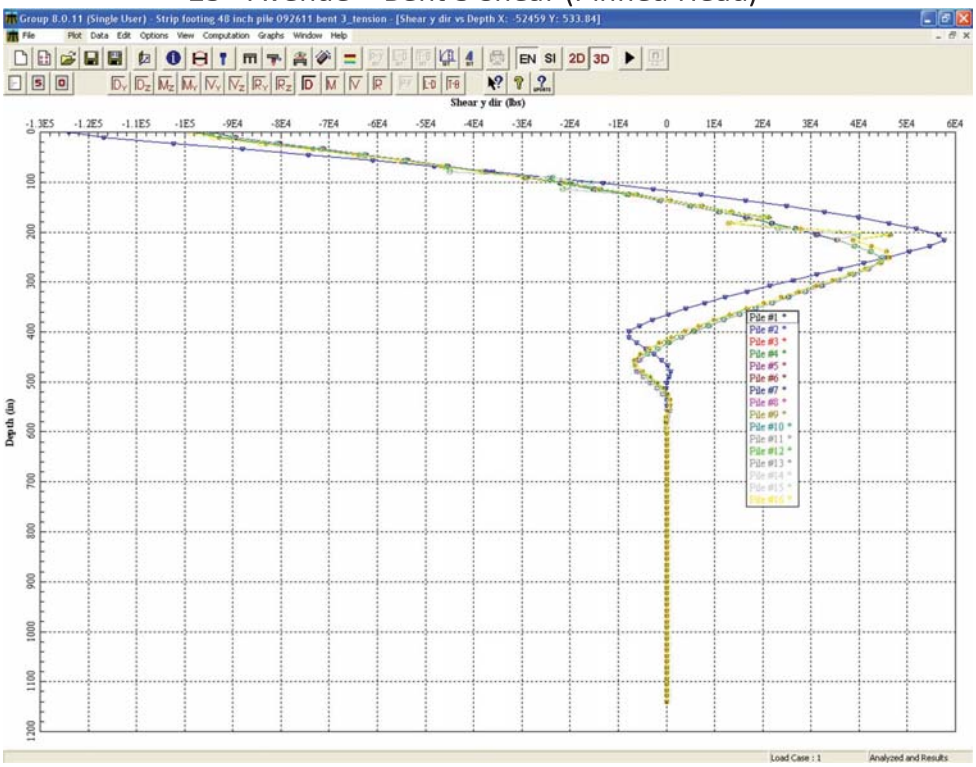
23rd Avenue – Bent 3 Displacement (Pinned Head)



23rd Avenue – Bent 3 Moment (Pinned Head)

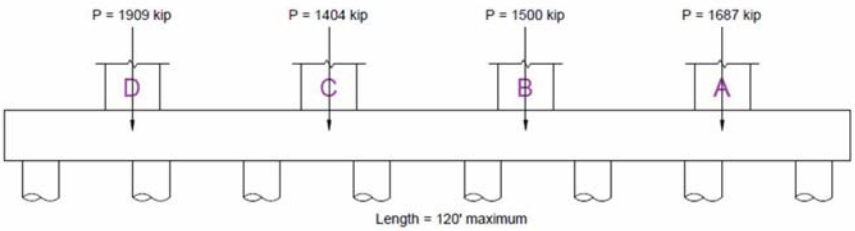


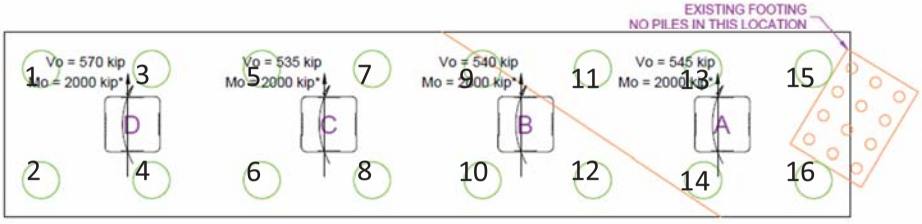
23rd Avenue – Bent 3 Shear (Pinned Head)



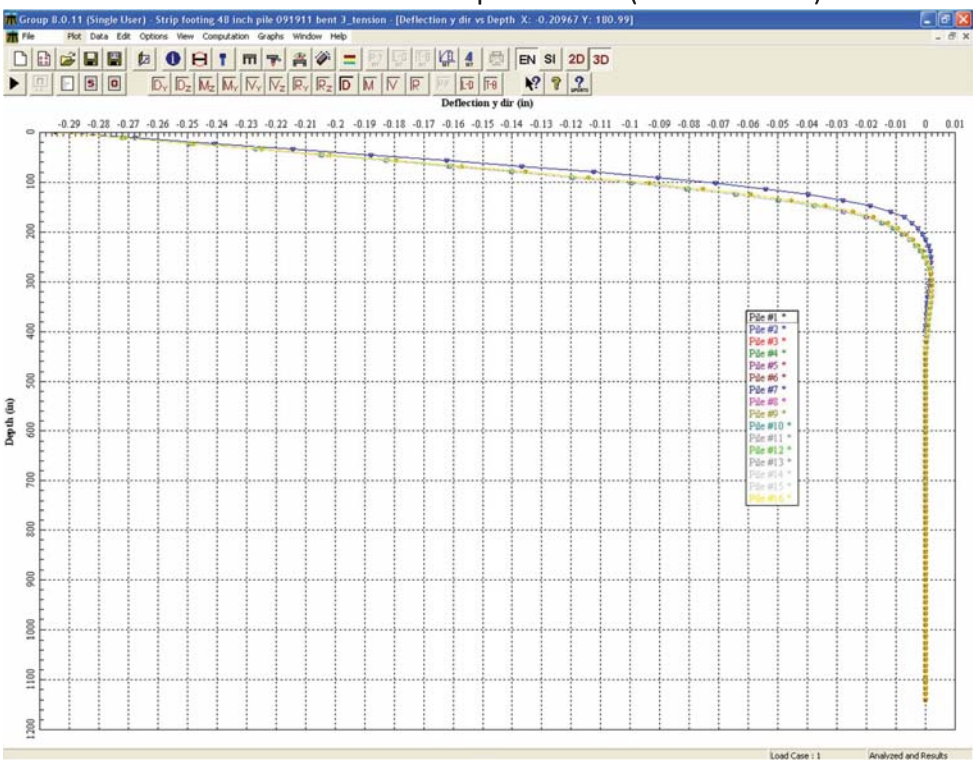
BENT 3 SEISMIC 3 (TRANSVERSE)

48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi

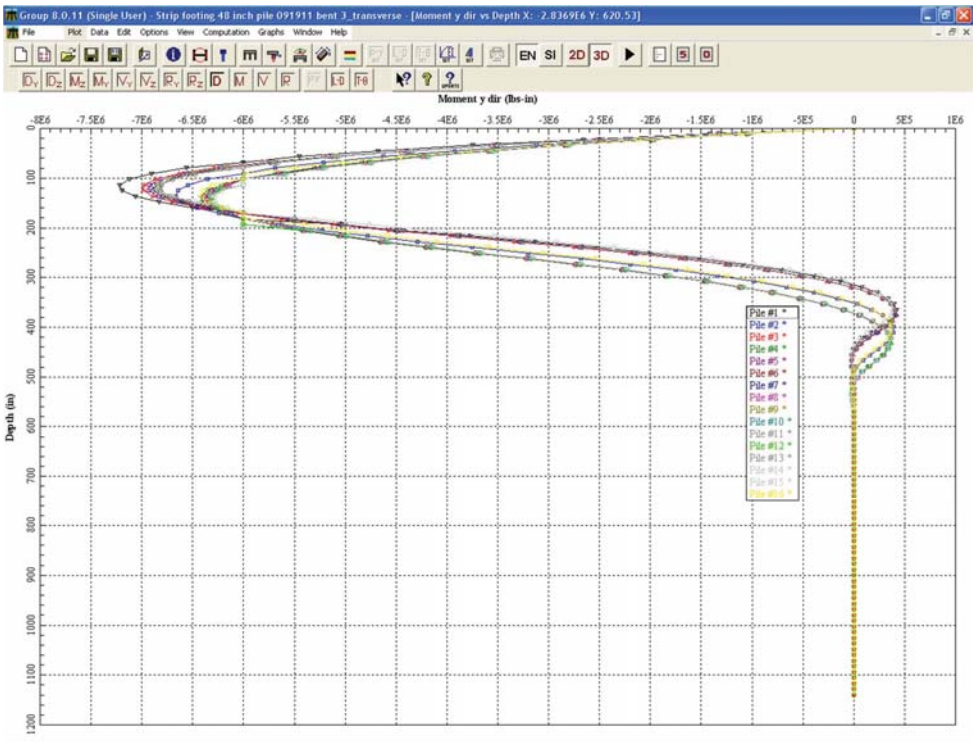




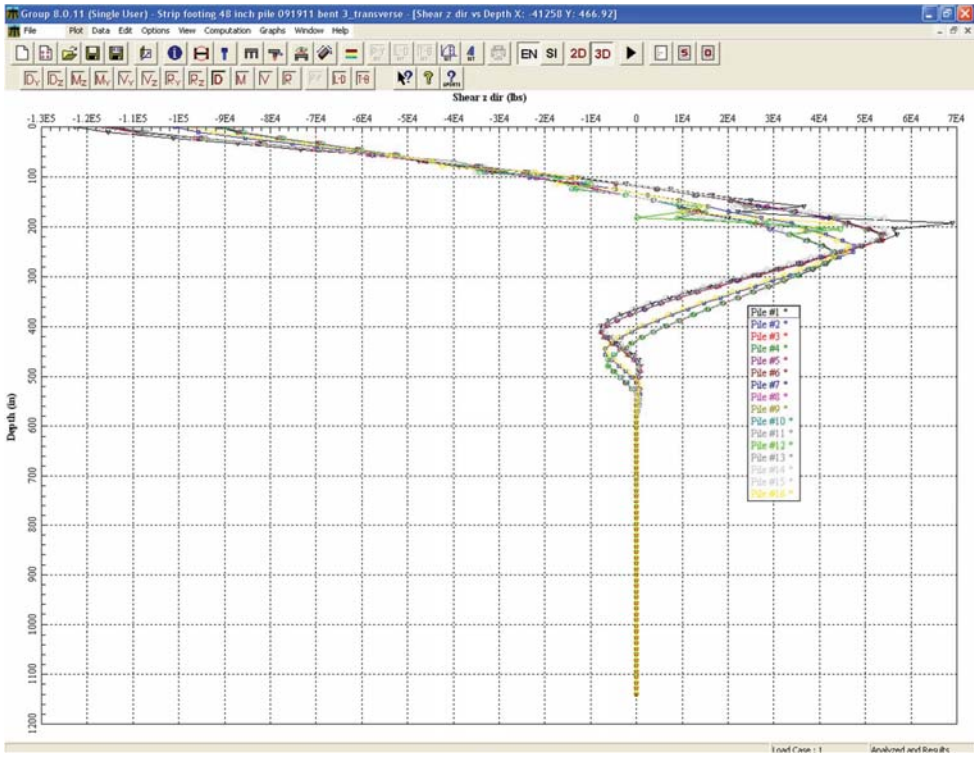
23rd Avenue – Bent 3 Displacement (Pinned Head)



23rd Avenue – Bent 3 Moment (Pinned Head)

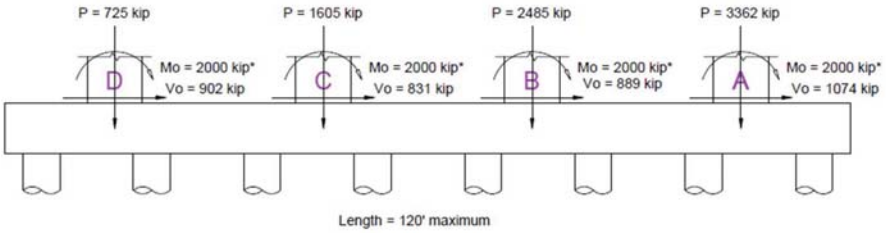


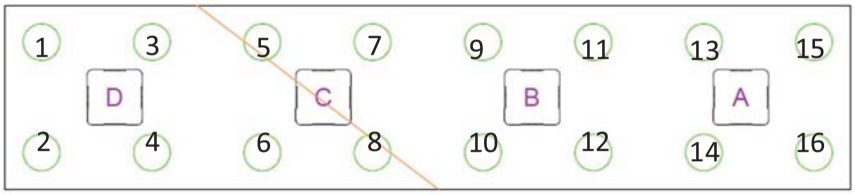
23rd Avenue – Bent 3 Shear (Pinned Head)



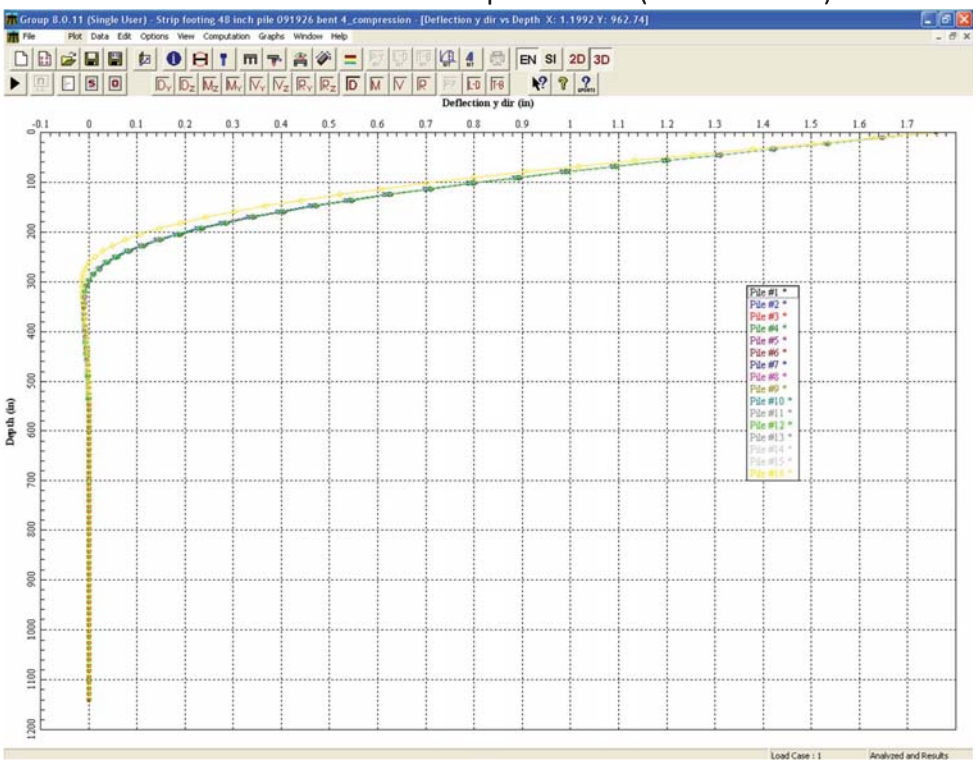
BENT 4 SEISMIC 1 (COMPRESSION)

48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi

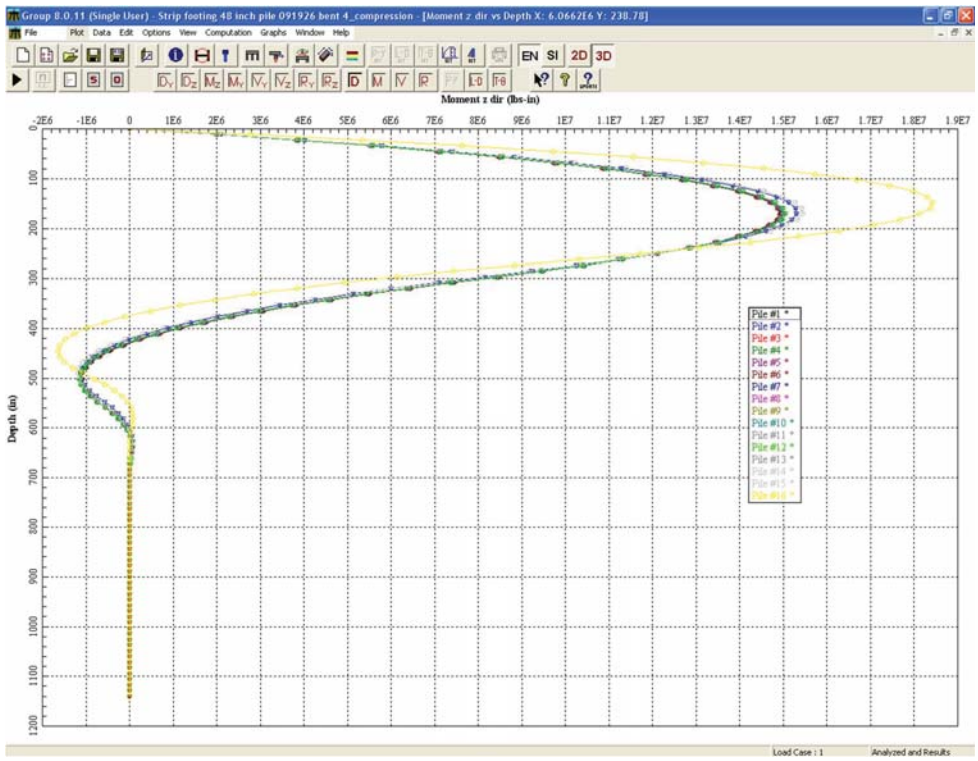




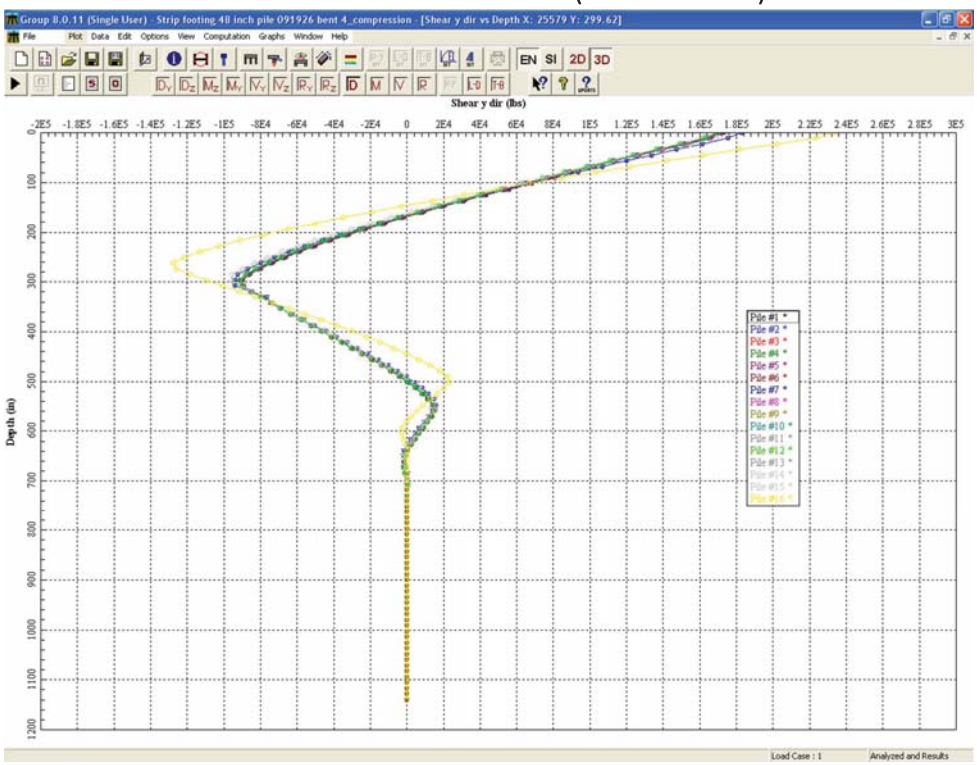
23rd Avenue – Bent 4 Displacement (Pinned Head)



23rd Avenue – Bent 4 Moment (Pinned Head)

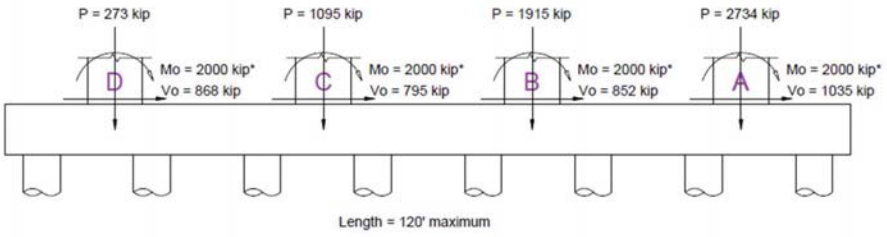


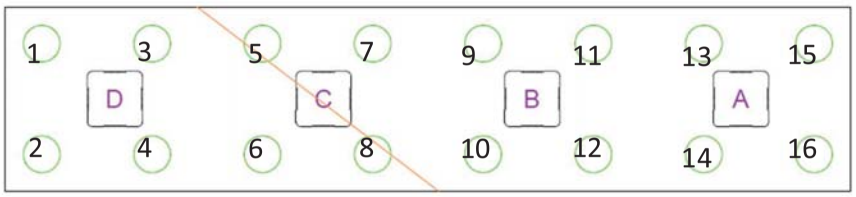
23rd Avenue – Bent 4 Shear (Pinned Head)



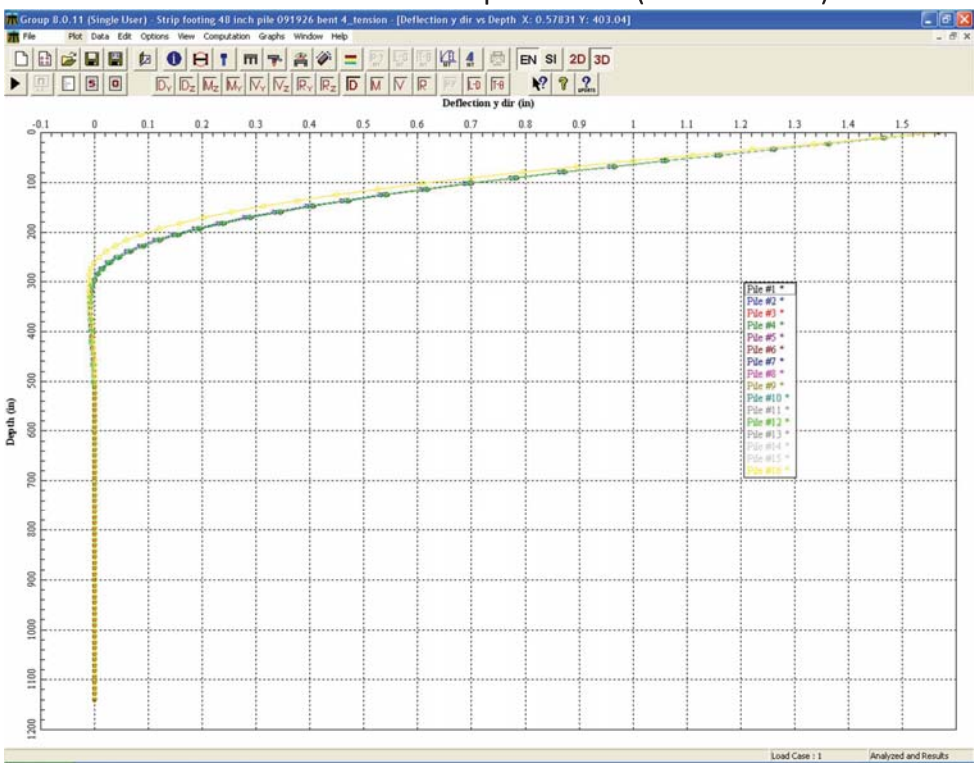
BENT 4 SEISMIC 2 (TENSION)

48" CIDH Material Properties
fc' = 5.2 ksi
Ec = 4372 ksi
fy = 68 ksi
Es = 29,000 ksi

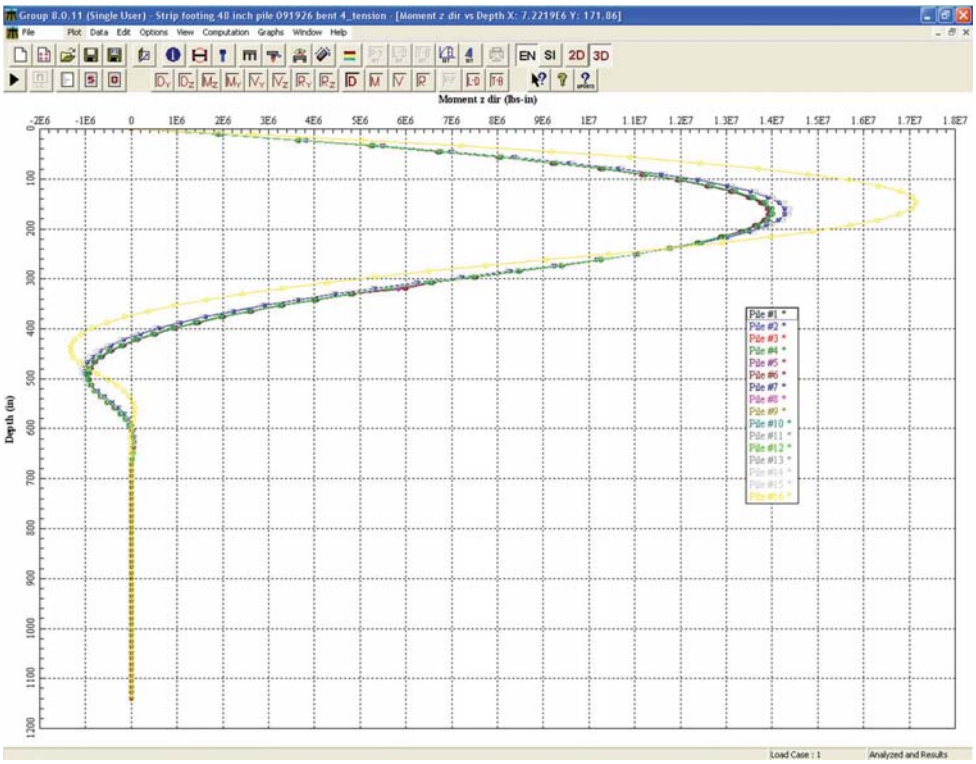




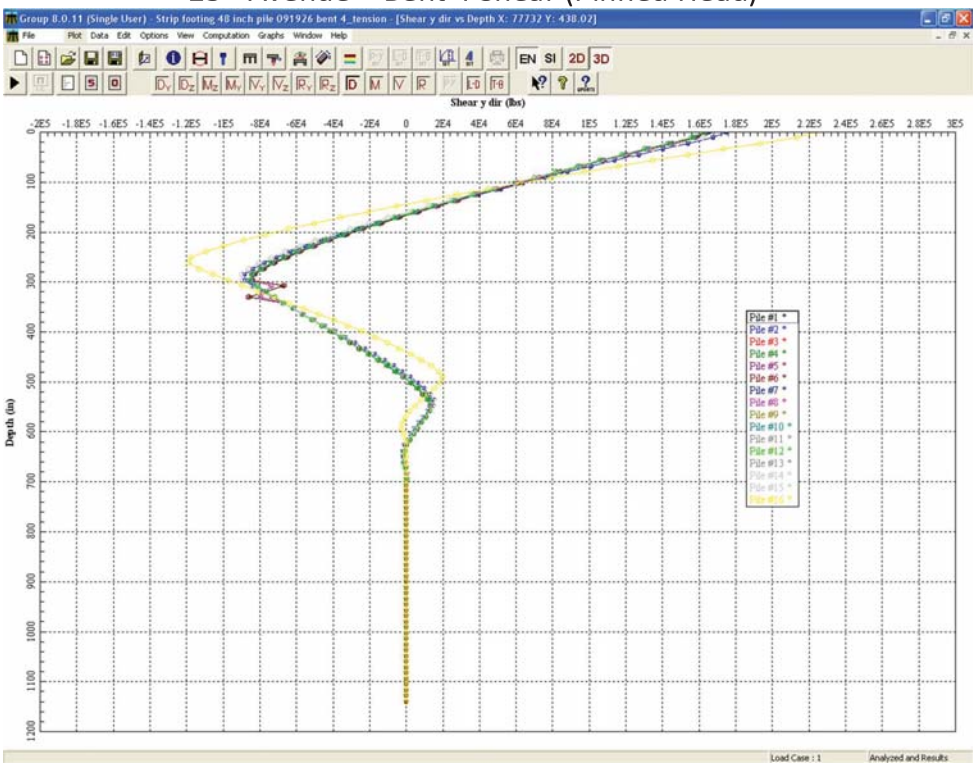
23rd Avenue – Bent 4 Displacement (Pinned Head)



23rd Avenue – Bent 4 Moment (Pinned Head)



23rd Avenue – Bent 4 Shear (Pinned Head)



BENT 4 SEISMIC 3 (TRANSVERSE)

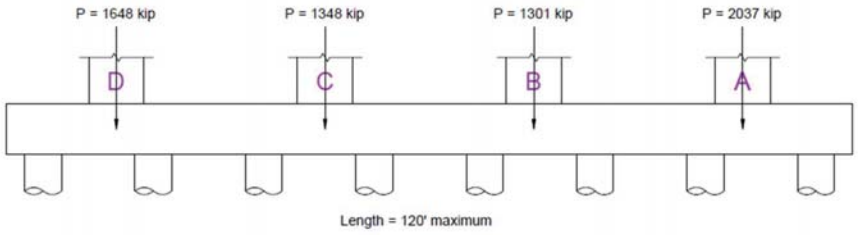
48" CIDH Material Properties

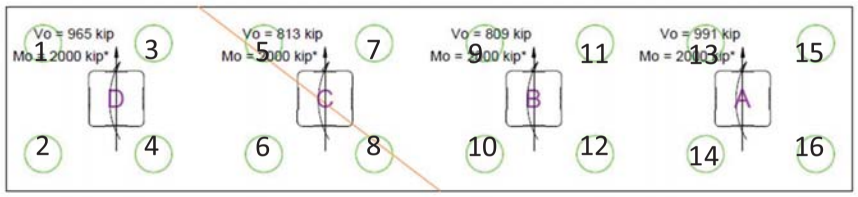
fc' = 5.2 ksi

Ec = 4372 ksi

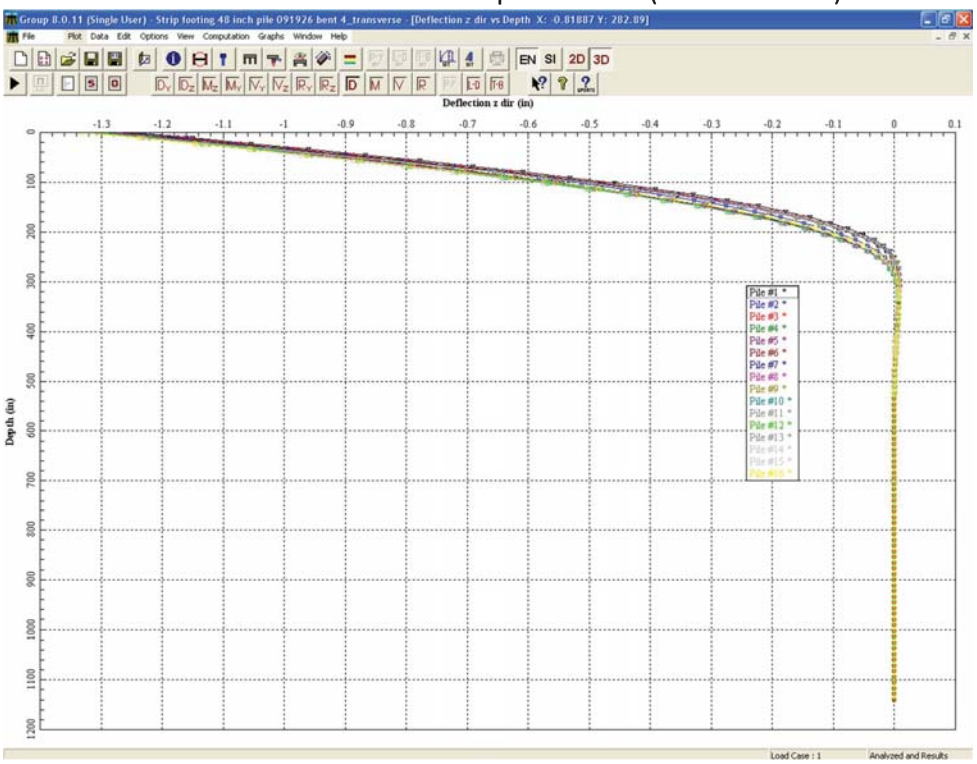
fy = 68 ksi

Es = 29,000 ksi

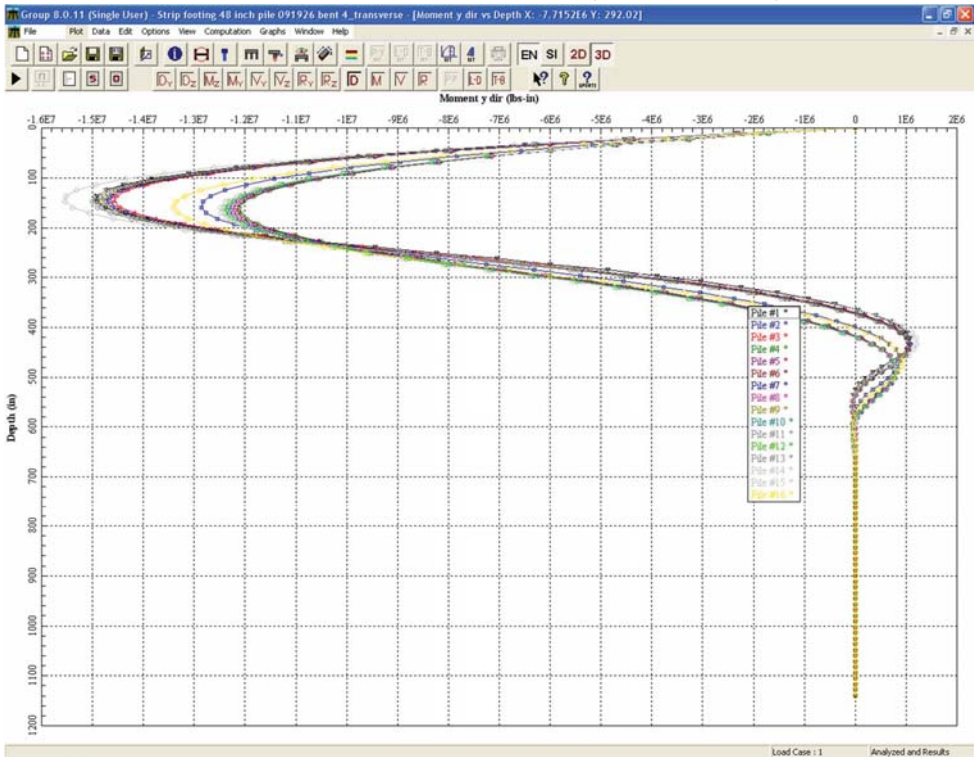




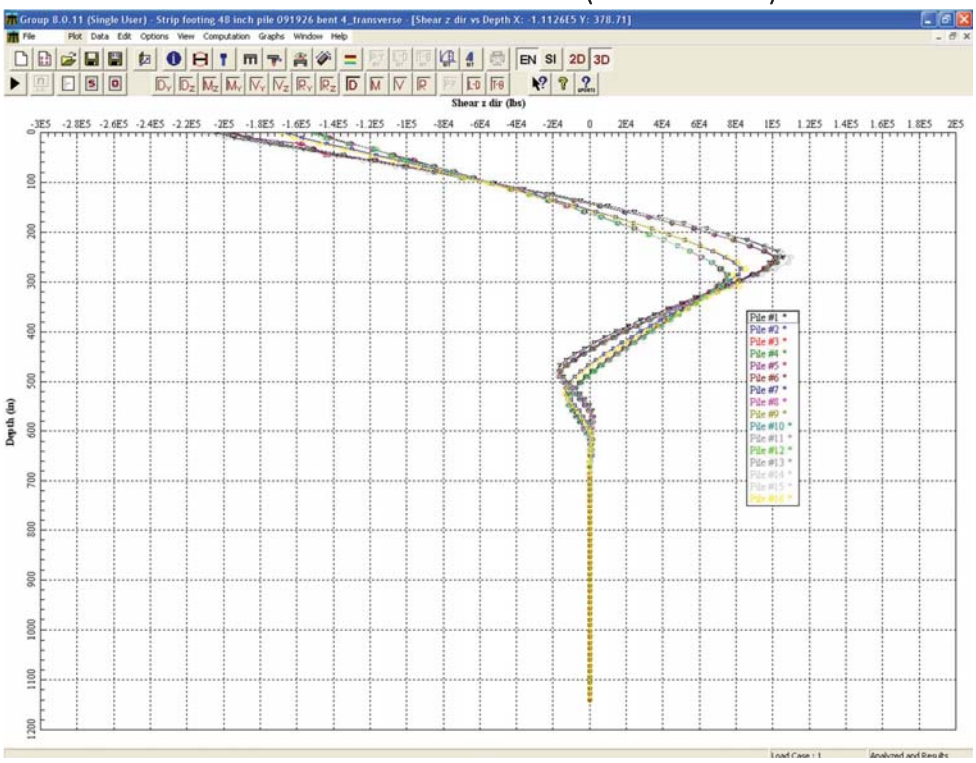
23rd Avenue – Bent 4 Displacement (Pinned Head)



23rd Avenue – Bent 4 Moment (Pinned Head)

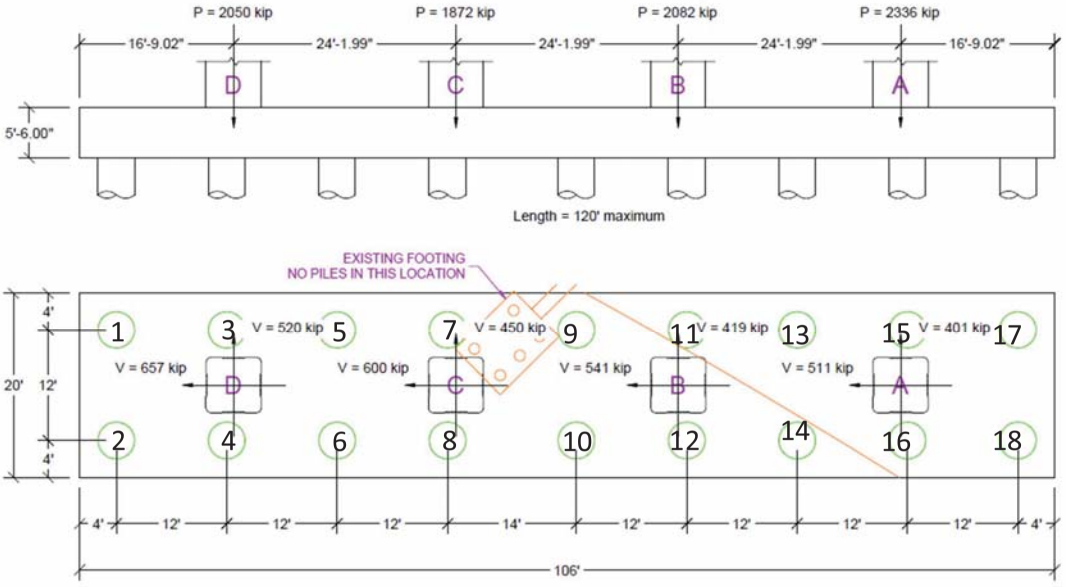


23rd Avenue – Bent 4 Shear (Pinned Head)

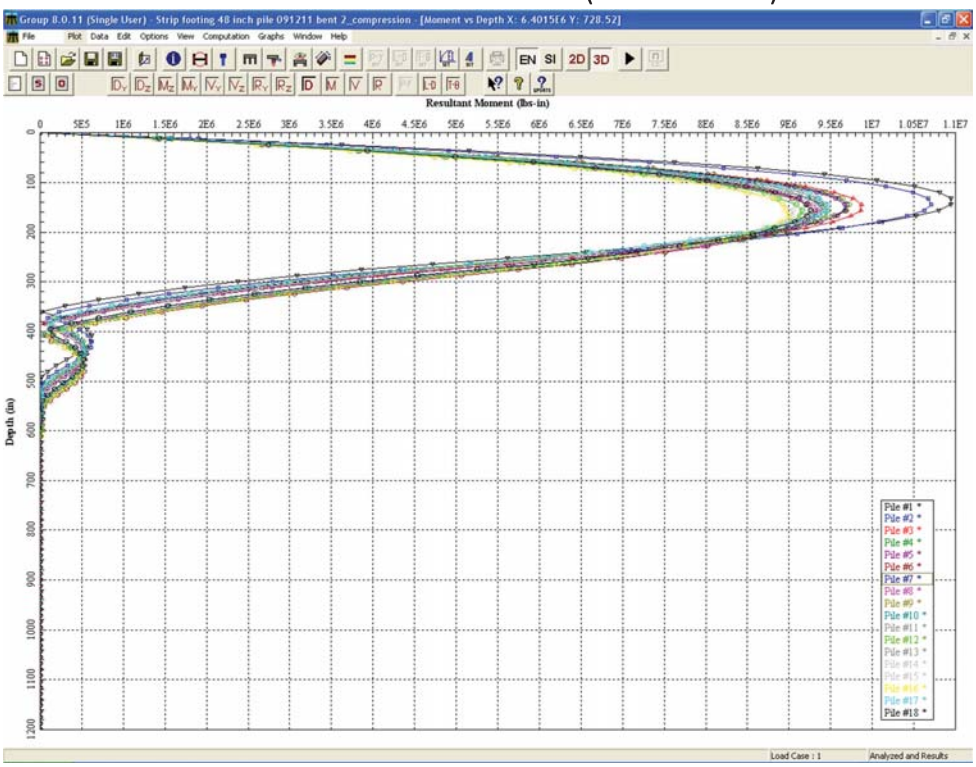


BENT 2 SERVICE

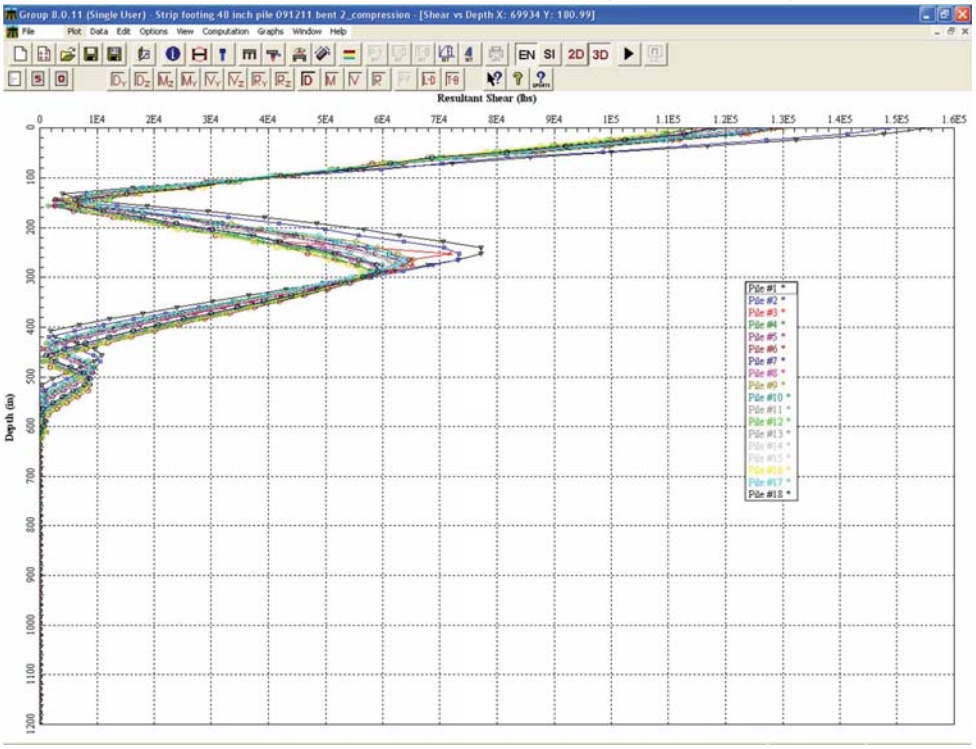
48" CIDH Material Properties
fc' = 4 ksi
Ec = 3834 ksi
fy = 60 ksi
Es = 29,000 ksi



23rd Avenue – Bent 2 Moment (Pinned Head)

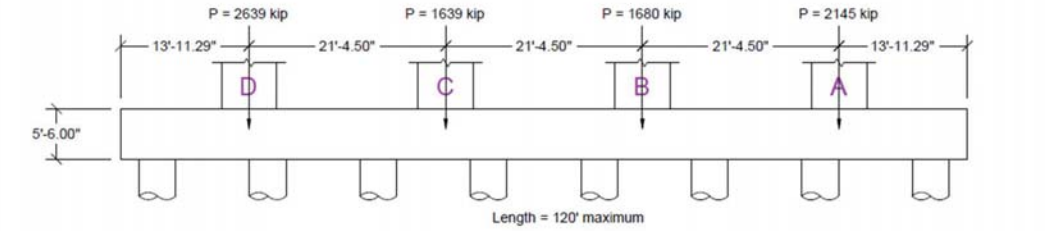


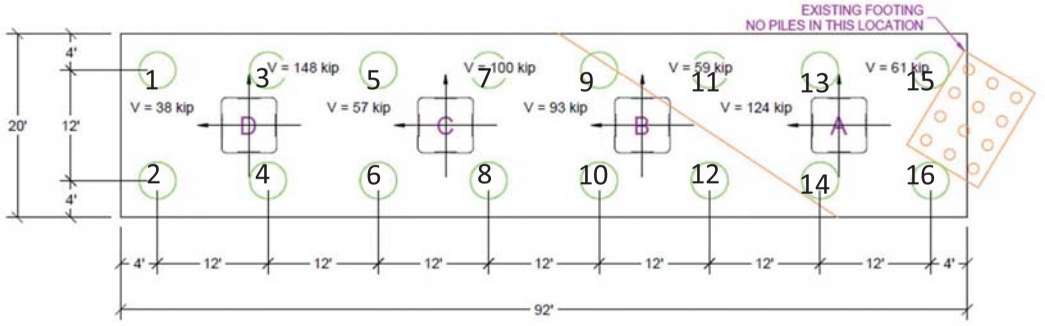
23rd Avenue – Bent 2 Shear force (Pinned Head)



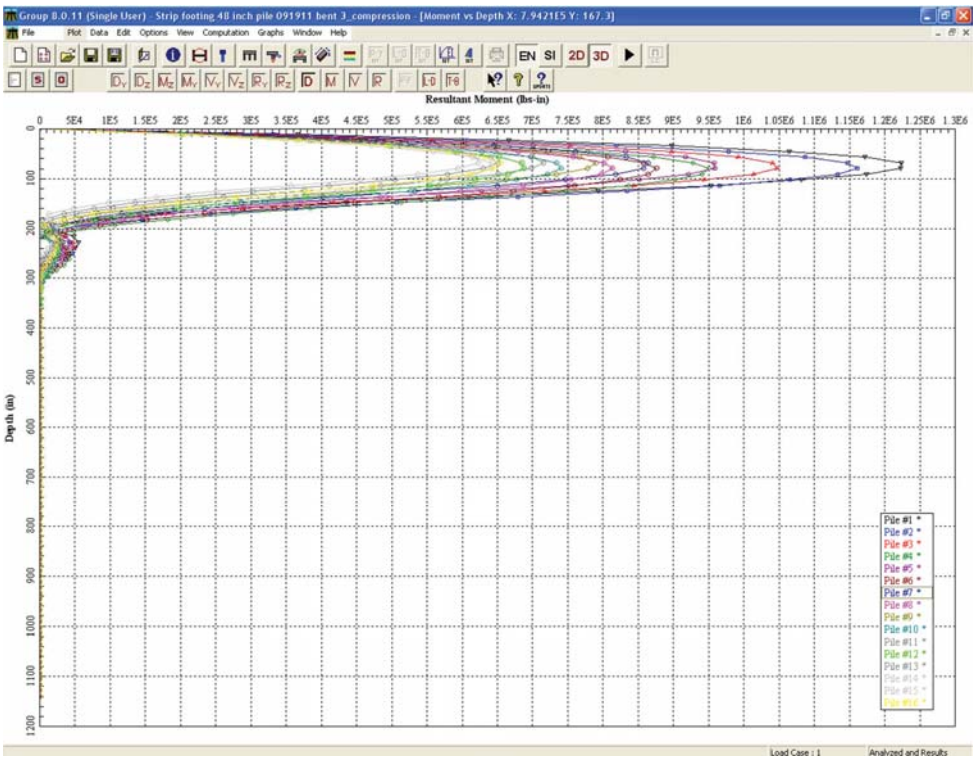
BENT 3 SERVICE

48" CIDH Material Properties
fc' = 4 ksi
Ec = 3834 ksi
fy = 60 ksi
Es = 29,000 ksi

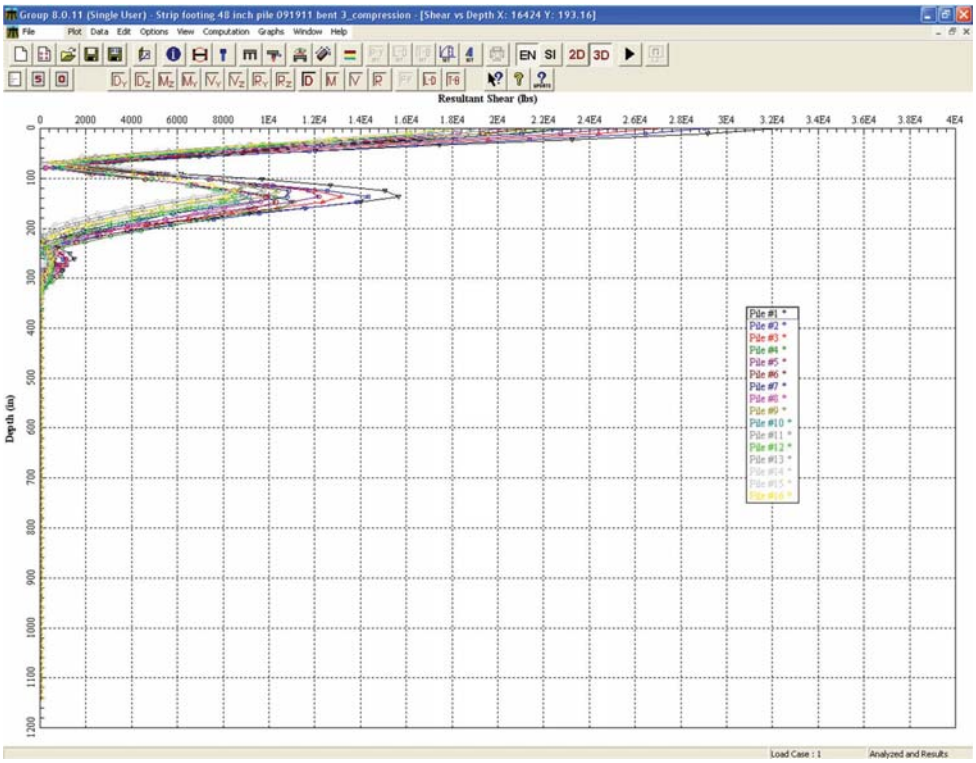




23rd Avenue – Bent 3 Moment (Pinned Head)

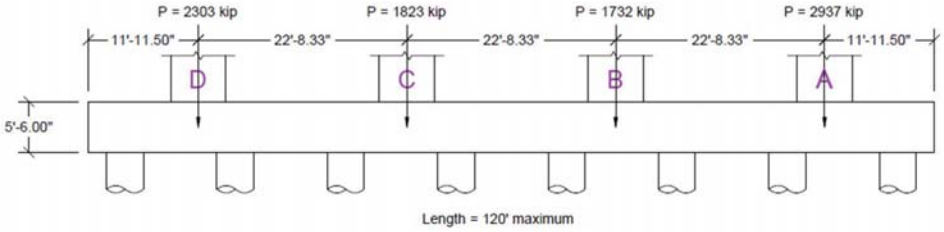


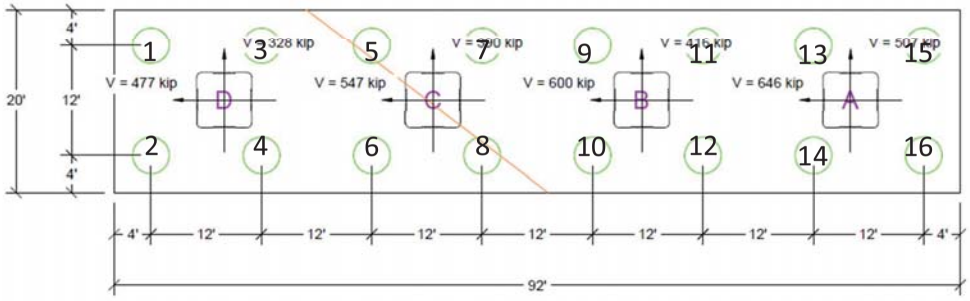
23rd Avenue – Bent 3 Shear Force (Pinned Head)



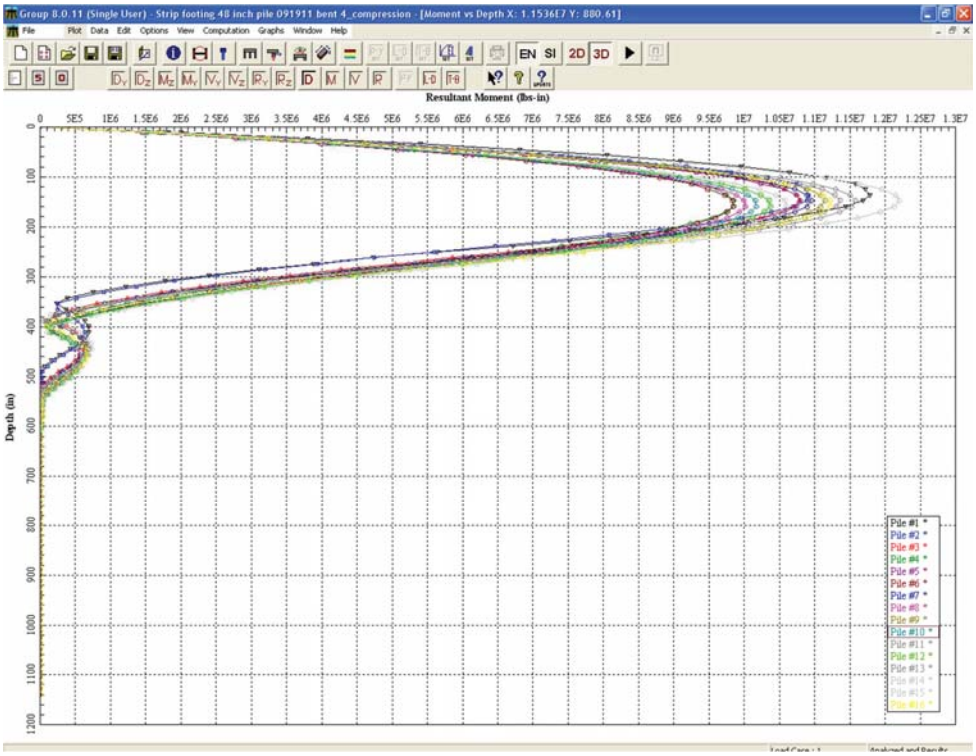
BENT 4 SERVICE

48" CIDH Material Properties
fc' = 4 ksi
Ec = 3834 ksi
fy = 60 ksi
Es = 29,000 ksi

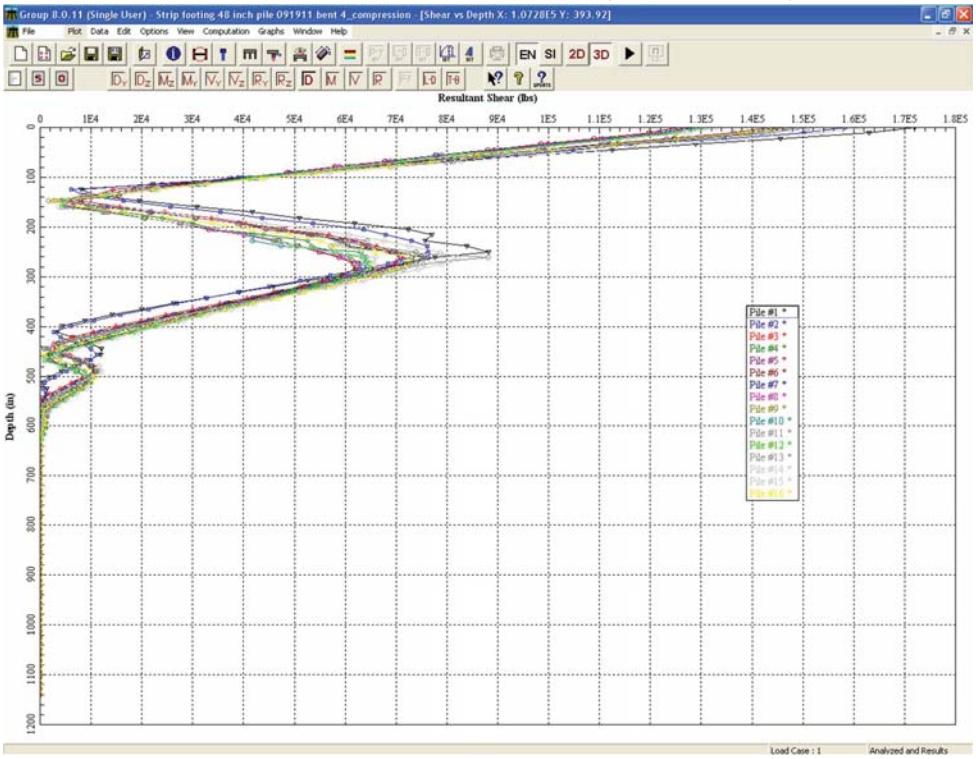




23rd Avenue – Bent 4 Moment (Pinned Head)

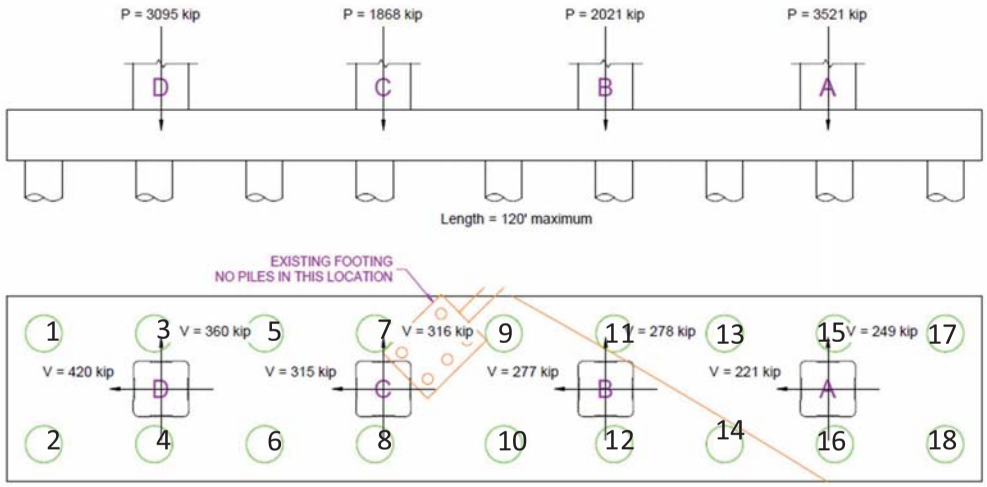


23rd Avenue – Bent 4 Shear force (Pinned Head)

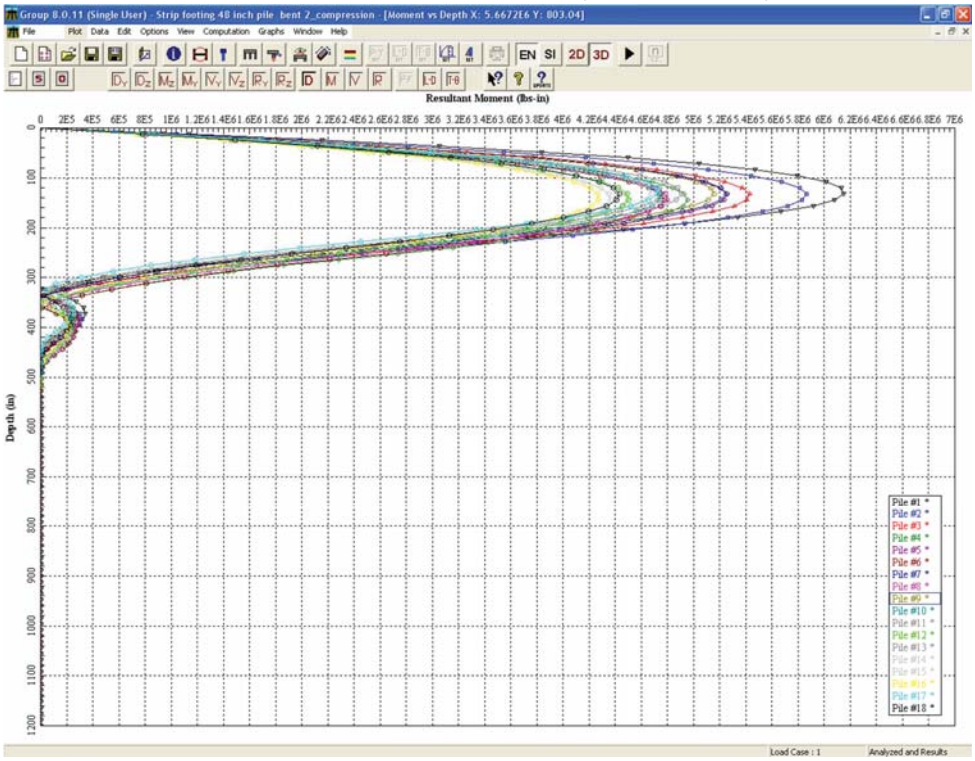


BENT 2 STRENGTH

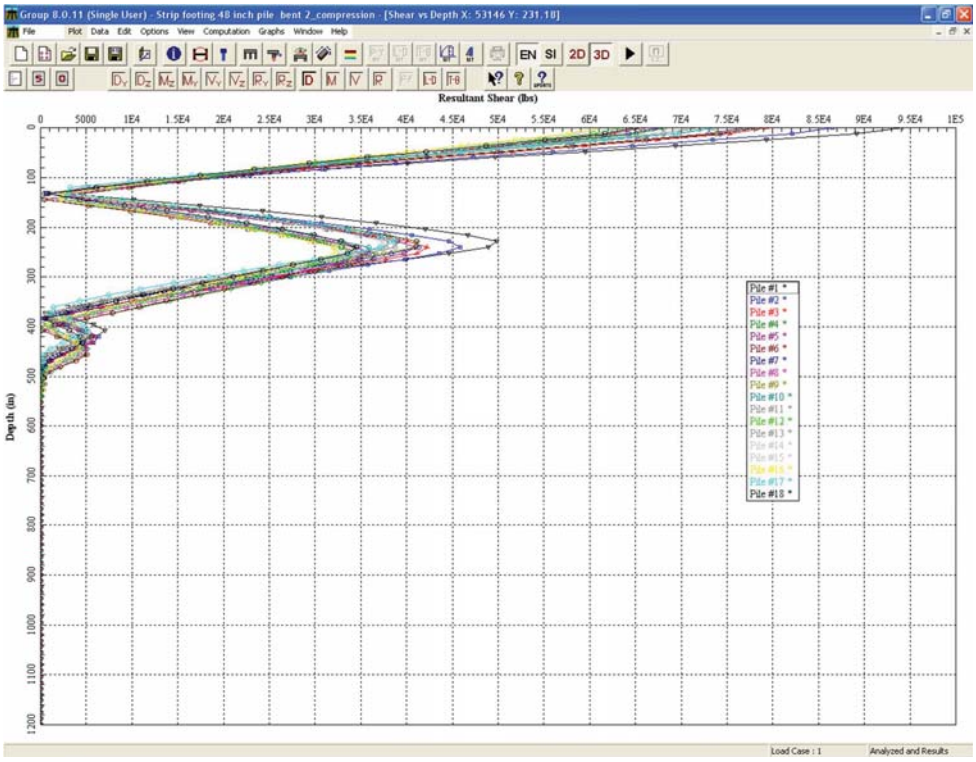
48" CIDH Material Properties
fc' = 4 ksi
Ec = 3834 ksi
fy = 60 ksi
Es = 29,000 ksi



23rd Avenue – Bent 2 Moment (Pinned Head)



23rd Avenue – Bent 2 Shear Force (Pinned Head)



BENT 3 STRENGTH

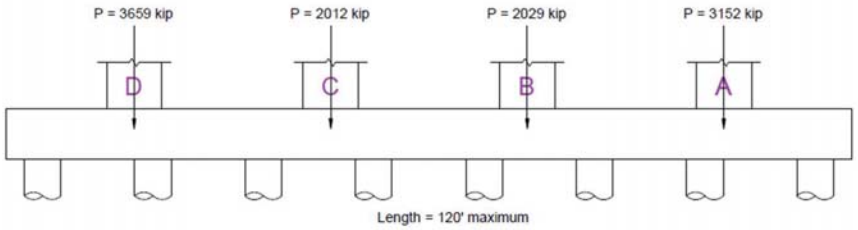
48" CIDH Material Properties

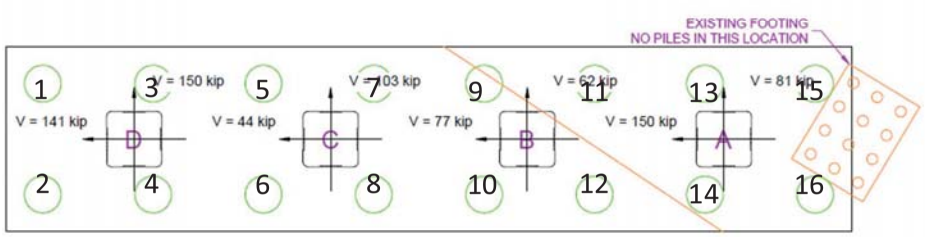
fc' = 4 ksi

Ec = 3834 ksi

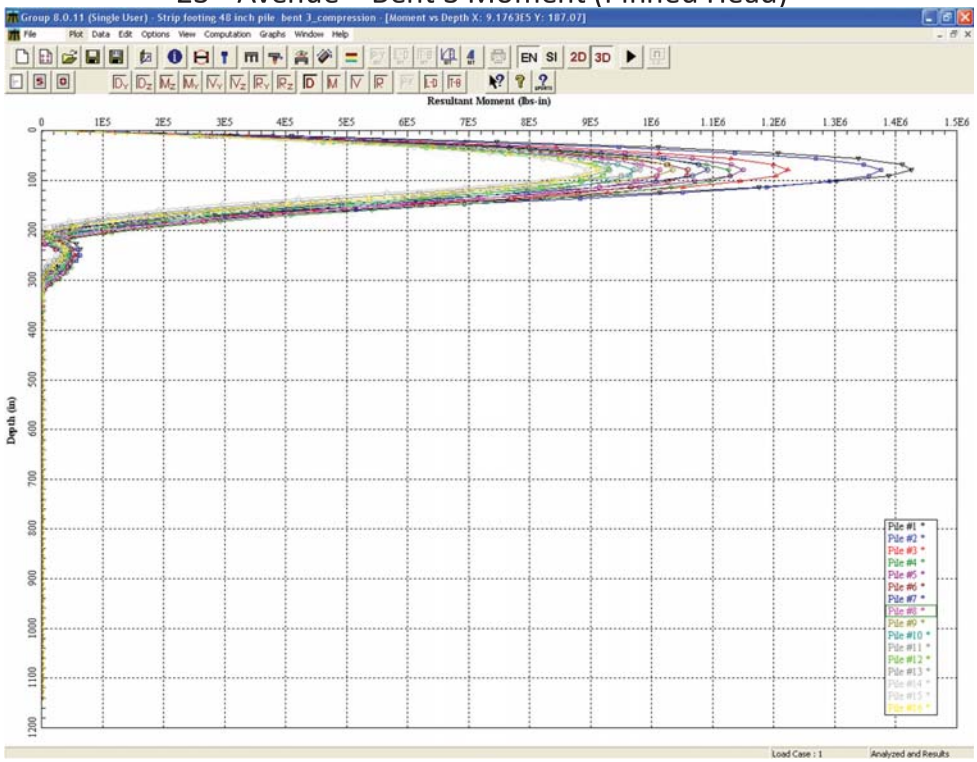
fy = 60 ksi

Es = 29,000 ksi

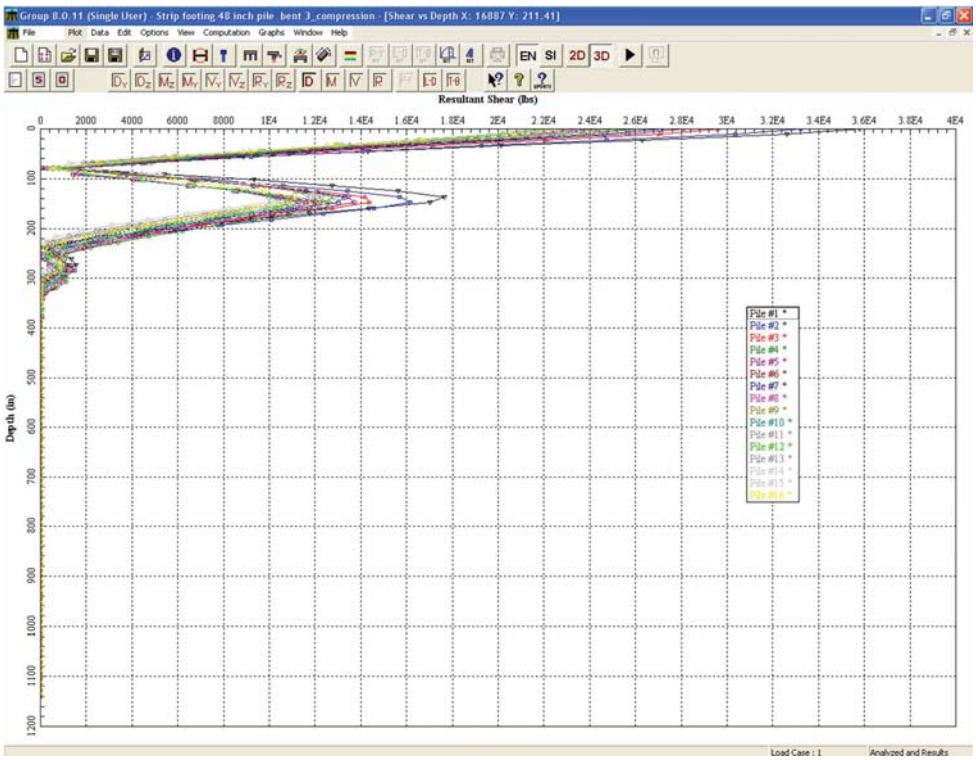




23rd Avenue – Bent 3 Moment (Pinned Head)

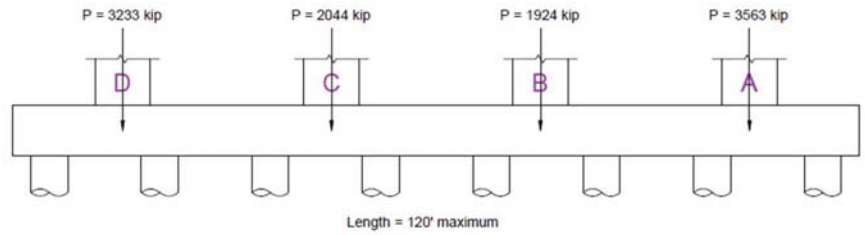


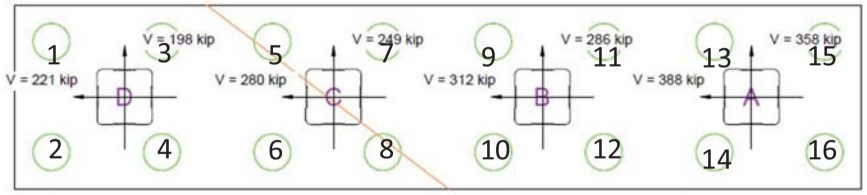
23rd Avenue – Bent 3 Shear Force (Pinned Head)



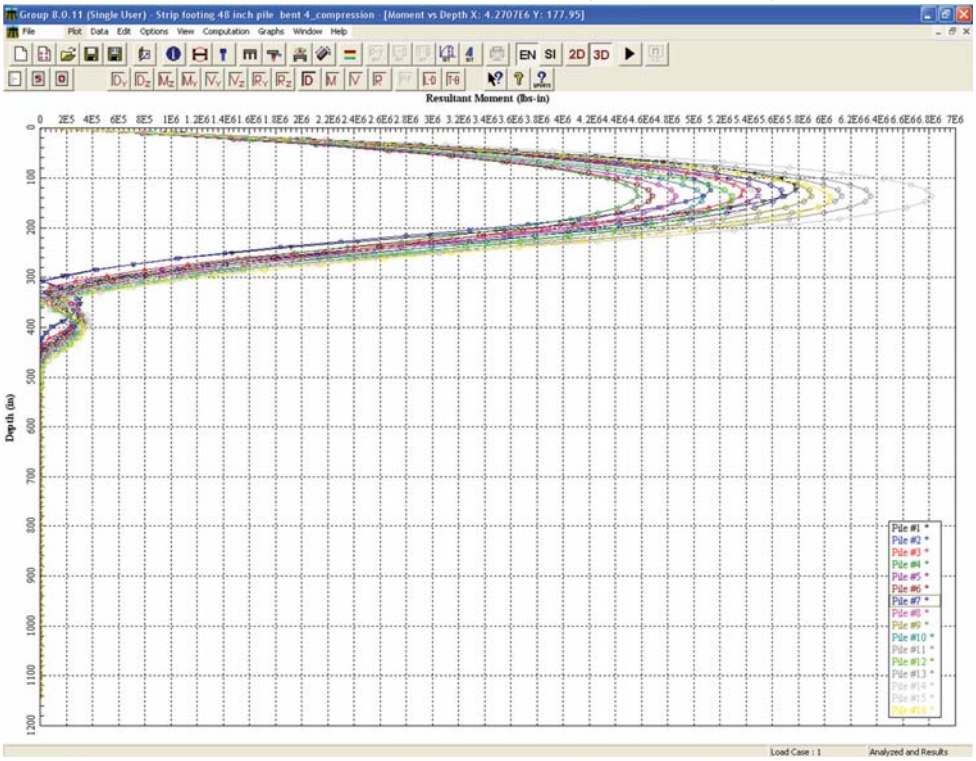
BENT 4 STRENGTH

48" CIDH Material Properties
fc' = 4 ksi
Ec = 3834 ksi
fy = 60 ksi
Es = 29,000 ksi

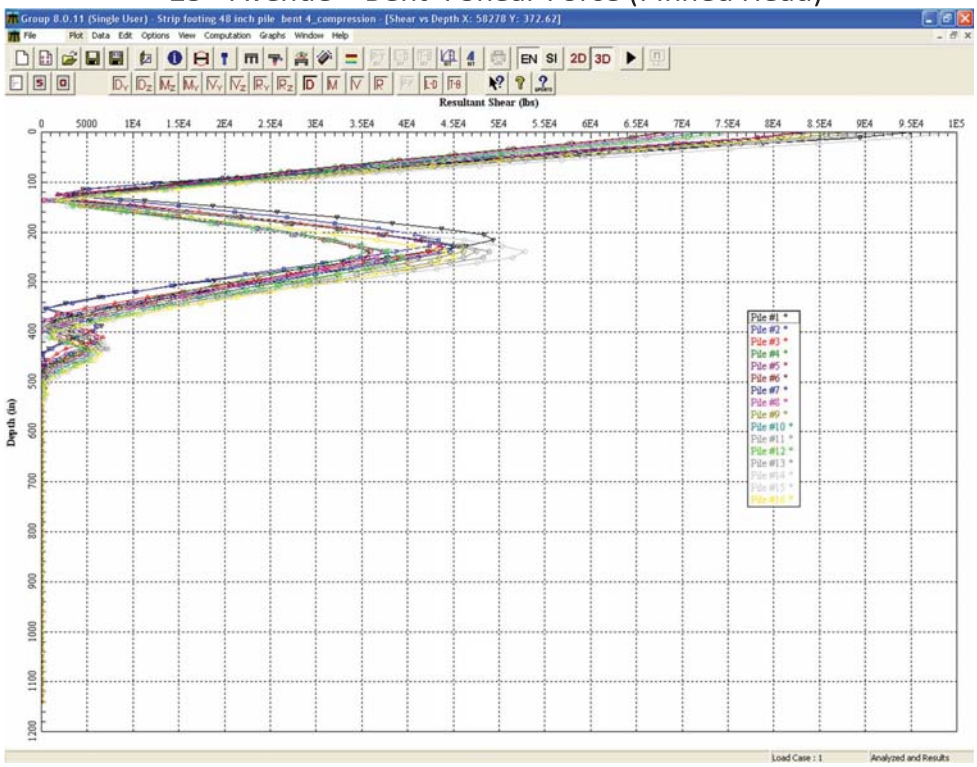




23rd Avenue – Bent 4 Moment (Pinned Head)



23rd Avenue – Bent 4 Shear Force (Pinned Head)



EMI data 1

Boring	Soil type	Depth	Δd (in)	H_{50} (in.)	t_{50} (min.)	c_v (ft^2/day)	t_{90} (min.)	c_v (ft^2/day)	sp' ksf	depth ft	sv psf	OCR
R-11-002	CL	15	0.0702	0.9298	1.50	0.28	9.00	0.20	3.5	15	1563	2.2
R-11-002	CL	25	0.084	0.9160	1.5	0.28	4	0.44	4	25	2189	1.8
R-11-010	CL	15	0.0742	0.9258	3	0.14	9	0.20	5.5	15	1563	3.5
R-11-014	CL	40	0.081	0.9190	2	0.21	6.25	0.29	5	40	3128	1.6
R-11-034	CL	20	0.0793	0.9207	4.5	0.09	9	0.20	3.5	20	1876	1.9
				Average	0.27							

Boring	Soil type	Depth	s1 ksf	e1 %	s2 ksf	e2 %	Cc
R-11-002	CL	15	4	4	10	9	0.125647
R-11-002	CL	25	5	5	15	9	0.083836
R-11-010	CL	15	10	5	15	6.5	0.085183
R-11-014	CL	40	6.5	5	15	9	0.110139
R-11-034	CL	20	5	5	15	12.2	0.150905
						average	0.11

Boring	Soil type	Depth	s1 ksf	e1 %	s2 ksf	e2 %	Cr
R-11-002	CL	15	10	11	0.4	8	0.02146
R-11-002	CL	25	2	7.5	0.4	6	0.02146
R-11-010	CL	15	9	6	0.6	3	0.025508
R-11-014	CL	40	5	8	0.7	6	0.023423
R-11-034	CL	20	5	11	2	10	0.025129
						average	0.02

URS Lab Consolidation Tests

Boring	Soil type	LL	PI	sp' ksf	depth ft	sv psf	OCR	Cv of recompression range ft/day			
B-2	CL	44	27	7	32	2627.2	2.7	0.68	1.25		
B-4	CL	40	20	5	21	1938.6	2.6	0.496302	0.255747	3.16317	
B-5	CL	48	24	7	50	3754	1.9	0.209155	0.050357	1.348924	
B-8	CL	49	24	7	10	1250	5.6	0.109361	2.323357	0.468885	1.349241
B-11	CH	65	35	7	27	2314.2	3.0	0.212382	4.87707		
										Average	1.20

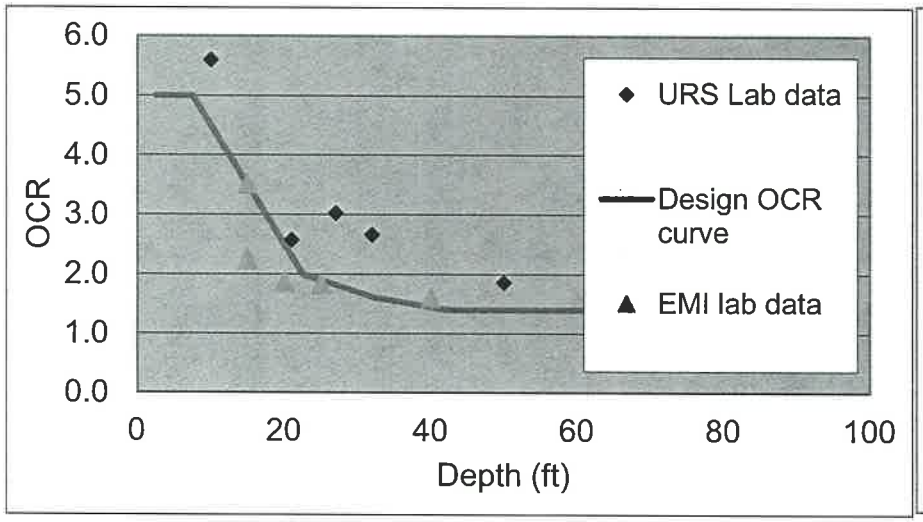
Boring	Soil type	LL	PI	s1 ksf	e1 %	s2 ksf	e2 %	Cc	
B-2	CL	44	27	80	17	10	6.5	0.116267	} Average.
B-4	CL	40	20	90	20	10	7	0.136234	
B-5	CL	48	24	100	21.5	20	11	0.150221	
B-8	CL	49	24	100	20	20	10	0.143068	
B-11	CH	65	35	40	24	10	7	0.282364	
							average	0.14	

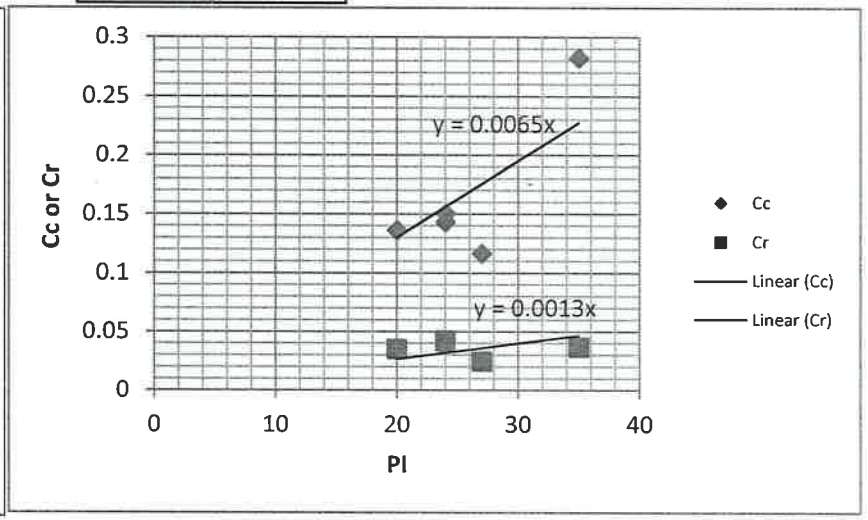
Boring	Soil type	LL	PI	s1 ksf	e1 %	s2 ksf	e2 %	Cr
B-2	CL	44	27	5	15	0.3	12	0.024553
B-4	CL	40	20	10	19.5	1	16	0.035
B-5	CL	48	24	30	22.3	0.9	16	0.041369
B-8	CL	49	24	20	20	1	14.5	0.042274
B-11	CH	65	35	30	26	0.7	20	0.036764
							average	0.04

Boring	Sample No.	Sample depth	USGS	LL	PI
URS-1	4	15	CL	34	15
URS-3	4	15	CL	33	17
URS-3	12	60	CL	45	20
URS-4	5	20	CL	44	20
URS-9	14	80	CL	41	20
URS-5	11	85	CL	48	24
URS-8	3	10	CL	49	24
URS-2	5	30	CL	44	27
URS-11	7	27	CL	65	35
URS-4	8	35	CH	77	44
URS-9	11	50	CH	75	44
URS-8	8	35	CH	80	52
			Average	52.9	28.5

Design parameter				
	Cc=	0.19	to	0.12
	Cr=	0.04	to	0.03
	Cv=	1.20 ft2/day		
	OCR=	See left		

Depth (ft)	OCR	
2.5	5	
7.5	5	
12.5	4	
17.5	3	
22.5	2	
27.5	1.8	
32.5	1.6	
37.5	1.5	
42.5	1.4	*given Su/σv'=0.3, OCR~1.4
47.5	1.4	
52.5	1.4	
57.5	1.4	
62.5	1.4	
67.5	1.4	
72.5	1.4	
77.5	1.4	
82.5	1.4	
87.5	1.4	
92.5	1.4	
97.5	1.4	





23 west (lower bound)

Fill Height	25	ft	**Settlement**	**3.84**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	55	ft			
Length of fill	100	ft			
Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	3250	psf			

Based on Boring R-11-030 (EMI boring)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	3033	3345.37	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	2660	3597.97	5	-	-	-
CL	12.5	5	125	0.03	0.12	1562.5	156	1406.5	2354	3760.41	4	5626	N	0.77
CL	17.5	5	125	0.03	0.12	2187.5	468	1719.5	2098	3817.81	3	5158.5	N	0.62
SP-SM	22.5	5	125	0.03	0.12	2812.5	780	2032.5	1883	3915.32	2	4065	N	0.00
CL	27.5	5	125	0.03	0.12	3437.5	1092	2345.5	1699	4044.85	1.8	4221.9	N	0.43
CL	32.5	5	125	0.03	0.12	4062.5	1404	2658.5	1542	4200.28	1.6	4253.6	N	0.36
CL	37.5	5	125	0.03	0.12	4687.5	1716	2971.5	1405	4376.91	1.5	4457.25	N	0.30
CL	42.5	5	125	0.03	0.12	5312.5	2028	3284.5	1287	4571.05	1.4	4598.3	N	0.26
ML	47.5	5	125	0.03	0.12	5937.5	2340	3597.5	1182	4779.81	1.4	5036.5	N	0.22
CL	52.5	5	125	0.03	0.12	6562.5	2652	3910.5	1090	5000.85	1.4	5474.7	N	0.19
SP-SM	57.5	5	125	0.03	0.12	7187.5	2964	4223.5	1009	5232.32	1.4	5912.9	N	0.00
CL	62.5	5	125	0.03	0.12	7812.5	3276	4536.5	936	5472.67	1.4	6351.1	N	0.15
CL	67.5	5	125	0.03	0.12	8437.5	3588	4849.5	871	5720.65	1.4	6789.3	N	0.13
SP	72.5	5	125	0.03	0.12	9062.5	3900	5162.5	813	5975.23	1.4	7227.5	N	0.00
CL	77.5	5	125	0.03	0.12	9687.5	4212	5475.5	760	6235.53	1.4	7665.7	N	0.10
CL	82.5	5	125	0.03	0.12	10312.5	4524	5788.5	712	6500.83	1.4	8103.9	N	0.09
CL	87.5	5	125	0.03	0.12	10937.5	4836	6101.5	669	6770.51	1.4	8542.1	N	0.08
CL	92.5	5	125	0.03	0.12	11562.5	5148	6414.5	630	7044.04	1.4	8980.3	N	0.07
CL	97.5	5	125	0.03	0.12	12187.5	5460	6727.5	593	7320.98	1.4	9418.5	N	0.07
														3.84

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)=	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	15	ft	(30ft compression, two direction)		
t50	3.69E+01	day			
t90	1.59E+02	day			

23 west (upper bound)

Fill Height	25	ft	**Settlement**	**5.12**	inches
Fill Unit Weight	130	pcf			
Width of fill	55	ft			
Length of fill	100	ft			
Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	3250	psf			

Based on Boring R-11-030 (EMI boring)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	3033	3345.37	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	2660	3597.97	5	-	-	-
CL	12.5	5	125	0.04	0.19	1562.5	156	1406.5	2354	3760.41	4	5626	N	1.03
CL	17.5	5	125	0.04	0.19	2187.5	468	1719.5	2098	3817.81	3	5158.5	N	0.83
SP-SM	22.5	5	125	0.04	0.19	2812.5	780	2032.5	1883	3915.32	2	4065	N	0.00
CL	27.5	5	125	0.04	0.19	3437.5	1092	2345.5	1699	4044.85	1.8	4221.9	N	0.57
CL	32.5	5	125	0.04	0.19	4062.5	1404	2658.5	1542	4200.28	1.6	4253.6	N	0.48
CL	37.5	5	125	0.04	0.19	4687.5	1716	2971.5	1405	4376.91	1.5	4457.25	N	0.40
CL	42.5	5	125	0.04	0.19	5312.5	2028	3284.5	1287	4571.05	1.4	4598.3	N	0.34
ML	47.5	5	125	0.04	0.19	5937.5	2340	3597.5	1182	4779.81	1.4	5036.5	N	0.30
CL	52.5	5	125	0.04	0.19	6562.5	2652	3910.5	1090	5000.85	1.4	5474.7	N	0.26
SP-SM	57.5	5	125	0.04	0.19	7187.5	2964	4223.5	1009	5232.32	1.4	5912.9	N	0.00
CL	62.5	5	125	0.04	0.19	7812.5	3276	4536.5	936	5472.67	1.4	6351.1	N	0.20
CL	67.5	5	125	0.04	0.19	8437.5	3588	4849.5	871	5720.65	1.4	6789.3	N	0.17
SP	72.5	5	125	0.04	0.19	9062.5	3900	5162.5	813	5975.23	1.4	7227.5	N	0.00
CL	77.5	5	125	0.04	0.19	9687.5	4212	5475.5	760	6235.53	1.4	7665.7	N	0.14
CL	82.5	5	125	0.04	0.19	10312.5	4524	5788.5	712	6500.83	1.4	8103.9	N	0.12
CL	87.5	5	125	0.04	0.19	10937.5	4836	6101.5	669	6770.51	1.4	8542.1	N	0.11
CL	92.5	5	125	0.04	0.19	11562.5	5148	6414.5	630	7044.04	1.4	8980.3	N	0.10
CL	97.5	5	125	0.04	0.19	12187.5	5460	6727.5	593	7320.98	1.4	9418.5	N	0.09
														5.12

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)=	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	15	ft	(30ft compression, two direction)		
t50	3.69E+01	day			
t90	1.59E+02	day			

23 east (upper bound)

Fill Height	13.52	ft	**Settlement**	3.43	**inches**
Fill Unit Weight	130	pcf			
Width of fill	75	ft			
Length of fill	178.25	ft			
Design Groundwater at	15	ft bgs			
Depth to Start Sett. Calc.	15	ft bgs			
Surcharge Load	1757.6	psf			

Based on Boring B-3 (old boring)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	1677	1989.88	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1533	2470.80	5	-	-	-
CL	12.5	5	125	0.04	0.19	1562.5	0	1562.5	1408	2970.29	4	6250	N	0.67
CL	17.5	5	125	0.04	0.19	2187.5	156	2031.5	1298	3329.18	3	6094.5	N	0.51
CL	22.5	5	125	0.04	0.19	2812.5	468	2344.5	1200	3544.97	2	4689	N	0.43
CL	27.5	5	125	0.04	0.19	3437.5	780	2657.5	1114	3771.66	1.8	4783.5	N	0.36
SC	32.5	5	125	0.04	0.19	4062.5	1092	2970.5	1037	4007.63	1.6	4752.8	N	0.00
SM	37.5	5	125	0.04	0.19	4687.5	1404	3283.5	968	4251.57	1.5	4925.25	N	0.00
ML	42.5	5	125	0.04	0.19	5312.5	1716	3596.5	906	4502.38	1.4	5035.1	N	0.23
CL	47.5	5	125	0.04	0.19	5937.5	2028	3909.5	850	4759.16	1.4	5473.3	N	0.20
CL	52.5	5	125	0.04	0.19	6562.5	2340	4222.5	799	5021.15	1.4	5911.5	N	0.18
CL	57.5	5	125	0.04	0.19	7187.5	2652	4535.5	752	5287.72	1.4	6349.7	N	0.16
ML	62.5	5	125	0.04	0.19	7812.5	2964	4848.5	710	5558.31	1.4	6787.9	N	0.14
ML	67.5	5	125	0.04	0.19	8437.5	3276	5161.5	671	5832.47	1.4	7226.1	N	0.13
ML	72.5	5	125	0.04	0.19	9062.5	3588	5474.5	635	6109.80	1.4	7664.3	N	0.11
ML	77.5	5	125	0.04	0.19	9687.5	3900	5787.5	602	6389.96	1.4	8102.5	N	0.10
ML	82.5	5	125	0.04	0.19	10312.5	4212	6100.5	572	6672.64	1.4	8540.7	N	0.09
ML	87.5	5	125	0.04	0.19	10937.5	4524	6413.5	544	6957.61	1.4	8978.9	N	0.08
SM	92.5	5	125	0.04	0.19	11562.5	4836	6726.5	518	7244.62	1.4	9417.1	N	0.00
SM	97.5	5	125	0.04	0.19	12187.5	5148	7039.5	494	7533.48	1.4	9855.3	N	0.00
														3.43

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	10	ft	(20ft compression, 2 sides drain)		
t50	1.64E+01	day			
t90	7.07E+01	day			

23 east (lower bound)

Fill Height	13.52	ft	**Settlement**	**2.57**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	75	ft			
Length of fill	178.25	ft			
Design Groundwater at	15	ft bgs			
Depth to Start Sett. Calc.	15	ft bgs			
Surcharge Load	1757.6	psf			

Based on Boring B-3 (old boring)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	1677	1989.88	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1533	2470.80	5	-	-	-
CL	12.5	5	125	0.03	0.19	1562.5	0	1562.5	1408	2970.29	4	6250	N	0.50
CL	17.5	5	125	0.03	0.19	2187.5	156	2031.5	1298	3329.18	3	6094.5	N	0.39
CL	22.5	5	125	0.03	0.19	2812.5	468	2344.5	1200	3544.97	2	4689	N	0.32
CL	27.5	5	125	0.03	0.19	3437.5	780	2657.5	1114	3771.66	1.8	4783.5	N	0.27
SC	32.5	5	125	0.03	0.19	4062.5	1092	2970.5	1037	4007.63	1.6	4752.8	N	0.00
SM	37.5	5	125	0.03	0.19	4687.5	1404	3283.5	968	4251.57	1.5	4925.25	N	0.00
ML	42.5	5	125	0.03	0.19	5312.5	1716	3596.5	906	4502.38	1.4	5035.1	N	0.18
CL	47.5	5	125	0.03	0.19	5937.5	2028	3909.5	850	4759.16	1.4	5473.3	N	0.15
CL	52.5	5	125	0.03	0.19	6562.5	2340	4222.5	799	5021.15	1.4	5911.5	N	0.14
CL	57.5	5	125	0.03	0.19	7187.5	2652	4535.5	752	5287.72	1.4	6349.7	N	0.12
ML	62.5	5	125	0.03	0.19	7812.5	2964	4848.5	710	5558.31	1.4	6787.9	N	0.11
ML	67.5	5	125	0.03	0.19	8437.5	3276	5161.5	671	5832.47	1.4	7226.1	N	0.10
ML	72.5	5	125	0.03	0.19	9062.5	3588	5474.5	635	6109.80	1.4	7664.3	N	0.09
ML	77.5	5	125	0.03	0.19	9687.5	3900	5787.5	602	6389.96	1.4	8102.5	N	0.08
ML	82.5	5	125	0.03	0.19	10312.5	4212	6100.5	572	6672.64	1.4	8540.7	N	0.07
ML	87.5	5	125	0.03	0.19	10937.5	4524	6413.5	544	6957.61	1.4	8978.9	N	0.06
SM	92.5	5	125	0.03	0.19	11562.5	4836	6726.5	518	7244.62	1.4	9417.1	N	0.00
SM	97.5	5	125	0.03	0.19	12187.5	5148	7039.5	494	7533.48	1.4	9855.3	N	0.00
														2.57

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	10	ft	(20ft compression, 2 sides drain)		
t50	1.64E+01	day			
t90	7.07E+01	day			

Appendix E
Responses to Comments

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Paul Cotter** **Phone: (916)227-5671** **e-mail: paul.cotter@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 05/09/2012** **Structure Name*: 23rd Ave OC (Replace) Br No*:33-0753** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 3/30/2012, responses to Caltrans last review comments dated 2/17/2012, and Plans prepared by URS dated 3/30/2012.		
2	FR	Page 4-2 Section 4.3	1) The groundwater encountered in the borings by EMI is not consistent with the range indicated in the report. Please check. 2) Boring "R-11-007" and "R-11-010" should be "CPT-11-007" and "CPT-11-010," respectively.	1) The groundwater encountered in the borings by EMI was corrected in the report. 2) Boring ID was corrected.	
3	FR	Page 7-2 Section 7.4	1) Cut-off elevations shown on Table 5 are not consistent with those presented on Tables 7 and 8. 2) Note 3 under Tables 7 and 8 do not apply.	1) Cut-off elevations shown on Table 7 were corrected 2) Note 3 under Tables 7 and 8 were deleted.	
4	FR	Page 7-6 Section 7.4	Table numbers referenced on this page is wrong.	Table numbers were corrected	
5	FR	Section 7.5 Page 7-8	Light-weight fill is recommended behind the abutment wall. 1. Please address the impact of the light-weight fill on the	1. The passive resistance of light weight fill was not accounted for seismic design of the abutment	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer:_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

			passive resistance for seismic design of the abutment backwall. 2. Please address buoyancy issue associated with use of EPS, if any, and provide remediation if needed.	backwall. 2. There is no buoyancy issue associated with use of EPS since EPS will be placed above the ground water table.	
6	LOTBs		Description of consistency of several clay layers is not supported by the field test or lab test results.	Description of consistency of clay layers were checked and corrected.	
7	FR,P	LOTBs	Please include LOTBs originally intended for other structures, including those done by different geotechnical consultant, into the plans for each structure if the borings are close enough and are being referenced/used for the analysis for that particular structure. It is noted that several structures significantly rely on the borings conducted for adjacent structures for the GW information, or the borings intended for adjacent structure show much higher GWT than those intended for this particular one.	We agree that it is useful to include LOTBs originally intended for other structures done by different geotechnical consultant into the plans for our design structure. However, since Caltrans have a standard way to name boring ID, it's possible to have identical IDs on a plan if using LOTB from different geotechnical consultants. To avoid confusion, we clearly stated which borings in addition to our explorations were used instead of including them in our LOTBs.	
8	FR		Artesian condition was encountered in the High Street Project during construction at the site about 4000 ft southeast to 29th Ave OC. It may be necessary to probe the possibility of artesian conditions at this site due to the proximity and similarity of the subsurface conditions, at least for the support locations that needs deeper excavation for pile cap installation.	Our field explorations do not show any artesian condition at the project sites and neither do the field explorations by EMI (2012). There is no issue of artesian for the construction.	

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: yiwei.hu@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 02/17/2012** **Structure Name*: 23rd Ave OC (Replace) Br No*:33-0753** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 1/6/2012, responses to Caltrans last review comments dated 10/3/2011, and Plans prepared by URS dated 1/10/2012.		
2	FR	Page 3-2 Section 3.2.1	The drilling methods indicated in this section for the top 5 ft is not reflected in the LOTBs.	The boring was hand augered to check for the existence of underground utilities, but then re-drilled through using Rotary Wash method. A note "The borings were hand augered in the top 5 ft to check for the existence of underground utilities" was added on LOTB.	
3	FR	Page 4-2 Section 4-2	Please add a note to reflect how the soil strength changes with depth.	Text was revised to reflect how the soil strength changes with depth, in an overconsolidated strength profile.	
4	FR	Page 4-2 Section 4.3	1) The groundwater encountered in the borings by EMI is not consistent with the range indicated in the report. Please check. 2) Why the design groundwater level is much lower than what	The design ground water elevation was selected to be EL+10.0 feet at the 23rd Avenue Overcrossing based on several data sources. We reviewed groundwater elevations in the 2011 EMI borings	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

			was actually encountered in the field investigations?	A-11-032, R-11-030, and R-11-031, which are at the site. Our design water table is much higher than the investigations conducted in 1993 (elevation -1.5 feet and elevation -1.7 feet), slightly higher than the range encountered by EMI (between elevation +4.9 feet and +7.2 feet), and is slightly lower than our CPT interpretation (+10.9 feet and +13.8 feet).Therefore, the design ground water elevation was reasonably assumed to be EL+10.0 feet at the 23rd Avenue Overcrossing	
5	FR	Page 7-2 Section 7.4	1) Please include foundation data provided by structure designer and present foundation design data and resistance factor for each limit state in the main body of the report, not in the appendix. 2) The values of required factored nominal resistance are not correct. 3) Report states that GW is expected to be encountered between El +7 and +3 ft, which is not consistent with the information provided in Section 4.3.	1. We have included foundation data provided by structure designer and presented foundation design data and resistance factors for each limit state in the main body of the report. 2. The values of required factored nominal resistance have been corrected. 3. The text was revised to state "GW is expected to be encountered between El +7 and +13 ft.	
6	FR		Please show bridge number on the cover page of the report since it is now available. Please indicate both the old and new bridge numbers in the beginning of the report.	1. New Bridge numbers have been added to the cover page of the report. 2. Old and new Bridge numbers have been added in the beginning of the report.	
7	LOTBs		1) Boreholes are not identified correctly. Please refer to the current Caltrans logging manual. Please revise accordingly, including the LOTBs, report, and all pertinent information such as lab test results included in the appendices. 2) Consistency or density of soil layers is not described. 3) Description of consistency of several clay layers is not supported by the field test or lab test results. Please examine the entire LOTB set to make sure it follows Caltrans current logging manual.	1. Changed names of the borings in LOTB, text and lab test appendices 2. Consistency or density of soil layers added where missing. 3. Checked the consistencies and made changes where applicable.	

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: yiwei.hu@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 10/03/2011** **Structure Name*: 23rd Ave OC (Replace) Br No*:33-xxxx** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 9/6/2011 and Plans prepared by URS dated 9/6/2011.		
2	FR	Page 3-1 Section 3.2.1	1) Borehole diameters indicated in this section and on LOTBs are inconsistent. 2) The drilling methods indicated in this section are not reflected in the LOTBs. 3) The SPT sampler size indicated in the report is 1.5 inch (I.D.), but LOTBs shows 1.4 inch.	1) Borehole diameters of 8" indicated in LOTBs are correct. The text in Section 3.2.1 was revised. 2) The drilling methods indicated in LOTBs were corrected to reflect rotary wash method. 3) The SPT sampler size of 1.4 inch indicated LOTBs is correct. The text in Section 3.2.1 was revised.	
3	FR	Page 4-2 Section 4-2	Cohesion of the first soil layer is shown to range from 2500 psf to 1500psf. Please use a single value or indicate how such a wide range of value is used in analyses.	As shown in figure 7, the field testing, lab testing, and CPT interpretation exhibits a classic overconsolidated stress history at the site, in which the shear strength is higher near ground surface and decreases with depth until reaching normally consolidated conditions. Based on a	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
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✓= Comment Resolved
(for Reviewer's use)

				review of all geotechnical data, generalized soil engineering parameters were developed as shown in the solid gray line in Figure 7, indicating soil strength ranges from 2500 psf to 1500 psf with the depth.	
4	FR	Page 4-2 Section 4.3	1) Groundwater (GW) encountered in one of the borings conducted in 1993 is at El -1.5 ft, not 1.5 ft. 2) Show the GW table indicated by the CPTs on the LOTBs. 3) The CPTs indicate GW elevation at 10.9 ft and 13.8 ft. Why is the design GW elevation assumed to be at about El +5.0 ft, which is much lower than what was actually observed in the field investigation?	1) Corrected. 2) GW table indicated by the CPTs was added to the LOTBs. 3) The CPT data obtained by this study indicate that the water table was at elevation of +10.9 feet and feet and +13.8 feet in boring B7 and B10, respectively. Groundwater encountered in borings performed by Earth Mechanics Inc. (EMI, 2011) also presented in the similar range, between elevation +4.9 feet and elevation +10.7 feet. Therefore, the design ground water elevation was revised to be EL+10.0 feet at the 23rd Avenue Overcrossing.	
5	FR	Page 5-2 Section 5.4	Be specific that the ARS curve mentioned and generated based on the parameters mentioned in the first paragraph is the ARS curve obtained by deterministic method, not the design curve. The design curve is the envelope as mentioned in the second paragraph.	Text revised to clarify the difference.	
6	FR	Page 7-1 Section 7.3	Report states spread footing foundations are expected to be suitable for support of the bridge bents. Why are they not recommended/proposed?	Adequate soil bearing capacity exists for spread footing foundations, however, excessive settlements are computed under the design loading. Therefore deep foundations are recommended. Additional explanation was provided in text.	
7	FR	Page 7-2 Section 7.4	1) Please make recommendations following LRFD method. Include foundation data provided by structure designer. Present foundation design data and resistance factor for each limit state. Refer to AASHTO Bridge Design Specifications, Caltrans amendments, and Caltrans Memo To Designer for information. 2) Nominal resistance should be rounded up to the nearest 10 kips.	1) Foundation data provided by structure designer was included in Appendix D. Foundation design data and resistance factor for each limit state were also presented in Appendix D per AASHTO Bridge Design Specifications, Caltrans amendments, and Caltrans Memo To Designers. 2) Pile data table has been updated. 3) "0"is entered instead of "NA" if there is no	

			3) Put "0" instead of "NA" if there is no tension demand. 4) Report states that GW is expected to be encountered between El +7 and +3 ft, which is not consistent with the information provided in Section 4.3. 5) Pile length at several supports exceeds the limit. The length of CIDH piles is limited to 30 diameter of the piles due to constructability. 6) It appears relatively deep excavation is needed to install the pile caps due to the pile cap bottom elevation being much lower than the existing grade. Please address the pertinent issues.	tension demand. 4) Report now states that GW is expected to be encountered between El +10 and +5 ft, which is consistent with the information provided in Section 4.3. 5) Pile length at all supports is now limited to 30 pile diameters. 6) The pile cap elevation was updated and appears to be shallower.	
8	FR	Page 7-3 Section 7.4	What type of connection between pile and pile cap is assumed in the lateral analyses? Please provide summary of lateral displacement at pile head.	Pinned head connections between pile and cap were assumed. A summary table of lateral displacement at pile head has been added.	
9	LOTBs		Please prepare LOTBs in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition). There are many items need to be corrected or added. Following are some items noted: 1) Borehole is not identified correctly. 1) Legend sheets are missing. 2) All the laboratory and field testing performed are not presented, such as UU test, UC test, etc.. 3) All laboratory and field testing data are not presented, such Pocket Penetration test. 4) GW encountered is not shown. A note should be added accordingly if GW is not encountered or not measured. 5) Indicate Hammer energy ration. 6) Consistency or density of soil layers is not described. 7) Description of consistency of several clay layers is not supported by the field test or lab test results. 8) Graphics are not following legends in the Logging Manual 9) Why does the conversion table on the as-built LOTBs refer to Rte 101? The above list shows only some of the many issues needed to be corrected. Consultant should examine the entire LOTB set to make sure it follows Caltrans current logging manual referenced	LOTBs are revised according to the comment and in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition). 1) Borehole is identified as rotary drilling 2) Legend sheets have been added. 3) All the laboratory and field testing performed are now presented. 4) All laboratory and field testing data is now presented. 5) GW encountered in CPT is now shown. A note "Ground water table was not measured in the borings due to rotary wash drilling "was added. 6) A note "Hammer energy ratio calibration not performed" was added. 7) Consistency or density of soil layers was added. 8) Description of consistency was checked against the field test or lab test results. 9) Graphics were revised following legends in the Logging Manual. 10) "Rte 101" was removed.	

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer**:**_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

			above.		
10	FR	Lab test report	What are the values shown on the Particle Size report and Liquid and Plastic Limit Test report, elevation or depth?	It was clarified as depth.	

FOUNDATION REPORT

I-880 29TH AVE OVERCROSSING REPLACEMENT
OAKLAND, CA
BRIDGE NO. 33-0751

Prepared for
RBF Consulting, Alameda County Transportation Commission and California Department of Transportation

June 22, 2012

URS Corporation
1333 Broadway, Suite 800
Oakland, California 94612

27560836

I-880 Operational and Safety Improvements at 23rd/29th Ave OCs
04-Ala-880

Foundation Report
I-880 29th Avenue Overcrossing Replace
Bridge No. 33-0751

Submitted to
RBF Consulting, Alameda County Transportation Commission, and California Department of Transportation

This report has been prepared by or under the supervision of the following Registered Geotechnical Engineer. The Registered Geotechnical Engineer attests to the technical information contained herein and has judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

URS CORPORATION

Philip Meymand, Ph.D., G.E.
Registered Geotechnical Engineer

June 22, 2012
Date

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C Laboratory Tests
D Analysis and Calculations
E Responses to Comments

The proposed project is sponsored by Alameda County Congestion Management Agency (ACCMA) and will replace the 29th Avenue overcrossing and the two 23rd Avenue overcrossings of Interstate I-880 (I-880) located at Post Miles 28.69 and 28.95, respectively. In addition to the replacement of the overcrossings, the existing northbound 29th Avenue and 23rd Avenue off ramps and on ramps will be reconstructed to improve operations and safety. A soundwall will be constructed along East 8th Street, between 29th and 23rd Avenues to reduce noise impacts associated with the I-880 freeway within the Jingletown residential community. A project Vicinity Map is presented in Figure 1.

The new overcrossings will provide standard vertical clearances over mainline I-880. Replacement of the overcrossings will also provide room to widen the existing I-880 mainline lanes. In addition, the proposed project will widen the mainline outside shoulders and lengthen existing northbound auxiliary lane between the 29th Avenue on ramp and 23rd Avenue off ramp. These improvements, especially lengthening the auxiliary lane, will increase the flow of vehicles along the mainline and help reduce the rate of congestion related accidents in the area.

1.1 PURPOSE AND SCOPE OF THIS STUDY

The purpose of this Foundation Report (FR) is to document previous field investigations and existing foundation conditions, perform geotechnical and geological investigations or studies, and make foundation recommendations for the replacement of the 29th Avenue Overcrossing (New Bridge No. 33-0751; Old Bridge No. 33-0141). This Foundation Report supersedes the Foundation Report for I-880 29th Avenue Overcrossing Replace dated March 30, 2012.

1.2 PROJECT SCOPE OF WORK

The scope of work for this study includes:

- Review of logs of test borings (LOTBs), geologic maps, foundation reports, and other existing information
- Preparation of this FR, which includes:
  - Conduction of field exploration and laboratory tests
  - Preparation of LOTBs
  - Development of seismic design criteria and earthquake ground motions;
  - Description of site geology and evaluation of geologic hazards;
  - Assessment of subsurface conditions;
  - Foundation recommendations for proposed structures; and
  - Discussion of construction considerations

2.1 REGIONAL GEOLOGY

The 29th Avenue Overcrossing is located near the east side of the structural and topographic basin that contains San Francisco Bay. Elevations on site range between approximately 10 and 20 feet above Mean Sea Level (MSL). The bay trough has formed through processes of faulting, folding, and erosion that have been ongoing for millions of years. The project site lies in a region of very gently sloping to flat lying, unconsolidated, sandy to clayey, Holocene-age (less than 10,000 years old), alluvial fan deposits (Graymer, 2000) as shown in Figure 2. These deposits are derived from sediments that have been eroded from the uplifted East Bay hills and transported to the San Francisco Bay margins by local streams. These and older alluvial and basin fill deposits mantle bedrock of the Franciscan Complex at great depth. Previously drilled exploratory borings extended to depths of 80 feet and did not encounter bedrock. Subsurface information from available LOTB sheets is summarized in Section 3

2.2 SEISMIC SETTING

The I-880 corridor in Oakland is located along the eastern margin of San Francisco Bay in one of the most seismically active regions in California. The majority of earthquakes are associated with the strike-slip faults of the San Andreas system. The trend of most of the faults in this portion of the California Coast Ranges is northwest-southeast, as shown on Figure 3. The major active faults near the 29th Avenue Overcrossing, the Hayward, Calaveras, and San Andreas faults, are capable of generating earthquakes of Maximum Moment (M_{max}) 7.3, 7.4, and 7.9, respectively (Caltrans Caltrans Seismic Design Criteria, 2010). The Hayward and Calaveras faults are located about 4.6 km and 17.6 km northeast of the site; the San Andreas fault is about 24 km to the southwest. As well as these local faults, earthquakes on more distant seismic sources, including the Greenville - Marsh Creek, Concord - Green Valley, Rodgers Creek, and the Mount Diablo blind thrust may also result in significant levels of seismic shaking in the project vicinity.

The last major earthquake on the Hayward fault occurred in 1868 and caused widespread damage throughout much of the East Bay. This earthquake caused surface rupture from Fremont to as far north as Berkeley. Although the fault rupture was poorly documented, the recorded lateral displacements were at least 1 meter. Smaller vertical displacements were also recorded. Based on empirical relationships among earthquake magnitude, fault rupture length, and displacement (Wells and Coppersmith, 1994), a large event on the Hayward fault is capable of generating displacements of several meters. In addition to coseismic rupture, the Hayward fault is undergoing creep, i.e., it is undergoing continuous aseismic slip. This amounts to about 4 to 6 mm/yr on the Hayward fault in Fremont (Lienkaemper and others, 1997).

3.1 PREVIOUS FIELD EXPLORATIONS

A total of two exploratory test borings were drilled as part of previous studies in 1993 for a seismic retrofit of the 29th Avenue Overcrossings. A list of these borings and the maximum depth of exploration for each boring are provided in Table 1. The LOTBs obtained from these subsurface investigations are provided in Appendix A.

Table 1
Existing Logs of Test Borings Reviewed

Boring No.	Location	Depth of Boring (feet)
B-5	29th Avenue	80
B-6	29th Avenue	80

Other LOTB sheets available for nearby structures are summarized below.

- **23rd Avenue Overcrossing** (Bridge No. 30-149) – Four test borings were performed in 1993 for a seismic retrofit of the 29th Avenue Overcrossings. The depths of these boring are approximately 75 to 90 feet below ground surface (bgs).
- **16th Avenue Overcrossing** (Bridge No. 33-137) – Nine test borings were performed between 1944 and 1946 in the vicinity of the former 16th Avenue Overcrossing alignment to depths of approximately 22 to 51 feet below ground surface.
- **Fruitvale Overhead** (Bridge No. 33-41) – Subsurface exploration was performed around 1959 in conjunction with the widening of the Fruitvale Avenue Overhead. This exploration consisted of twelve penetration borings and eight mud rotary borings. The borings were pushed or drilled to depths of about 40 to 60 feet below ground surface.

3.2 NEW FIELD EXPLORATIONS

The geotechnical investigation program for the project site at 29th Avenue consisted of drilling five exploratory soil borings and advancing one cone penetrometer test (CPT) soundings. Well permits were obtained from the Alameda County Public Works Agency. Underground Services Alert was notified 48-hours prior to the scheduled drilling date to clear the boring/CPT locations of underground utility lines. In addition, the services of a private utility locator (Cruz Brothers of Scotts Valley, California) were utilized by URS to clear the boring/CPT locations of underground utilities.

The approximate locations of these borings and CPT soundings are shown in Figure 4 and Appendix B. The borings and CPTs were located in the field by measuring from existing structures and landmarks in the vicinity and surveyed using a hand-held GPS.

3.2.1 EXPLORATORY SOIL BORINGS

The three soil borings, designated as R-11-001, R-11-003 and R-11-004, were drilled to depths about 100 feet bgs and the other two soil borings, designated as R-11-002 and R-11-005, were drilled to depths of about 50 feet bgs. These soil borings were drilled at the project site from

April, 25, 2011 through April, 29, 2011. An additional boring, designated as R-12-012, was drilled to depth about 130 feet bgs on March 21, 2012.

Pitcher Drilling Co., of East Palo Alto, California, drilled the soil borings with a truck-mounted CME-55 TMR drill rig. The exploratory borings were advanced by hand auger in top 5 feet. The borings were then advanced using the rotary wash drilling method with an 8-inch diameter drag bit. Soil samples were generally retrieved at approximately 5-foot intervals from the surface to at depth of 50 feet bgs, and at 10-foot intervals below the depth of 50 feet bgs by advancing the sampler into the soils at the bottom of the boring. Sheri Janowski, a geologist with our firm, supervised the drilling, logged and visually classified the soils encountered during drilling in accordance with the Unified Soil Classification System.

Three types of samplers were used for this study as follows:

- Modified California (MC) Sampler – 2.0-inch I.D., 2.5-inch O.D., split-barrel equipped with brass tube liners.
- Shelby Tube Sampler – 3-inch O.D., 36-inch long, thin-walled steel sampler tube.
- Standard Penetration Test Sampler (SPT) – 1.4-inch I.D., 2-inch O.D., 24-inch long, split barrel, with a 1.4-in I.D. cutting shoe.

After the borehole was drilled to the specified depth, the sampler mounted on the drill rods was lowered to the bottom, seated, and then either driven into the soil with a hammer to retrieve a MC, or SPT sample, or was pushed into the soil in one continuous motion by the drill rig to retrieve a Shelby tube sample. The samplers were driven 18 inches into the material at the bottom of the borehole using a 140-pound automatic hammer with a free fall of 30 inches for each blow. The number of hammer blows required to advance the sampler each of the three successive 6-inch increments was counted in the field. The number of blows required to advance the sampler the last 12 inches was recorded as the penetration resistance (blows-per-foot). These blowcounts were used to determine density and consistency of the soils and to evaluate the liquefaction hazard at the site as discussed in Section 4. The MC sampler was generally used to obtain drive samples in clayey material. The split-barrel SPT drive sampler was generally used to sample granular materials.

After completion of the drilling and sampling, borings were tremie backfilled with neat cement grout and inspected in accordance with the Alameda County Public Works Agency regulations and patched with a concrete cap. Soil cuttings and drilling fluid were collected in 55-gallon drums that were temporarily stored on-site.

The MC samples were collected and sealed on both ends with plastic caps. The SPT samples were placed in 1-gallon plastic bags and sealed. All samples were carefully sealed, labeled, and transported to the Signet Testing Laboratory in Hayward, California for further examination and testing. Logs of the test borings were prepared based on the soil classification made in the field and on the laboratory test results, and are presented in Appendix B of this report. Detail boring logs with laboratory test results are presented in Appendix C.

3.2.2 CONE PENETRATION TESTS

One cone penetrometer test (CPT) sounding, designated as CPT-11-006, were performed as part this study at the 23rd Avenue project site on April 29, 2011. The CPT sounding was about 100

feet in depth, and was performed under the general direction of our site geologist. The soundings was performed using an integrated electronic piezo-cone system with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone has a tip end area ratio of 0.85. Pore pressures were monitored from a position immediately behind the probe tip during the advancement of the cone. The CPT probe was advanced using a hydraulic push system mounted in a mobile truck with 20-ton capacity. Lankelma, Inc of Richmond, California owns and operates the CPT rig. Tip resistance, sleeve friction, pore pressure and inclination data were obtained electronically at 0.05 m intervals as the sounding was advanced. The CPT testing was performed in general conformance with the requirements of ASTM D3441 abd D5778 test methods.

The CPT soundings included Pore Pressure Dissipation Tests (PPDTs). The PPDTs were conducted in the sandy soil layers identified by the exploratory soil borings and CPT soundings to measure hydrostatic water pressures in the soil layers. A PPDT was conducted when the cone was halted at specific intervals determined by our geologist in the field. The pore pressure was monitored until such time as there was no variation in pore pressure with time. This time is commonly referred to as t100, the point at which 100 percent of the excess pore pressure due to probing activity has dissipated.

The CPT soundings also included Seismic Cone Penetrometer Testing (SCPT) performed at 5-foot increments. The SCPT uses a modified CPT cone that contains a built-in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters. The shear waves were generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig. Compression waves were generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements were taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods. Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface. At least two waves are recorded for each test depth for a consistency check of the waveforms. Shear wave data is sampled at a frequency of 20 kHz and compression wave data is sampled at 50 kHz. The input sensitivity (gain) is increased with depth to maintain a desired signal resolution.

3.3 SOIL TESTING

Representative soil samples obtained from the exploratory borings were tested at Signet Testing Laboratory in Hayward, California to evaluate their engineering properties. The tests were performed in accordance with the ASTM Standards for Testing. The following tests were performed:

Moisture Content (ASTM D2216)

Dry Density (ASTM D2937)

Particle-size (sieve) Analysis (ASTM D-422 and D-1140)

Unconfined Compressive Strength (ASTM D2166)

Unconsolidated Undrained Triaxial Test (ASTM D2850)

Atterberg Limits (ASTM D4318)

One-dimensional Consolidation (ASTM Test Method D2435)

The results of the laboratory testing are summarized on the logs of borings at the corresponding sample depths along with the sample blow counts. Detailed results of the laboratory tests are presented in Appendix C of this report.

3.4 CORROSION TESTING

Soil samples for corrosion tests were obtained from Borings R-11-001 and R-11-005 at depths of 1 foot and 10 feet. The samples were submitted to Cerco Testing Laboratory of Concord, California, to test for pH, resistivity, chloride and sulfate in accordance with Caltrans standards. The test results are shown in the following table:

Table 2
Corrosion Test Results

Parameter	R-11-001	R-11-005
Soil Description	Sandy Clay	Lean Clay
Depth (ft)	10	1
pH	7.9	7.5
Resistivity (Ohm-cm)	1600**	2400
Chloride (mg/kg)	N.D.	N.D.
Sulfate (mg/kg)	55	38

N.D.: None-detected

** Smaller box used as limited amount of soil

4.1 SITE AND SUBSURFACE CONDITIONS

The site is located on the Oakland alluvial plain that generally slopes gently to the west towards the San Francisco Bay. The site, with the exception of the existing approach embankments, is relatively flat. Elevations on site range between approximately 15 and 30 feet above mean sea level (MSL) (USGS, 1997). Approach embankment side slopes are up to about 15 feet high with gradients on the order of 1½:1 (horizontal to vertical) to 2½:1 (horizontal to vertical). Retaining walls support portions of the approach embankments.

4.2 SUBSURFACE CONDITIONS

Our review of the geologic mapping and all available geotechnical data indicates the subsurface soil conditions at the project site consist of primarily unconsolidated Holocene alluvial fan deposits. The LOTBs indicate that the borings at the 29th Avenue Overcrossing encountered alluvial deposits that primary consisted of stiff to hard clay with varying amounts of silt and sand, alternating with compact to very dense gravel and sand layers.

We developed a generalized subsurface profile at the 29th Avenue Overcrossing based on all available geotechnical data for the purposes of foundation evaluations. In-situ and laboratory tests (including pocket penetrometer, torvane, moisture content, Atterberg limit, unit weight, unconfined compressive strength, unconsolidated–undrained triaxial compression test, grain size distribution) have been performed on samples recovered from previous explorations and new explorations by this study. The unit weights versus elevation for fine-grained soils are presented in Figure 5, indicating that the unit weights are in the range between 110 pcf to 140 pcf. The liquid limits, as shown in Figure 6, are generally in the range between 30%-50%, except a few fat clay sample showing higher liquid limits about 80%. The water contents are typically close to the plastic limit, indicating that the soils have been overconsolidated with high strengths. The undrained shear strengths along with CPT data versus elevation for fine-grained soils are presented in Figure 7. The CPT data correlate well with field and laboratory test results, which also exhibits a classic overconsolidated stress history. The SPT blowcount versus elevation is presented in Figure 8. This data was interpreted to represent shear wave velocity profile.

Based on a review of all geotechnical data, generalized soil engineering parameters were developed for the 29th Ave Overcrossing for the purposes of this foundation evaluation and are tabulated below. The shear strength parameters were selected taking a reasonable value of the range of available geotechnical data. In an overconsolidated strength profile, soil strengths first decrease with depth, reach a minimum, and then increase with depth as shown in Figure 7.

Table 3
Soil Parameters

Soil Type	Layer Elev. (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Stiff/V. Stiff Clay	25~5	125	2500~1500	0
Stiff Clay	5~-5	125	1500	0
Stiff/V. Stiff Clay	<-5	125	Su/σ_v'=0.45	0

* Strength decreases with depth from 2500 psf to 1500 psf

4.3 GROUNDWATER CONDITIONS

During the investigations conducted in 1993, groundwater was encountered between elevation -1.5 feet and elevation -1.7 feet at 23rd Avenue. The CPT data obtained by this study indicate that the water table was at elevation of 8.6 feet at boring CPT-11-006. Groundwater was encountered in the nearby boring by Earth Mechanics Inc. (EMI, 2011) at similar range, between elevation +9.3 feet and elevation +14.0 feet. Therefore, for the purposes of this foundation evaluation, the groundwater level was assumed to be at about EL+10.0 feet at the 29th Avenue Overcrossing.

5.1 SEISMIC DESIGN METHODOLOGY

The seismic design methodology adopted for this project is based on the following current Caltrans standards:

1) Seismic Design Criteria (SDC), v 1.6, December 2010
2) Caltrans Guidelines for Structures Foundation Reports, v 2.0, updated March 2009
3) California Seismic Hazard Map (2007)
4) Caltrans ARS online (v1.0.4)

The new Caltrans procedures for developing the ARS curve uses the envelope of the deterministic and probabilistic spectra, in contrast to the old procedure that used only the deterministic spectrum. The new deterministic spectrum is now adopting two next generation attenuation (NGA) models: an average of Campbell and Bozorgnia (CB) and Chiou and Youngs (CY) attenuation models. The probabilistic spectrum is based on the 5% in 50 year USGS2008 Hazard map. In addition, the new procedure also updates the site factor, the near fault factor and includes the deep basin effect.

5.2 SITE SOIL PROFILE

Boring logs and CPT soundings from the field explorations at the project site were reviewed. The representative blowcounts as shown in Figure 7 were used to estimate shear wave velocity using an empirical correlation proposed by Pitilakis (1999) for clayey type material. The weighted average of the shear wave velocity over the depth of exploration (to a maximum depth of approximately 100 feet) was used to determine $Vs_{,30}$, which was found to be 249 m/s. In addition, 3 S-CPTs (CPT-11-006, CPT-11-007 and CPT-11-010) at both sites directly measured Vs profile to a maximum depth of approximately 100 feet and $Vs_{,30}$ were found to be 251, 255, and 236 m/sec, respectively The average shear wave velocity of 250 m/sec was used to classify the soil profile based on the guidelines given in SDC Table B.12. Accordingly, this site is classified as a stiff soil site or Soil Profile Type D.

5.3 FAULT TYPE AND NEAR-FIELD SPECTRAL ACCELERATIONS

The technical report that accompanies the California Seismic Hazard Map (2007) indicates that the controlling fault is the Hayward fault, which is 4.6 km away from the site. Since the project site is less than 15 km from the nearest active fault, design spectral accelerations should be modified to account for near-fault effects as follows:

Period (sec)	Increase in Spectral Acceleration (%)
< 0.5	0
0.5 – 1.0	0 – 20 (determined by linear interpolation)
≥1	20

This does not include adjustments for bridges with fundamental periods of vibration greater than 1.5 seconds. As the design proceeds, we will verify the fundamental period of vibration of the planned structures for this project with the Structural Engineer.

5.4 DESIGN ACCELERATION RESPONSE SPECTRUM

Based on Caltrans SDC (Version 1.6), the deterministic seismic response spectrum can be estimated with spectral acceleration values generated by:

- Soil Profile Type D with Vs, $_{30}$ = 250m/sec
- Hayward fault zone (ID = 353) with Maximum Moment (M_{max}) 7.3 and site to fault distance (Rrup) = 4.6km
- No deep basin effect
- ARS increase for near-field effect

The Deterministic Acceleration Response Spectrum corresponding to Vs, $_{30}$ = 250m/sec, magnitude of controlling event 7.3, was obtained from ARS online and modified to account for near field effects as described above. The Probabilistic Acceleration Response Spectrum of corresponding to Vs, $_{30}$ = 250m/sec, 975 yr return period, was also obtained from ARS online and modified to account for near field effects. Since the representative Vs,$_{30}$ is less than 300m/s, additional USGS PSHA deaggregation analysis was performed to obtain 5%-50yr spectrum and compared with those by ARS online. The Design Acceleration Response Spectrum (ARS) curve is the envelope of ARS online deterministic curve (M_{max} = 7.3, R = 4.6 km), the ARS online probabilistic curves (975 yr return period), and the USGS probabilistic curves (975 yr return period) and is dominated by the USGS probabilistic curve. The Design Acceleration Response Spectra are attached as Figure 9, and the spectral values are provided in Table 3.

Table 4
Spectral Acceleration Values

T (sec)	Sa (g)
0	0.719
0.1	1.196
0.2	1.531
0.3	1.568
0.5	1.481
1	1.271
2	0.737
3	0.470
4	0.335
5	0.268

6.1 LIQUEFACTION

Strong ground shaking caused by large earthquakes can induce ground displacement and/or failure such as liquefaction, compaction settlement, and slope movement. A site's susceptibility to these hazards relates to the site topography, soil conditions, and/or depth to groundwater.

Liquefaction is a soil behavior phenomenon whereby saturated sediments temporarily lose shear strength and undergo volume change. This condition is caused by cyclic loading during earthquake shaking that generates high pore water pressures within the sediments. The soil most susceptible to liquefaction is loose, cohesionless, granular soil below the water table. Low plasticity fine-grained soils are also potentially liquefiable. Liquefaction can result in loss of foundation support and settlement of overlying structures, ground subsidence, and translation due to lateral spreading, and differential settlement of affected deposits. The unconsolidated alluvial deposits at the 29th Avenue Overcrossing site have been mapped as moderately susceptible to liquefaction by the USGS (2006) as shown in Figure 10 and in a zone or required liquefaction investigation by the California Geological Survey.

The liquefaction potential for this site was evaluated using the procedure proposed by Seed *et al*. (2003) that is based on SPT blowcounts and soil characteristics. The recorded blow counts were corrected for various factors including hammer efficiency, fines contents, overburden pressure, borehole diameter, rod length, and sampling technique. The liquefaction analysis was also performed using the CPT data and correlations with the soil properties from the direct push sampling and borings. The analysis was performed in accordance with the methods proposed by Moss *et al.* (2006). As described in Section 5, the Hayward Fault (Mw=7.3) controls the seismic hazard at this site and could induce strong shaking up to 0.72g. Liquefaction potential was predicted at depths where the earthquake loading exceeded the soil resistance, or when the factor of safety against liquefaction, expressed as:

FS_L = *(cyclic shear stress required to cause liquefaction) / (equivalent cyclic shear stress induced by earthquake)*

is less than 1.

As mentioned earlier, the subsurface soil at 29th Avenue generally consisted of stiff to hard clay that is not susceptible to liquefaction. The few discontinues layer of silt and sand encountered as the project site, which are medium dense to dense with high fines content, could potentially liquefy given the design earthquake. However, because these cohesionless soils are covered with a thick cohesive clay stratum and only encountered at localized spots, they are not expected to liquefy extensively. Therefore, liquefaction hazard is judged to be low or will not cause significant ground surface failures.

6.2 FAULT RUPTURE

The nearest active fault is the Hayward fault located approximately 4.6km northeast of the site. The structure does not fall within a CGS Fault-Rupture Hazard Zone (Alquist-Priolo Earthquake Fault Zone). Caltrans (2009) considers a distance of 50 horizontal feet on either side of a field-evaluated active fault trace to have a potential for surface fault rupture displacement hazard (SFRDH). Therefore the potential for ground surface rupture is not a design consideration for the 29th AvenueOvercrossing.

6.3 LANDSLIDE AND SLOPE FAILURE

Due to the relatively flat topography at the site, landsliding is not considered a hazard. The existing fill embankment slopes at the site appear stable, and no slumping or slope distress was noted during the site reconnaissance.

6.4 GROUND SUBSIDENCE/HEAVE

Expansive soils are those that shrink or swell significantly with changes in moisture content. The clay content and porosity of the soil also influence its volume change characteristics. The shrinking and swelling caused by expansive clay-rich soils, typically LI>50 or PI> 25, often result in damage to overlying structures.

The clayey soils within the effect zone of water table fluctuation encountered during drilling are of low to medium plasticity (PI~20), suggesting that the site soils may be considered marginally expansive. Therefore, expansive soil potential is not considered to be of major concern at the site.

6.5 FLOOD

FEMA flood zone maps (http://www.fema.com) indicate that the project area is located outside the 100-year flood plain. However, during periods of heavy rains and high tides the approaches to the overcrossing may experience flooding. Tsunami, or seismically induced large waves, may be generated by rapid movements on earthquake faults. Studies have been conducted on wave attenuation within San Francisco Bay in the event of a large tsunami, and while this hazard is relatively low, there is the remote possibility that it could affect the project site and should be considered.

6.6 SCOUR

Because the existing and proposed structure supports are located outside waterways, scour is not an issue for foundation design.

6.7 CORROSION

As per California Amendments To AASHTO LRFD Bridge Design Specifications – Fourth Edition (2008b), "Corrosive" water or soil contains more than 500 parts per million (ppm) of chlorides. Sites that are considered corrosive due solely to sulfate content greater than 2,000 ppm and/or a pH of less than 5.5 shall be considered non-corrosive.

The Chloride ion concentrations are not detected from the chemical analysis and the results of low sulfate content and high pH from the chemical analysis indicate that the soil at the 29th Avenue site is none corrosive. However, pH from the chemical analysis by EMI was measured in a range of 6.5 to 7.6. Based on these measured pH value and sulfate concentration, cement type should be in accordance with table 8.22.2 of Caltrans Bridge Design Specification BDS (Caltrans, 2003) for “Soil or Water pH from 5.6 to 7”. Additional corrosion protection requirements for concrete structural members are presented in Section 8.22 of the Caltrans BDS (Caltrans, 2003).

7.1 DESIGN ASSUMPTIONS

The idealized soil profile with soil stratigraphy, soil engineering parameters, and estimated groundwater level is presented in Table 3 and Section 4.3, respectively. The idealized soil profile is the basis for developing foundation recommendations for the proposed structures within the project area.

7.2 EXISTING FOUNDATIONS

The 29th Avenue Overcrossing (Bridge No. 33-0141, PM 28.69) was constructed around 1947 as a two-lane overcrossing of the East Shore Freeway (Eastshore Highway, State Route 17 now known as I-880), and the Outer Highway (East 8th Street) near the north abutment (Caltrans, 1947). The bents and abutments are supported by shallow spread footings. Each bent or abutment is generally supported on two footings, except for Bents 2 and 11 which are each supported on one combined footing. The bottom of footing elevations ranges from EL +3ft to +10.5 ft. Two typical footing sizes (12' x 9', 36' x 7') were used. Maximum soil contact pressure was indicated as 3 tons per square foot on the As-Built Drawings..

7.3 NEW FOUNDATION ALTERNATIVES

Spread footings – Spread footing foundations bearing on competent soils are expected to be suitable for support of the bridge bents, as were used for the original 29th Avenue bridge construction. We found that adequate soil bearing capacity exists for spread footing foundations, however, excessive settlements are computed under the design loading.

Cast-in-drilled-hole (CIDH) piles – CIDH piles have the advantages of easy penetration into dense/hard soil zones, the availability of larger diameters for increased lateral capacity, and adaptability of length to variable subsurface conditions. The presence of shallow groundwater or caving soils can complicate the use of CIDH piles. From the constructability standpoint, CIDH piling rigs are more economical to mobilize than pile driving rigs, can work in limited access conditions, and have significantly lower noise and vibration impacts during pile installation than driving operations.

Driven precast concrete piles – The use of driven piles is sometimes limited due to constructability disadvantages such as noise and vibration impacts to adjacent structures during installation, as well as difficult driving conditions in dense sands or gravels. Based on the results of the subsurface investigation, the soil layers encountered at the site consists primarily of stiff to very stiff cohesive soils which are not likely to cause any drivability problem for driven piles. Precast concrete piles offer advantages in shallow groundwater and caving soil conditions and perhaps most importantly do not produce drill spoils.

7.4 PROPOSED NEW FOUNDATIONS

CIDH piles have the flexibility of larger diameters for increased lateral capacity, which is the key factor for the design at 29th Avenue to accommodate high lateral force demands. Therefore, 2.5' and 2.0' diameter cast-in-drilled-hole (CIDH) piles are selected for the bent and abutment foundations. Based on the investigations, we expect the CIDH piles are expected to encounter

groundwater approximately between Elevation +8 to +14 ft MSL. Tables 5 and 6 show the foundation design data provided by the Structural Engineer. Tables 7 and 8 present the foundation design for working stress design (WSD) and load and resistance factor design (LRFD) at the bents and the abutments, respectively. The proposed CIDH Pile Data Table is provided in Table 9.

Table 5
Foundation Design Data

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles per Support*
					B	L		
Abutment 1	WSD	24 inch CIDH	20	14.5	10	64	1	14
Abutment 1 RW - Left	LFRD	24 inch CIDH	20	14.5	10	32	1	8
Abutment 1 RW - Right	LFRD	24 inch CIDH	20	14.5	10	43	1	8
Bent 2	LFRD	30 inch CIDH	22	10.25	20	20	1	9
Bent 3	LFRD	30 inch CIDH	23	16.25	20	20	1	9
Bent 4	LFRD	24 inch CIDH	21	14.25	16	16	1	9
Bent 5	LFRD	30 inch CIDH	20	14.25	20	20	1	9
Bent 6	LFRD	30 inch CIDH	22.5	15.25	20	20	1	9
Bent 7	LFRD	30 inch CIDH	24.5	11.25	20	20	1	9
Abutment 8	WSD	24 inch CIDH	24.5	16.5	10	64	1	15
Abutment 8 RW - Left	LFRD	24 inch CIDH	22.75	16.5	10	44	1	8
Abutment 8 RW - Right	LFRD	24 inch CIDH	26.5	16.5	10	33	1	8

* Note that “per support” implies per column for Bent supports with 2 columns per Bent.

Table 6
Foundation Design Loading

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support*	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abutment 1	2018	191	1651	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 1 RW - Left	474	90	474	617	123	N/A	N/A	434	153	N/A	44
Abutment 1 RW - Right	642	123	642	836	168	N/A	N/A	588	206	N/A	59
Bent 2	1957	235	1472	2699	333	N/A	N/A	2197	340	N/A	N/A
Bent 3	1725	205	1255	2430	289	N/A	N/A	2012	329	N/A	N/A
Bent 4	1426	175	1061	2071	258	N/A	N/A	1621	285	N/A	N/A
Bent 5	1637	198	1268	2380	294	N/A	N/A	1994	314	N/A	N/A
Bent 6	1898	232	1488	2680	336	N/A	N/A	2147	355	N/A	N/A
Bent 7	2106	256	1653	2910	364	N/A	N/A	2297	366	N/A	N/A
Abutment 8	2105	181	1354	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 8 RW - Left	674	132	674	878	181	N/A	N/A	619	215	N/A	60
Abutment 8 RW - Right	524	104	524	683	141	N/A	N/A	482	181	N/A	60

* Note that "per support" implies per column for Bent supports with 2 columns per Bent.

Table 7
Foundation Recommendations for WSD

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support (Compression)		LRFD Service-1 Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	24" CIDH	14.5	2018	1651	191	390	-46(a) -27(c) -13 (d)	-46
Abut 8	24" CIDH	16.5	2105	1354	181	370	-43 (a) -23 (c) -11 (d)	-43

Notes:

1. *Design tip elevations are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load, respectively.*
2. *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3. *Design tip elevation for Lateral Load is typically provided by Structural Engineer.*

Table 8
Foundation Recommendations for LRFD

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (ϕ = 0.7)	Tension (ϕ = 0.7)	Comp. (ϕ = 1.0)	Tension (ϕ = 1.0)		
Abut 1 RW – Left	24" CIDH	14.5	474	1	123	N/A	153	44	-20 (a-I) N/A (b-I) -15 (a-II) 1 (b-II) -7 (c) -13 (d)	-20
Abut 1 RW – Right	24" CIDH	14.5	642	1	168	N/A	206	59	-29 (a-I) N/A (b-I) -23 (a-II) -3 (b-II) -14 (c) -13 (d)	-29
Bent 2	30" CIDH	10.25	1957	1	333	N/A	340	N/A	-49 (a-I) N/A (b-I) -37 (a-II) N/A (b-II) -31 (c) -18 (d)	-49
Bent 3	30" CIDH	16.25	1725	1	289	N/A	329	N/A	-40 (a-I) N/A (b-I) -31 (a-II) N/A (b-II) -22 (c) -13 (d)	-40
Bent 4	24" CIDH	14.25	1426	1	258	N/A	285	N/A	-45 (a-I) N/A (b-I) -35 (a-II) N/A (b-II) -26 (c) -9 (d)	-45
Bent 5	30' CIDH	14.25	1637	1	294	N/A	314	N/A	-42 (a-I) N/A (b-I) -31 (a-II) N/A (b-II) -24 (c) -15 (d)	-42
Bent 6	30" CIDH	15.25	1898	1	336	N/A	355	N/A	-46 (a-I) N/A (b-I) -34 (a-II) N/A (b-II) -27 (c) -14 (d)	-46
Bent 7	30" CIDH	11.25	2106	1	364	N/A	366	N/A	-52 (a-I) N/A (b-I) -39 (a-II) N/A (b-II) -33 (c) -17 (d)	-52

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (ϕ = 0.7)	Tension (ϕ = 0.7)	Comp. (ϕ = 1.0)	Tension (ϕ = 1.0)		
Abut 8 RW – Left	24" CIDH	16.5	674	1	181	N/A	215	60	-29 (a-I) N/A (b-I) -23 (a-II) -1(b-II) -14 (c) -11 (d)	-29
Abut 8 RW – Right	24" CIDH	16.5	524	1	141	N/A	181	60	-21 (a-I) N/A (b-I) -18 (a-II) -1 (b-II) -17 (c) -11 (d)	-21

Notes:

1. *Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, (d)Lateral Load..*
2. *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3. *Design tip elevation for Lateral Load is typically provided by Structural Engineer.*

Table 9
Proposed CIDH Pile Data Table

Location and B.O.F. EL (ft)	Pile Type	Nominal Capacity (kips)		Design* Tip Elevations (ft)	Specified Tip Elevations (ft)
		Compression	Tension		
Abut1 B.O.F=14.25	24-in CIDH	390	0	-46(A) -13(C)	-46
Abut1 RW Left B.O.F=14.25	24-in CIDH	180	40	-20(A) 1(B) -13(C)	-20
Abut1 RW Right B.O.F=14.25	24-in CIDH	240	60	-29(A) -3(B) -13(C)	-29
Bent2 B.O.F=10.00	30-in CIDH	480	0	-49(A) -18(C)	-49
Bent3 B.O.F=16.00	30-in CIDH	410	0	-40(A) -13(C)	-40
Bent4 B.O.F=14.00	24-in CIDH	370	0	-45(A) -9(C)	-45

Location and B.O.F. EL (ft)	Pile Type	Nominal Capacity (kips)		Design* Tip Elevations (ft)	Specified Tip Elevations (ft)
		Compression	Tension		
Bent5 B.O.F=14.00	30-in CIDH	420	0	-42(A) -15(C)	-42
Bent6 B.O.F=15.00	30-in CIDH	480	0	-46(A) -14(C)	-46
Bent7 B.O.F=11.00	30-in CIDH	520	0	-52(A) -17(C)	-52
Abut8 B.O.F=16.25	24-in CIDH	370	0	-43(A) -11(C)	-43
Abut8 RW Left B.O.F=16.25	24-in CIDH	260	60	-29(A) -1(B) -11(C)	-29
Abut8 RW Right B.O.F=16.25	24-in CIDH	200	60	-21(A) -1(B) -11(C)	-21

*Design tip elevation is controlled by the following demands:

(A) Compression, (B) Tension, (C) Lateral Loads

The drilled piers primarily derive their resistance through skin friction between the pier concrete and surrounding soils. Thorough cleaning of the pier bottom, which is especially difficult if drilling mud is used, is required to develop full end-bearing capacity. The end-bearing capacity was not considered in estimating the pile tip elevations presented in Table 7 and 8. The frictional pier resistance was calculated using the procedures recommended by the AASHTO (2010). The pile data are recommended following the LRFD method per Caltrans Amendments to AASHTO Bridge Design Specifications (2008b), and Caltrans Memo To Designer (2008a).

The computer program LPILE plus 6.0 and Group 8.0 were utilized, depending on the availability of pile group configuration, to analyze the individual pier or pile group response to applied lateral and axial loads with a series of nonlinear springs that are internally generated by the program as a function of user-specified soil properties. The drilled piers were modeled with reinforcing steel equal to 1.5 percent of the cross-sectional area of the pier. In addition, the piers were modeled free head conditions. The required depth to achieve lateral capacities is determined by the location of the second zero moment. The lateral displacements at the pile head are summarized in Table 10.

Table 10
Lateral Displacements at Pile Head

29th Avenue Overcrossing	Deflection (in)		
	Service Limit State	Strength Limit State	Extreme Event State
Abutment 1	< 0.1	N/A	N/A
Abutment 1 RW Left	< 0.1	< 0.1	< 0.1
Abutment 1 RW Right	< 0.1	0.2	< 0.1
Bent 2	< 0.1	< 0.1	0.2
Bent 3	< 0.1	< 0.1	0.4
Bent 4	< 0.1	< 0.1	0.3
Bent 5	< 0.1	< 0.1	0.3
Bent 6	< 0.1	< 0.1	0.4
Bent 7	< 0.1	< 0.1	0.2
Abutment 8	0.1	N/A	N/A
Abutment 8 RW – Left	< 0.1	0.1	< 0.1
Abutment 8 RW – Right	< 0.1	< 0.1	< 0.1

For initially computing the lateral resistance of piles arrayed in groups, a P-multiplier group efficiency factor should be applied for a single pile lateral resistance in the direction of loading. Table 11 summarizes P-multipliers for pile center to center spacings of 3 Diameters and 5 Diameters, where row 1 is the leading edge of the pile group.

Table 11
P-Multipliers for Pile Group Efficiency

	P-Multiplier		
Spacing	**Row 1**	**Row 2**	**Row 3**
3D	**0.7**	**0.55**	**0.40**
5D	**1.0**	**0.85**	**0.70**

7.5 APPROACH EMBANKMENTS

The existing approach embankment at the east and west ends of the 29th Avenue Overcrossing will be relocated to accommodate the proposed replacement bridge. The new embankment will be widened, extended, and mainly constructed as an MSE wall. The planned extended approach embankments will be up to 25 ft high at the new abutment location.

We estimate consolidation settlement due to the proposed fill at the abutments and approach embankments will be on the order of 2.5 to 3.5 inches. Slightly larger values were obtained by the roadway geotechnical consultant (EMI, 2011). We estimate up to 5 month settlement periods are required for 90% of predicted settlements to occur. Slightly longer settlement periods were obtained by the roadway geotechnical consultant (EMI, 2011). Although the construction

schedule can accommodate 5 month periods for the embankment-induced settlement to be completed prior to installing abutment foundations, there is limited right of way available to place surcharge prior to construction at the abutment locations. Therefore, the abutment areas would not adequately settle prior to construction of the abutments. In addition, settlement due to surcharge can impact existing adjacent facilities (e.g. an existing utility corridor).

The construction sequence will be to build MSE walls first with a vertical wrap at the end of the walls, allow the settlement period to occur, install piles, build abutment backwall and wingwalls, and then place light-weight fill (such as EPS block) between abutment walls and MSE walls. Light weight fill is required to fill this "hole" because piles are already in the ground and are not designed for additional settlement and downdrag. Therefore, we propose to use lightweight Expanded Polystyrene Block (EPS) in lieu of earth embankments at all abutment locations. The embankments constructed of EPS block will exert minimal surcharge, and therefore settlement, downdrag loads on piles, and impact to existing facilities are mitigated. However, it should be noticed that EPS Block presents a less passive resistance and higher compressibility compared to conventional fills.

7.6 CONSTRUCTION CONSIDERATIONS

Potential construction considerations are expected to include:

- Limited access: resolve the limited access conditions in the median of I-880 at the overcrossing. Given 22 ft free space between K-rails in the median, the drilling work for a 6 foot diameter (or smaller) drilled pier can be performed. However, removing spoil, delivering and installing reinforcing cages, and tremie concrete placement will all require lane closures, and these operations would likely be performed during nighttime lane closures. For constructing larger diameter shafts (more than 6 ft diameter), the crane would typically be 22 ft wide but it needs additional room to swing so it require more than 30 ft between barriers.
- Physical conflicts: resolve potential conflicts with locations of new bridge supports and all existing facilities such as utilities.
- Loading conflicts: resolve potential conflicts with loading imposed on existing facilities by new bridge/retaining wall foundations or approaches.
- Groundwater: dewatering and other groundwater control measures might be required depending on construction methods.

The opinions, conclusions and recommendations presented herein are based on subsurface information developed by others. The recommendations presented in this report are based on the assumption that the soil and geologic conditions do not deviate substantially from those anticipated by the information contained in the existing logs of test borings. If any variations are encountered during construction, the Geotechnical Professional (URS) should be contacted so that supplemental recommendations can be made.

If existing facilities, utilities, soils/bedrock conditions, road/structure distress, slope distress or groundwater/seepage conditions other than those noted in this report are present on the site, then their presence was not known, or was not considered in the preparation of this report. Locating utilities and evaluating potential utility interference is outside the scope of this report. Individuals utilizing this report shall inform URS Corporation if they are aware of any additional facilities or site conditions so that their presence and impact upon the project (or vice-versa) can be properly evaluated and recommendations modified to address geotechnical issues as necessary.

The Geotechnical Professional shall be given the opportunity to review the final specifications and drawings to verify that those documents are consistent with the intent of the geotechnical recommendations.

Geotechnical issues may arise during construction that were not apparent at the time this report was prepared. The Geotechnical Professional should be retained during construction to review the soil conditions encountered and the construction procedures used. All earthwork, pile and wall installation and testing should be completed under the direct observation of the Geotechnical Professional.

Specific review and investigation for environmental issues and subsurface environmental contamination were beyond the scope of our services.

The opinions and recommendations presented in this report were developed with the standard of care commonly used by other professionals practicing at the same time, within the same locality and under the same limitations. No other warranties are included, either express or implied, as to the professional advice included in this report.

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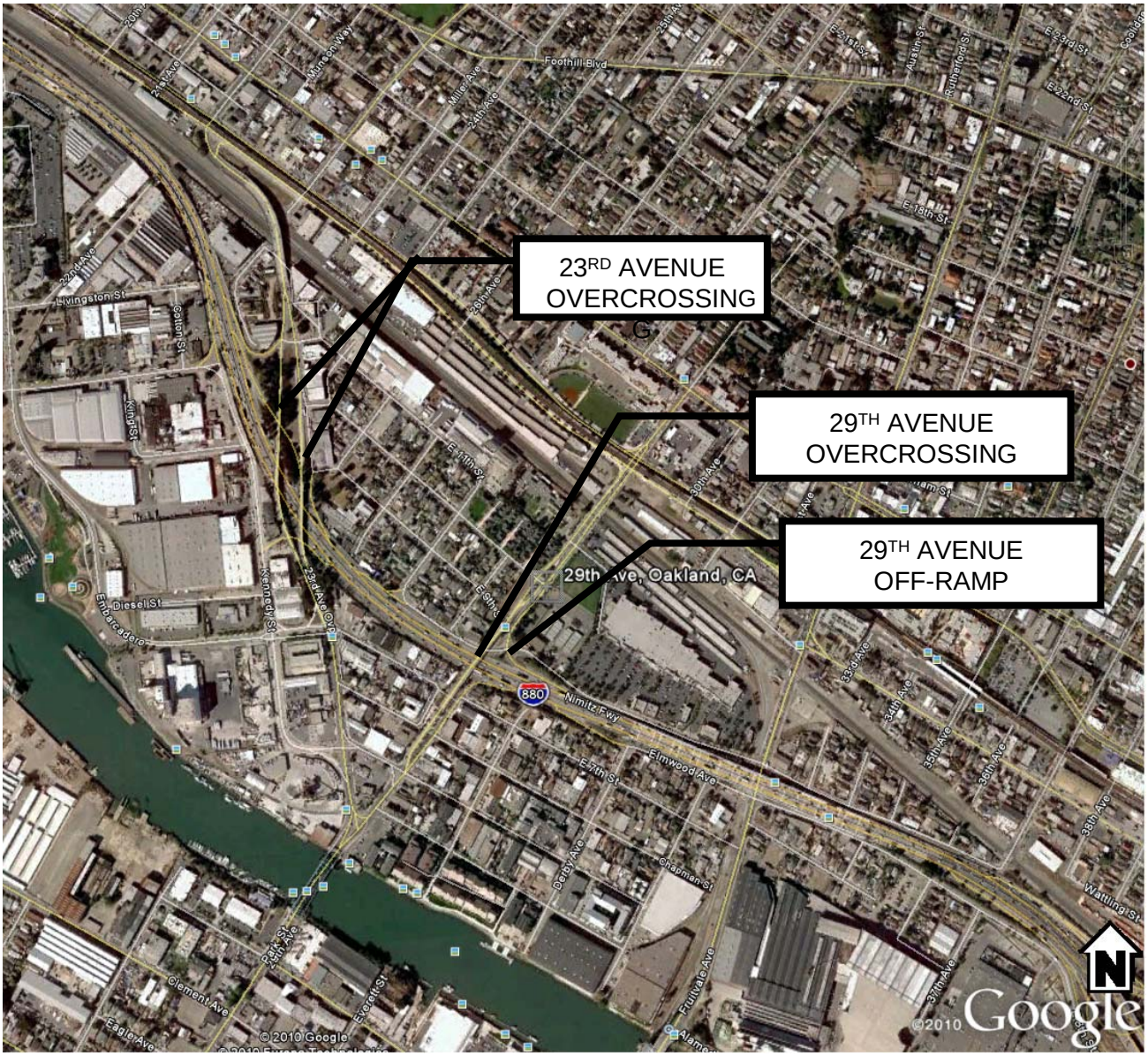
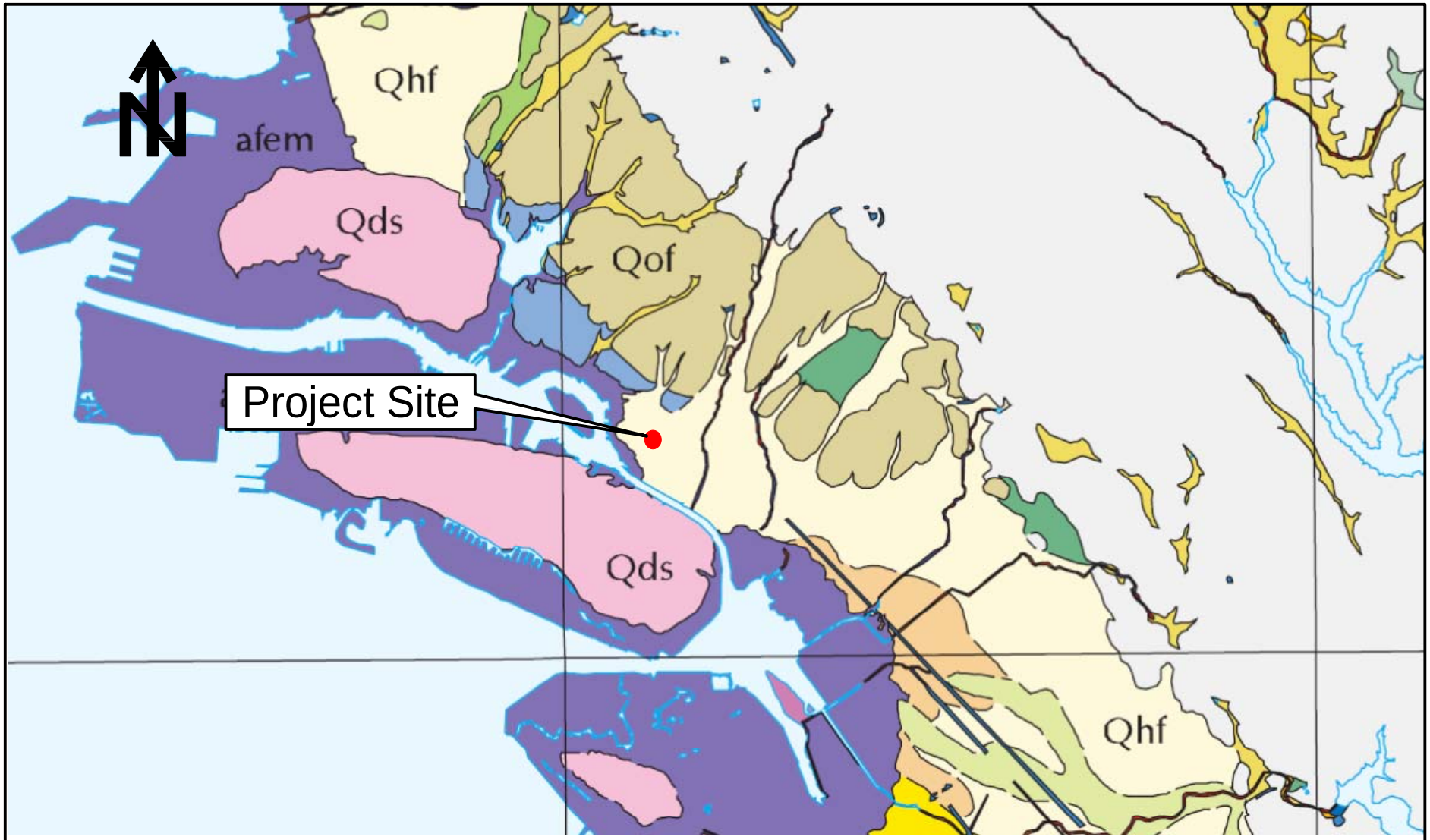
Figures



URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Site Vicinity**	Figure 1

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure



USGS Quaternary Deposits Map, Witter (2006)

afem: Artificial fill over estuarine mud

Qhf: Alluvial fan deposits (Holocene)

Qof: Alluvial fan deposits (Early to Late Pleistocene)

Qds: Dune sand (Holocene to Latest Pleistocene)

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**Regional Geology**	**Figure 2**

URS

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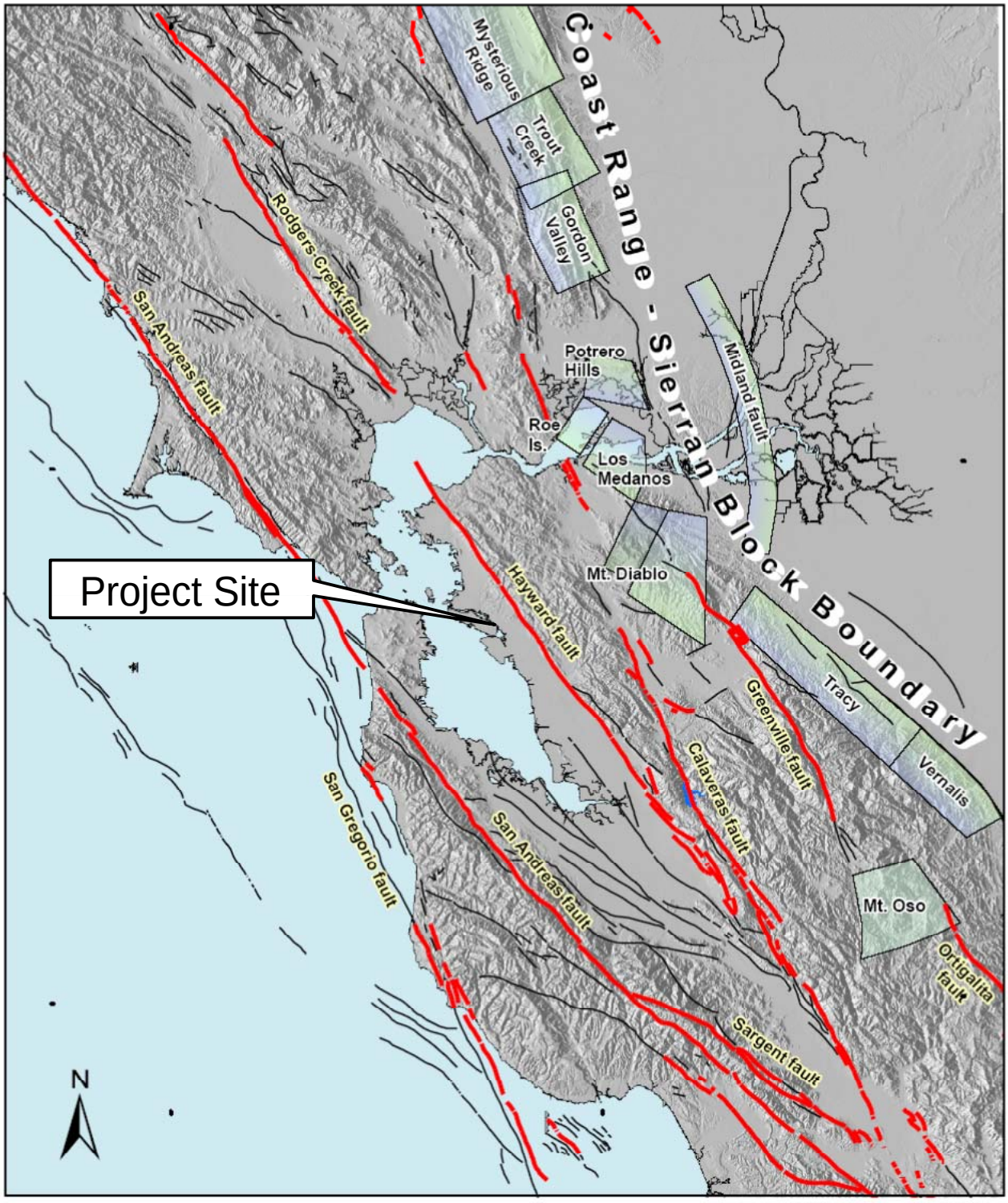


Blind Thrust Depth

Shallow

Deep

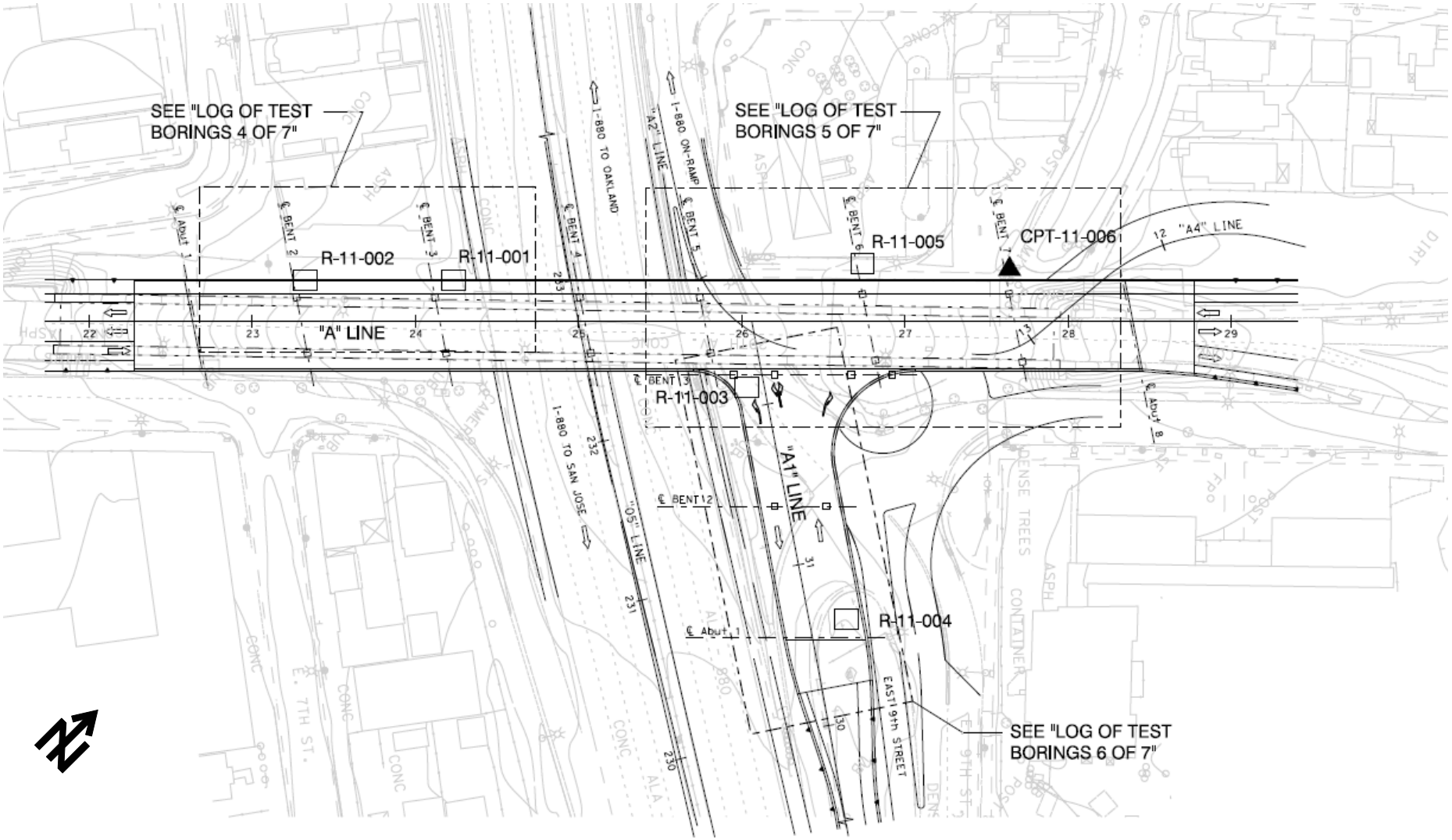
Legend

0 25 50 75 100 Kilometers

Sources:
Jennings 1994
O'Connell et al., 2001
Unruh and Hector, 1999

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Active Faults**	Figure 3

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure



Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**29th Ave Overcrossing Boring Locations**	**Figure 4**
URS			

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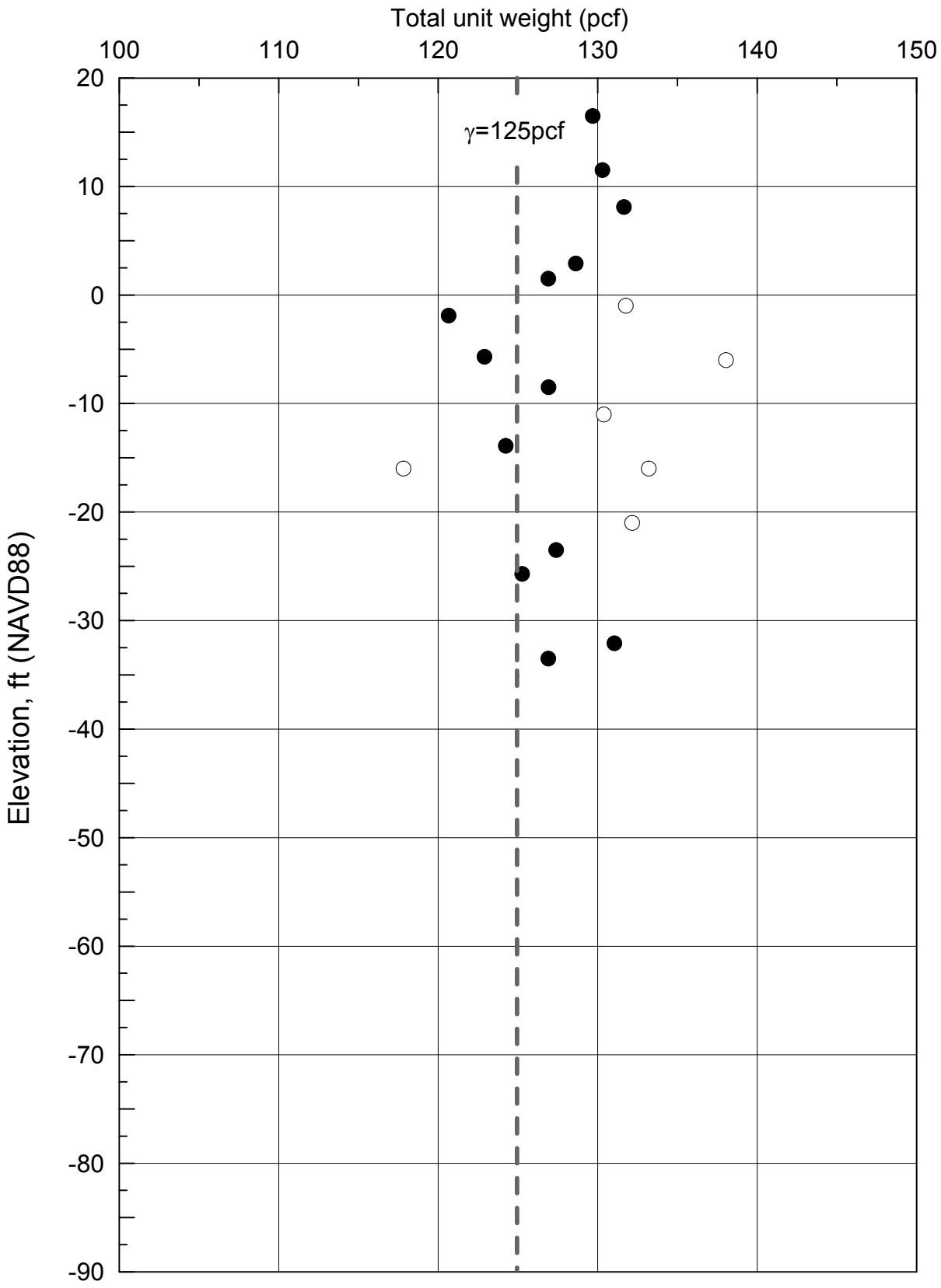

Note: Solid symbols are URS data (2011); hollow symbols are previous data

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Unit Weight**	Figure 5

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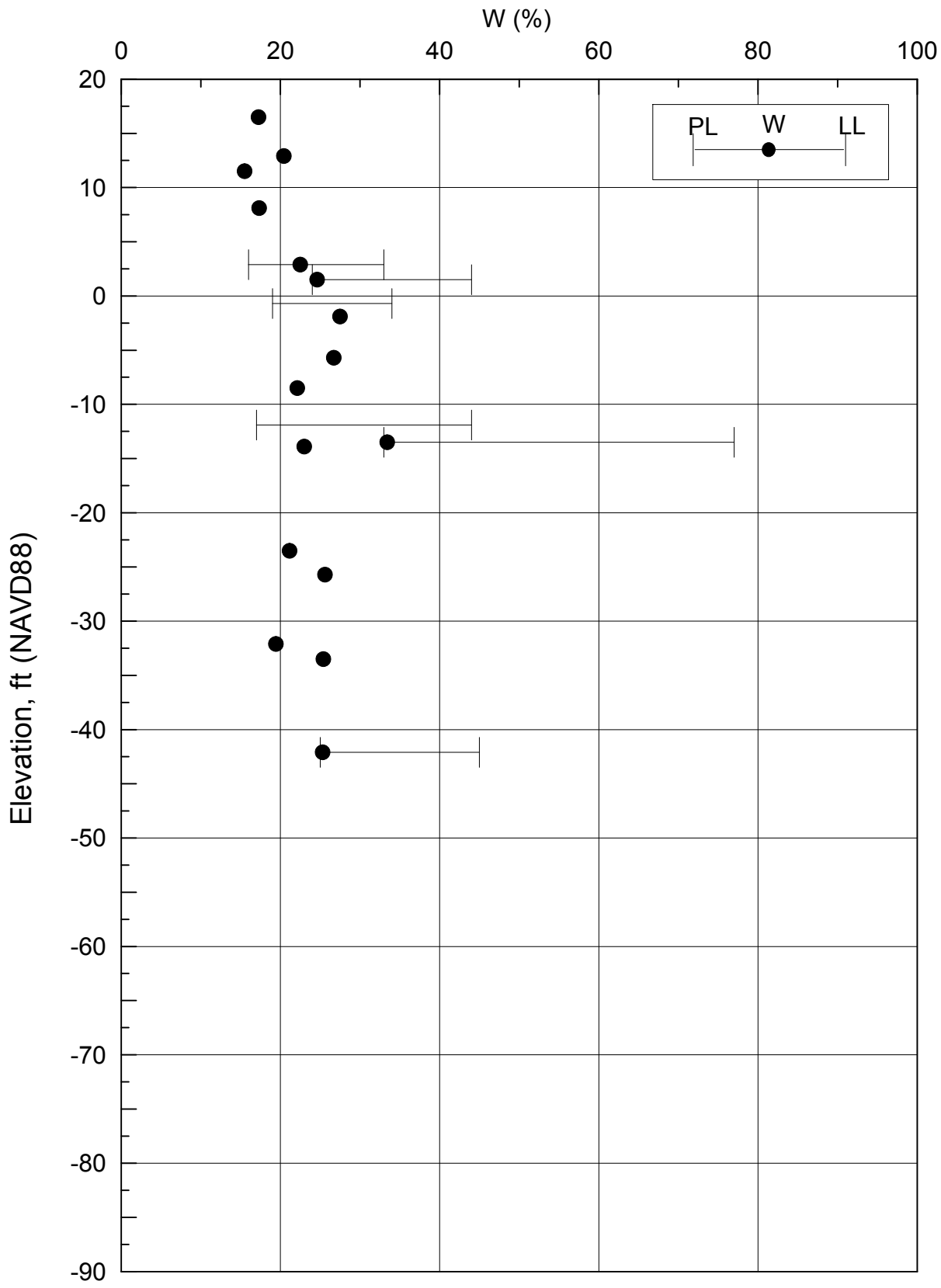
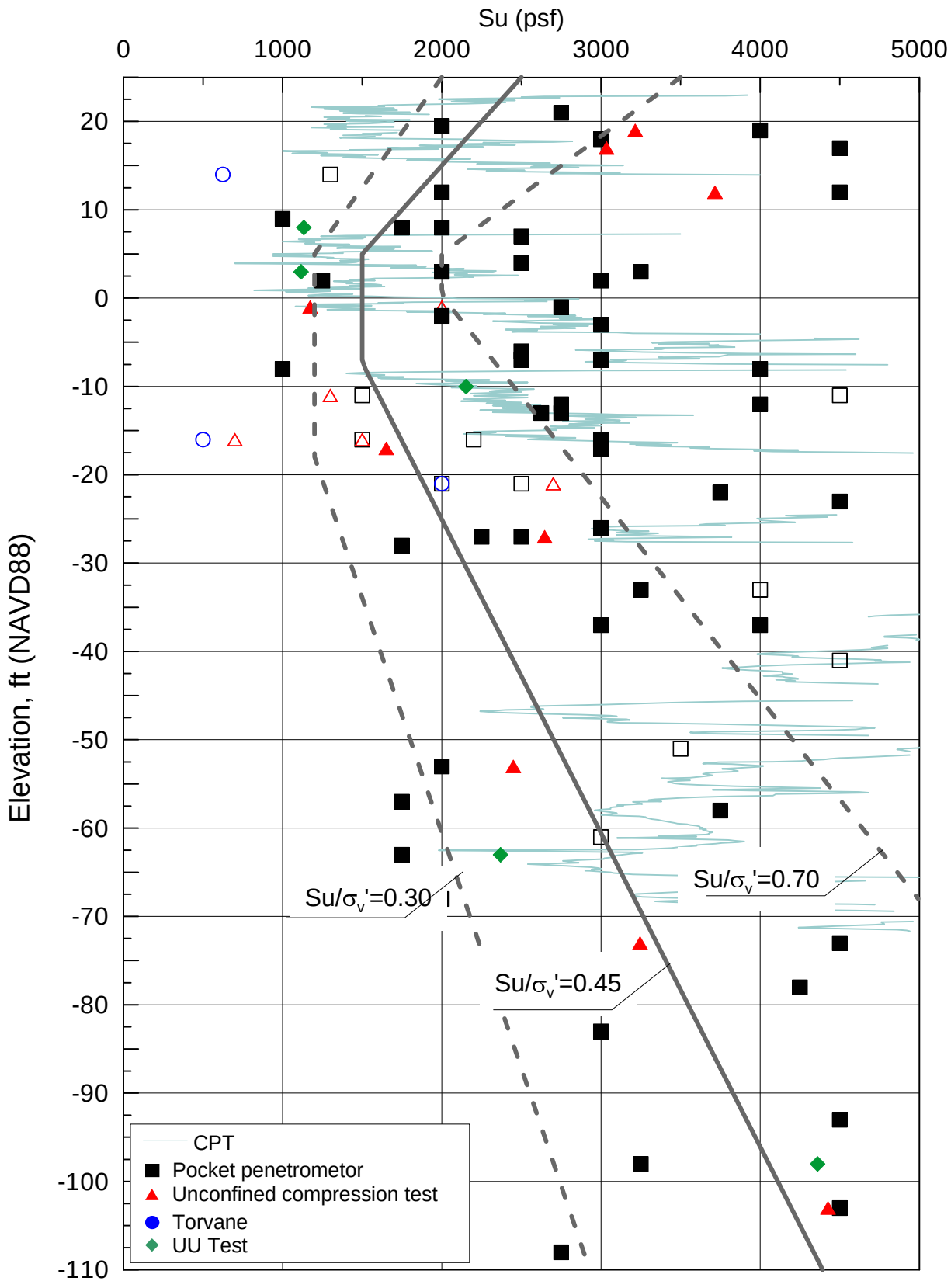


URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Water Content,Liquid Limit (LL), and Plastic Limit (PL) of Cohesive Soils**	Figure 6

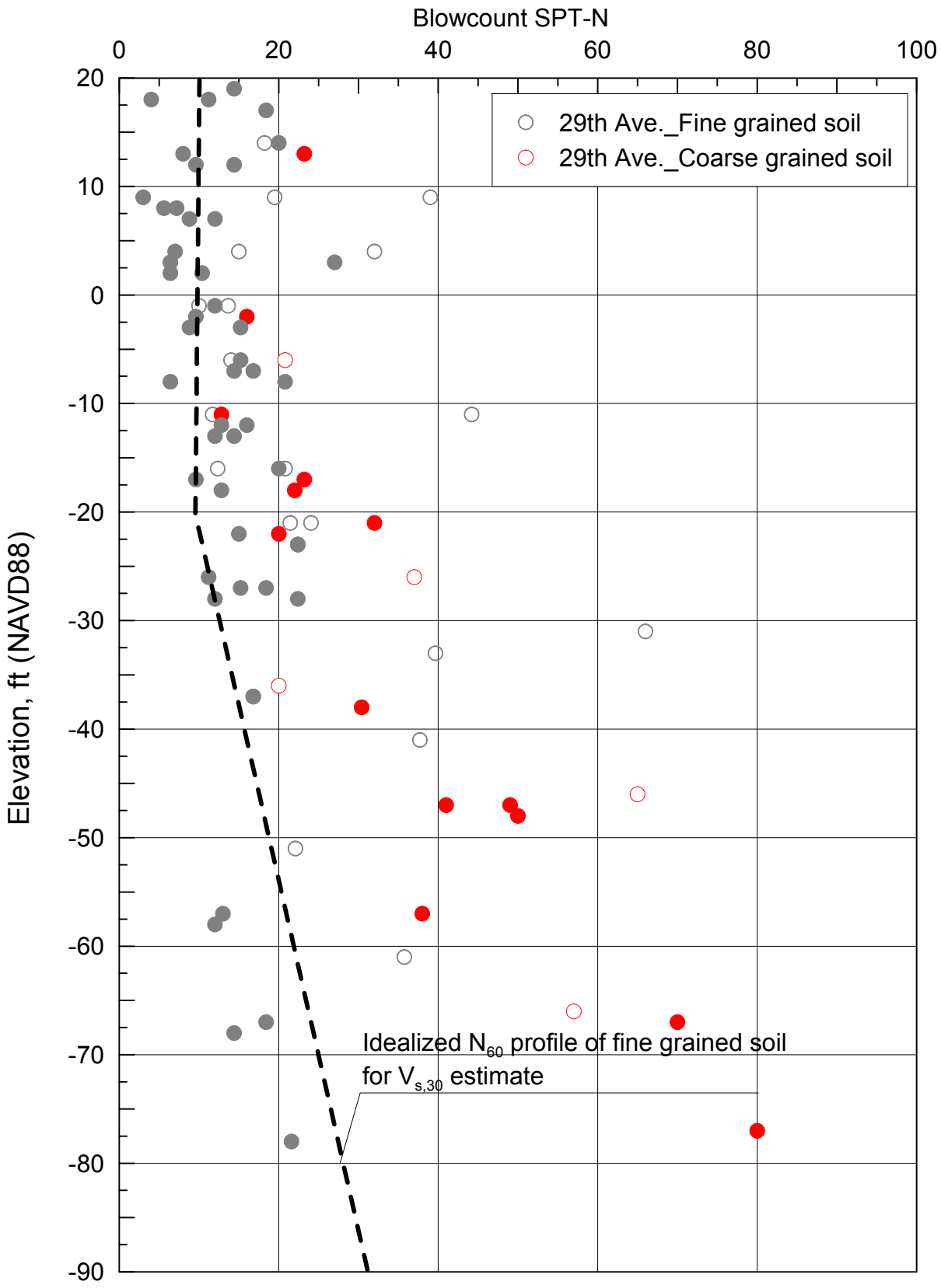
X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: 1. Solid symbols are URS data (2011); hollow symbols are previous data
2. Su estimated by CPT assuming N_{kT}=15

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Undrained Shear Strength of Fine-grained Soils at 29th Ave.**	Figure 7

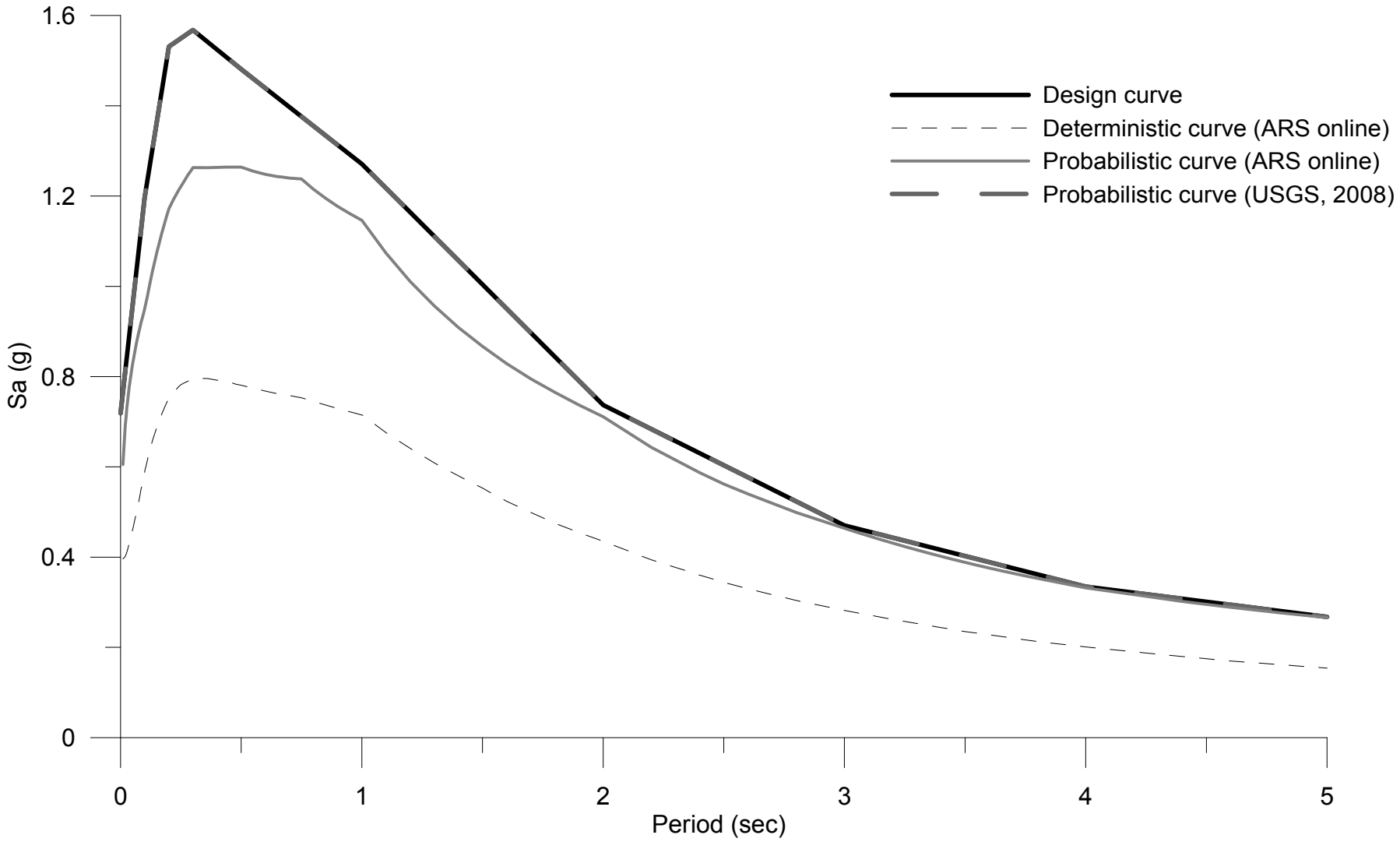
X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: Solid symbols are URS data (2011); hollow symbols are previous data

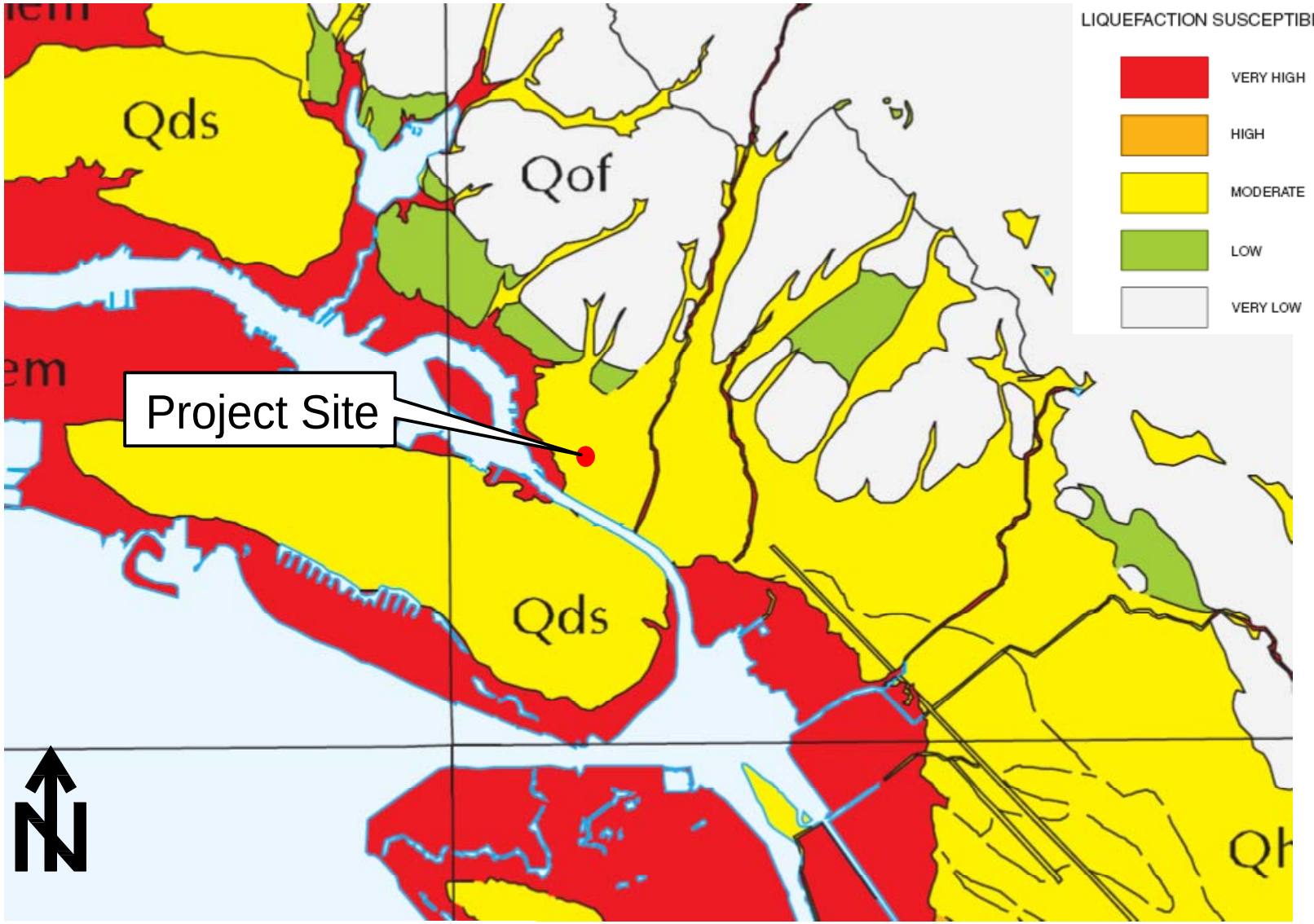
URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Blowcount SPT-N**	Figure 8

X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: 1. 5% damping spectrum
2. Near fault effects are included

URS	ACMMA I-880 23rd and 29th Project # 27560836	ARS Curve $V_{s,30}$=250 m/sec	Figure 9



USGS Liquefaction Susceptibility Map, Witter (2006)

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**Liquefaction Susceptibility**	**Figure 10**
URS			

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure

Appendix A
Logs of Test Borings from Previous Subsurface Investigation

BENCH MARK:

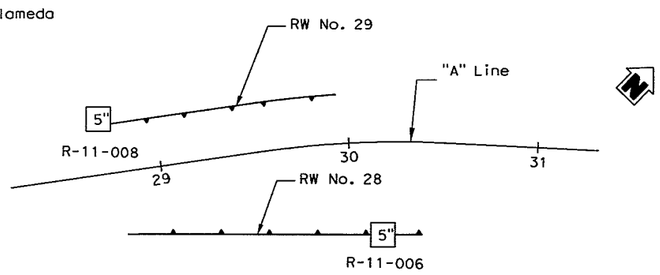
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER _____ DATE _____

PLANS APPROVAL DATE _____

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REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

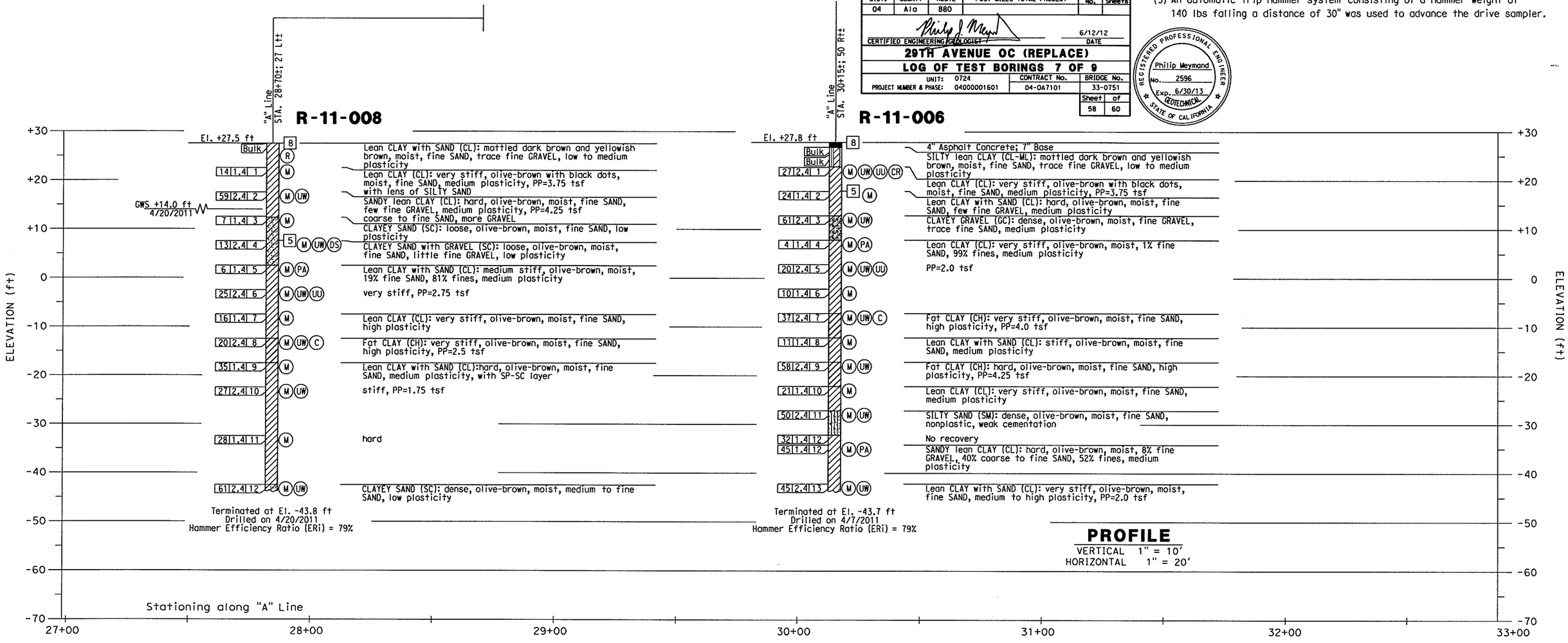
Philip J. Meymand — 6/12/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

29TH AVENUE OC (REPLACE)
LOG OF TEST BORINGS 7 OF 9

UNIT:	0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE:	04000001601	04-0A7101	33-0751
			Sheet 58 of 60

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

NOTES:
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).
(2) 2.4" samples were taken using a California Modified Sampler.
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO.	RETAINING WALL No. 28 and 29
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

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REVISION DATES | SHEET | OF

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BENCH MARK:

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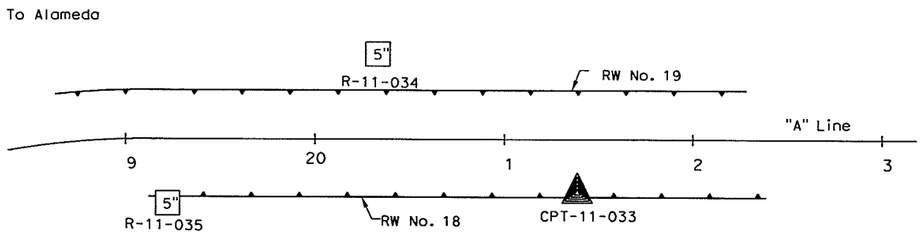

PLAN
1" = 40'

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			
CERTIFIED ENGINEERING GEOLOGIST				6/12/12 DATE	
29TH AVENUE OC (REPLACE)					
LOG OF TEST BORINGS 8 OF 9					
UNIT: 0724			CONTRACT No.	BRIDGE No.	
PROJECT NUMBER & PHASE: 04000001601			04-0A7101	33-0751	
				Sheet	of
				59	60

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

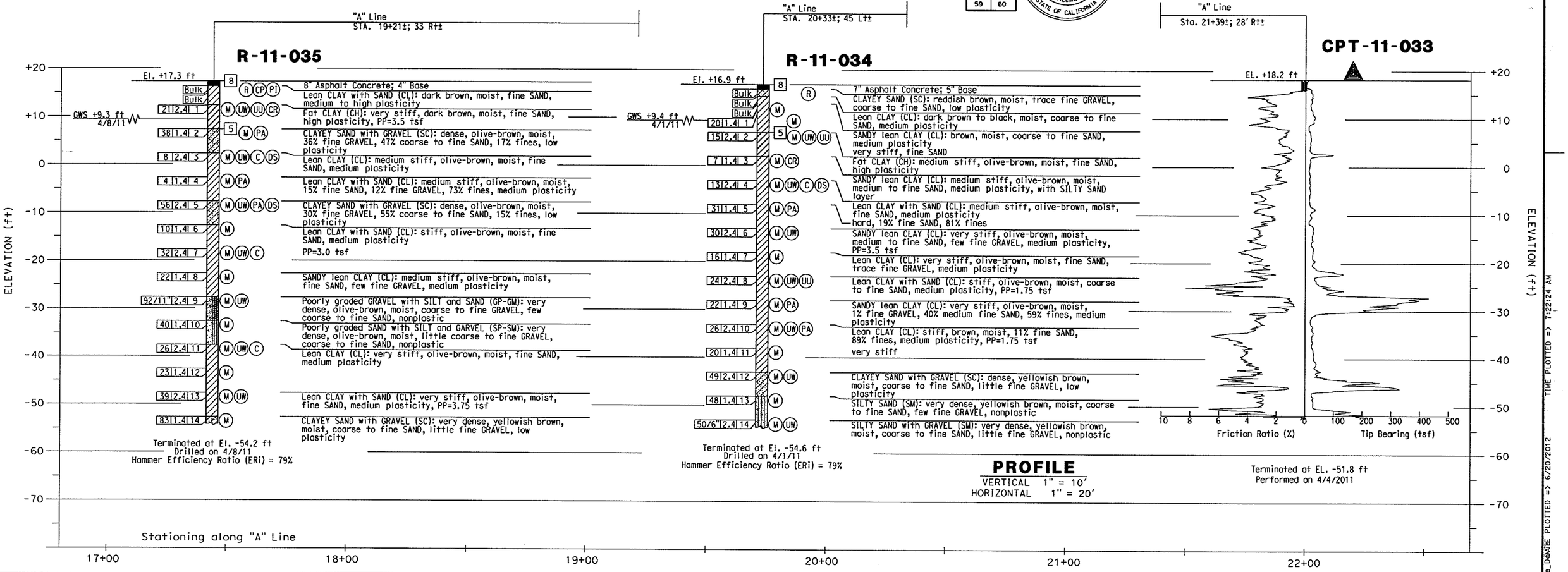
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 18 and 19
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GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

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CONTRACT NO.:04-0A7100 PROJECT ID:

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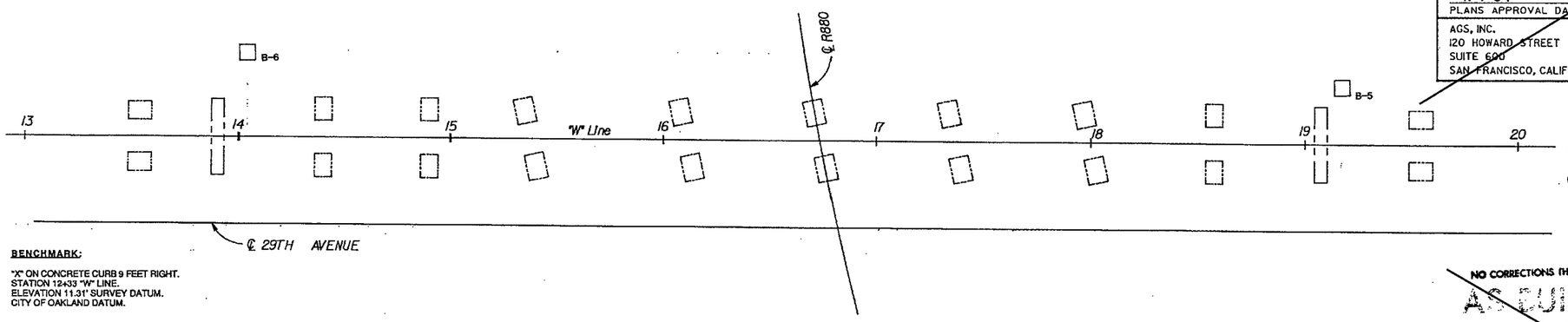
Bahram Khamenehpour
GEOTECHNICAL PROFESSIONAL

11-7-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BAHRAM KHAMENEHPOUR — No. 2104 — Exp. 12/31/93 GEOTECHNICAL — STATE OF CALIFORNIA

AGS, INC.
120 HOWARD STREET
SUITE 600
SAN FRANCISCO, CALIFORNIA 94105



PLAN
1"=30'

BENCHMARK:

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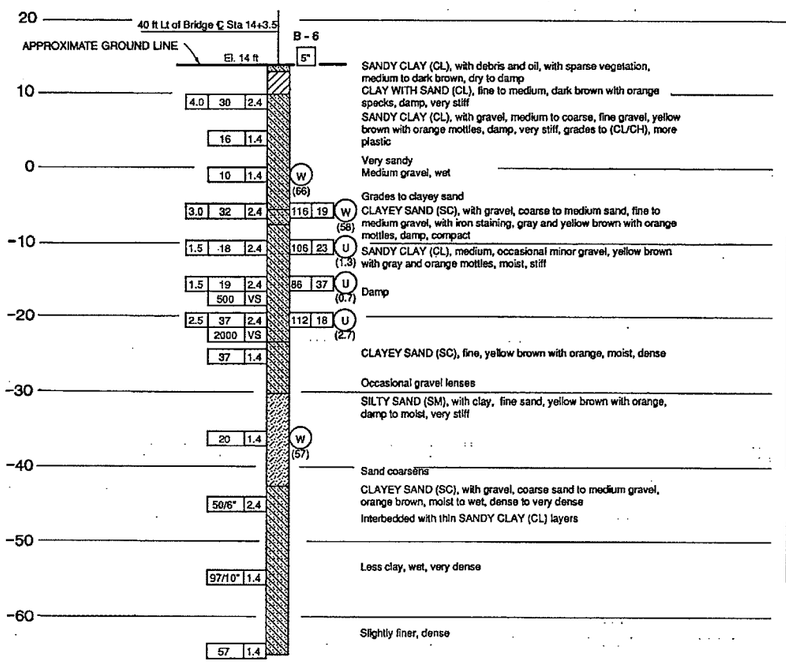
STATION 12+33 "W" LINE.
ELEVATION 11.31' SURVEY DATUM.
CITY OF OAKLAND DATUM.

LABORATORY TESTS

(W) WASH ANALYSIS (WITH % FINES CONTENT)
(U) UNCONFINED COMPRESSION (WITH UNCONFINED COMPRESSIVE STRENGTH IN TSF)

NO CORRECTIONS THIS SHEET
AS BUILT
CORRECTIONS BY DT
CONTRACT NO. 14-122224
DATE 11/15 '95 - 9/6/99



REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 GEOTECHNICAL — STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.					
DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Philip J Meymand — 3/30/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

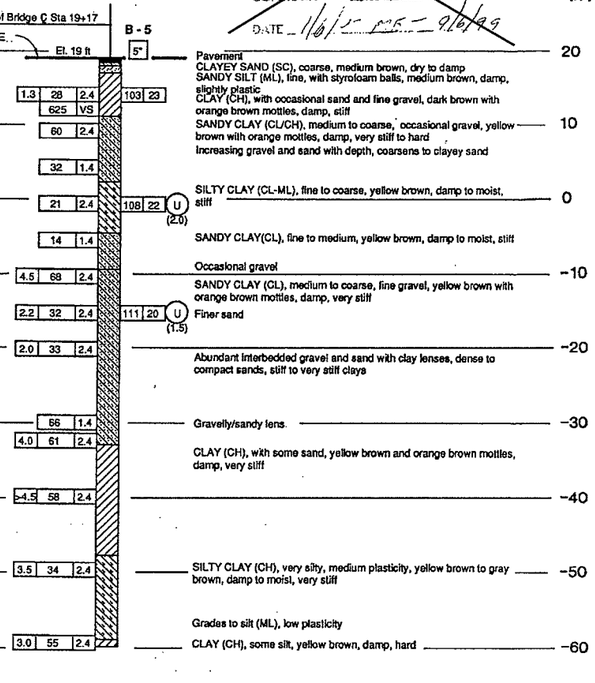
29TH AVENUE OC (REPLACE)
LOG OF TEST BORINGS 9 OF 9

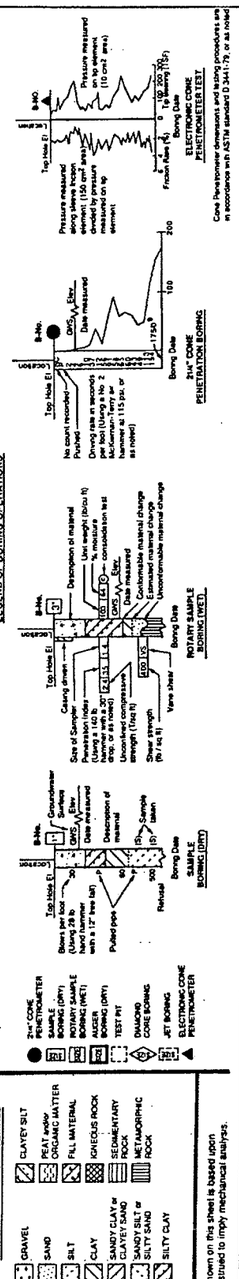
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA
UNIT: 0724 04-0A7101
PROJECT NUMBER & PHASE: 04000001601

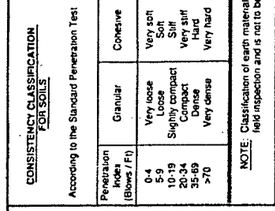
BRIDGE No.	Sheet	of
33-0751	60	60

Revisions made to this Log of Test Borings from the original ____ Log of Test Borings are the addition of the following table and notes:

Boring	Station	Offset from "A" Line
B-6	22+35	34.48 Lt
B-5	27+50	15.86 Lt







NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

M J Cullen
DESIGN OVERSIGHT
2-21-94
SIGN OFF DATE

DRAWN BY J. LAPID
CHECKED BY B. BROWN

C. ANDREWS
FIELD INVESTIGATOR
DATE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

B. KHAMENEHPOUR
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 133231

BRIDGE NO. 33 - 0141
POST MILE 28.69

EARTHQUAKE RETROFIT PROJECT NO. 83
29TH AVE OVERCROSSING
LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) 1/7/93 7/31/93 10/8/93

SHEET 7 OF 7

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Appendix B
Logs of Test Borings from Current Subsurface Investigation

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alc			

Philip J. Meymd — 6/25/12
REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

CEMENTATION

DESCRIPTION	CRITERIA
WEAK	CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE.
MODERATE	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE.
STRONG	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE.

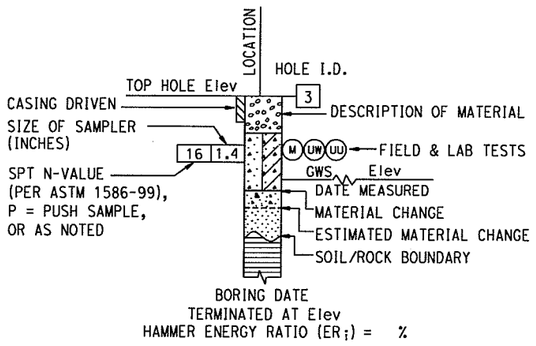
BOREHOLE IDENTIFICATION

SYMBOL	HOLE TYPE	DESCRIPTION
Size	A	AUGER BORING (HOLLOW OR SOLID STEM BUCKET)
Size	R	ROTARY DRILLED BORING (CONVENTIONAL)
Size	RW	ROTARY DRILLED WITH SELF-CASING WIRE-LINE
Size	RC	ROTARY CORE WITH CONTINUOUSLY-SAMPLED, SELF-CASING WIRE-LINE
Size	P	ROTARY PERCUSSION BORING (AIR)
Size	R	ROTARY DRILLED DIAMOND CORE
Size	HD	HAND DRIVEN (1-INCH SOIL TUBE)
Size	HA	HAND AUGER
●	D	DYNAMIC CONE PENETRATION BORING
▲	CPT	CONE PENETRATION TEST (ASTM D 5778)
⬚	O	OTHER (NOTE ON LOTB)

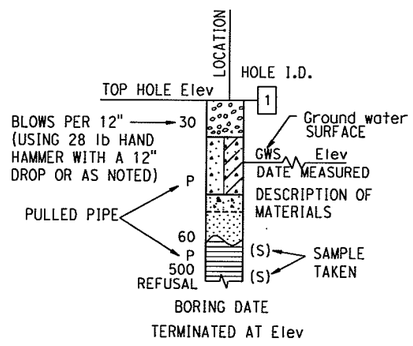
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

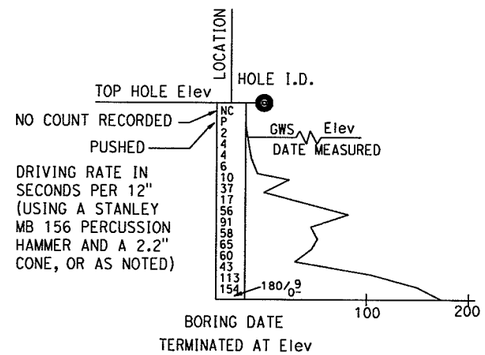
DESCRIPTION	SHEAR STRENGTH (tsf)	POCKET PENETROMETER MEASUREMENT, PP, (tsf)	TORVANE MEASUREMENT, TV, (tsf)	VANE SHEAR MEASUREMENT, VS, (tsf)
VERY SOFT	LESS THAN 0.12	LESS THAN 0.25	LESS THAN 0.12	LESS THAN 0.12
SOFT	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
MEDIUM STIFF	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
STIFF	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
VERY STIFF	1 - 2	2 - 4	1 - 2	1 - 2
HARD	GREATER THAN 2	GREATER THAN 4	GREATER THAN 2	GREATER THAN 2



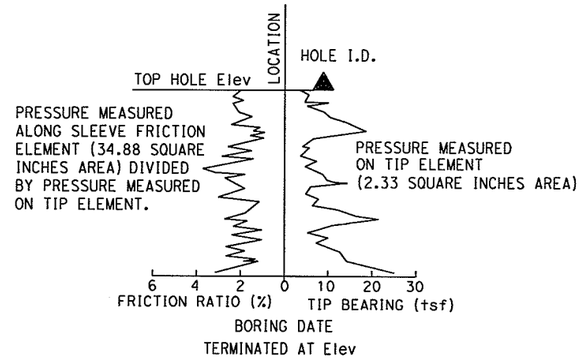
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0751	29TH AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69	LOG OF TEST BORINGS 1 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
3-5-11	1-30-12	3-30-12	6-25-12	52	60

FILE => 33-0751-z-1tb01.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:19 AM

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

GRAPHIC/SYMBOL	GROUP NAMES
GW	WELL-GRADED GRAVEL WELL-GRADED GRAVEL WITH SAND
GP	POORLY-GRADED GRAVEL POORLY-GRADED GRAVEL WITH SAND
GW-GM	WELL-GRADED GRAVEL WITH SILT WELL-GRADED GRAVEL WITH SILT AND SAND
GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
GP-GM	POORLY-GRADED GRAVEL WITH SILT POORLY-GRADED GRAVEL WITH SILT AND SAND
GP-GC	POORLY-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) POORLY-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND
SW	WELL-GRADED SAND WELL-GRADED SAND WITH GRAVEL
SP	POORLY-GRADED SAND POORLY-GRADED SAND WITH GRAVEL
SW-SM	WELL-GRADED SAND WITH SILT WELL-GRADED SAND WITH SILT AND GRAVEL
SW-SC	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY) WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
SP-SM	POORLY-GRADED SAND WITH SILT POORLY-GRADED SAND WITH SILT AND GRAVEL
SP-SC	POORLY-GRADED SAND WITH CLAY (OR SILTY CLAY) POORLY-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
SM	SILTY SAND SILTY SAND WITH GRAVEL
SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND WITH GRAVEL
PT	PEAT
	COBBLES COBBLES AND BOULDERS BOULDERS

GRAPHIC/SYMBOL	GROUP NAMES
CL	LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL SANDY LEAN CLAY SANDY LEAN CLAY WITH GRAVEL GRAVELLY LEAN CLAY GRAVELLY LEAN CLAY WITH SAND
CL-ML	SILTY CLAY SILTY CLAY WITH SAND SILTY CLAY WITH GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY WITH GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY WITH SAND
ML	SILT SILT WITH SAND SILT WITH GRAVEL SANDY SILT SANDY SILT WITH GRAVEL GRAVELLY SILT GRAVELLY SILT WITH SAND
OL	ORGANIC LEAN CLAY ORGANIC LEAN CLAY WITH SAND ORGANIC LEAN CLAY WITH GRAVEL SANDY ORGANIC LEAN CLAY SANDY ORGANIC LEAN CLAY WITH GRAVEL GRAVELLY ORGANIC LEAN CLAY GRAVELLY ORGANIC LEAN CLAY WITH SAND
OL	ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT WITH GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT WITH SAND
CH	FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL SANDY FAT CLAY SANDY FAT CLAY WITH GRAVEL GRAVELLY FAT CLAY GRAVELLY FAT CLAY WITH SAND
MH	ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL SANDY ELASTIC SILT SANDY ELASTIC SILT WITH GRAVEL GRAVELLY ELASTIC SILT GRAVELLY ELASTIC SILT WITH SAND
OH	ORGANIC FAT CLAY ORGANIC FAT CLAY WITH SAND ORGANIC FAT CLAY WITH GRAVEL SANDY ORGANIC FAT CLAY SANDY ORGANIC FAT CLAY WITH GRAVEL GRAVELLY ORGANIC FAT CLAY GRAVELLY ORGANIC FAT CLAY WITH SAND
OH	ORGANIC ELASTIC SILT ORGANIC ELASTIC SILT WITH SAND ORGANIC ELASTIC SILT WITH GRAVEL SANDY ORGANIC ELASTIC SILT SANDY ORGANIC ELASTIC SILT WITH GRAVEL GRAVELLY ORGANIC ELASTIC SILT GRAVELLY ORGANIC ELASTIC SILT WITH SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL WITH SAND ORGANIC SOIL WITH GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL WITH GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL WITH SAND

FIELD AND LABORATORY TESTING

- (C) CONSOLIDATION (ASTM D 2435)
- (CL) COLLAPSE POTENTIAL (ASTM D 5333)
- (CP) COMPACTION CURVE (CTM 216)
- (CR) CORROSIVITY TESTING (CTM 643, CTM 422, CTM 417)
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 4767)
- (DS) DIRECT SHEAR (ASTM D 3080)
- (EI) EXPANSION INDEX (ASTM D 4829)
- (M) MOISTURE CONTENT (ASTM D 2216)
- (OC) ORGANIC CONTENT-% (ASTM D 2974)
- (P) PERMEABILITY (CTM 220)
- (PA) PARTICLE SIZE ANALYSIS (ASTM D 422)
- (PI) PLASTICITY INDEX (AASHTO T 90) LIQUID LIMIT (AASHTO T 89)
- (PL) POINT LOAD INDEX (ASTM D 5731)
- (PM) PRESSURE METER
- (R) R-VALUE (CTM 301)
- (SE) SAND EQUIVALENT (CTM 217)
- (SG) SPECIFIC GRAVITY (AASHTO T 100)
- (SL) SHRINKAGE LIMIT (ASTM D 427)
- (SW) SWELL POTENTIAL (ASTM D 4546)
- (UC) UNCONFINED COMPRESSION-SOIL (ASTM D 2166)
UNCONFINED COMPRESSION-ROCK (ASTM D 2938)
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 2850)
- (UW) UNIT WEIGHT (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	880	Alg			

Philip J. Meymond — 6/25/12
REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymond — No. 2596 — 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

APPARENT DENSITY OF COHESIONLESS SOILS

DESCRIPTION	SPT N_{60} (BLOWS / 12 INCHES)
VERY LOOSE	0 - 5
LOOSE	5 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	GREATER THAN 50

MOISTURE

DESCRIPTION	CRITERIA
DRY	NO DISCERNABLE MOISTURE
MOIST	MOISTURE PRESENT, BUT NO FREE WATER
WET	VISIBLE FREE WATER

PERCENT OR PROPORTION OF SOILS

DESCRIPTION	CRITERIA
TRACE	PARTICLES ARE PRESENT BUT ESTIMATED TO BE LESS THAN 5%
FEW	5% - 10%
LITTLE	15% - 25%
SOME	30% - 45%
MOSTLY	50% - 100%

PARTICLE SIZE

DESCRIPTION		SIZE
BOULDER		GREATER THAN 12"
COBBLE		3" - 12"
GRAVEL	COARSE	3/4" - 3"
	FINE	1/5" - 3/4"
SAND	COARSE	1/16" - 1/5"
	MEDIUM	1/64" - 1/16"
	FINE	1/300" - 1/64"
SILT AND CLAY		LESS THAN 1/300"

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser, PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		BRIDGE NO. 33-0751; POST MILES 28.69

29TH AVENUE OC (REPLACE)

LOG OF TEST BORINGS 2 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
5-5-11	1-18-12	3-30-12	6-25-12	53	60

FILE => 33-0751-z-1tb02.dgn

USERNAME => Lynette_D@ATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:20 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

Philip J. Meymand
REGISTERED CIVIL ENGINEER

6/25/12
DATE

REGISTERED PROFESSIONAL ENGINEER
Philip Meymand
No. 2596
EXP. 6/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

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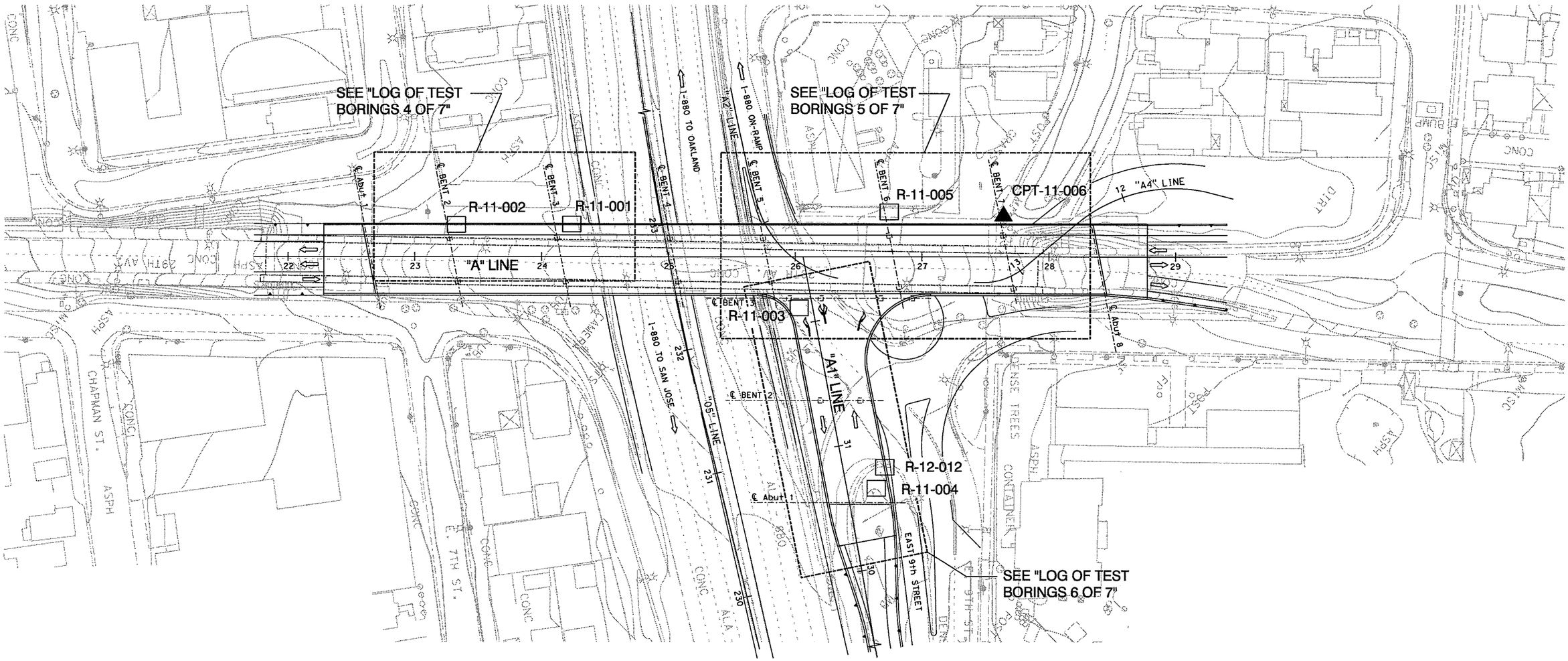
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=40'-0"

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0751	29TH AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69	LOG OF TEST BORINGS 3 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
3-1-11	1-10-12	3-30-12	6-25-12	54	60

FILE => 33-0751-z-l-tb03.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:21 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alg			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Weymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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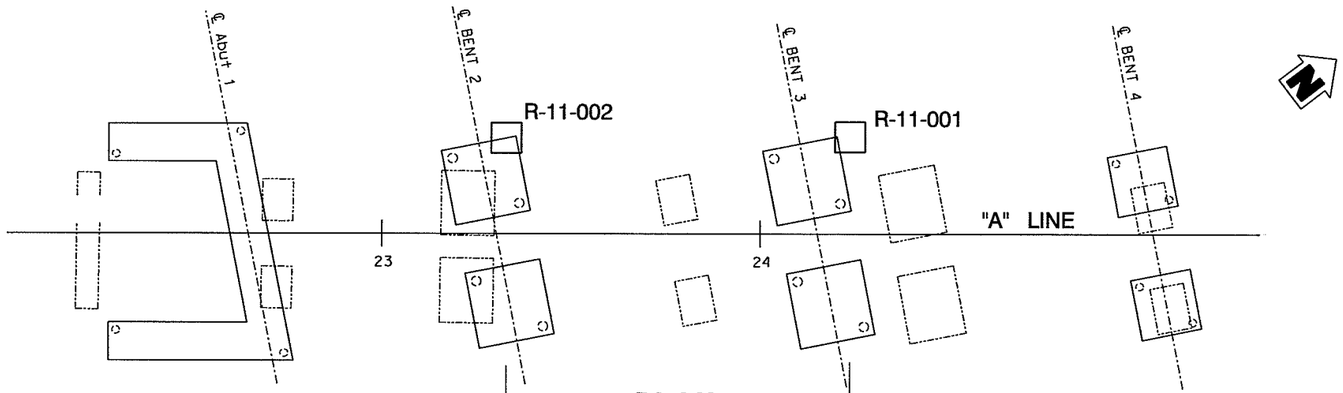


PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.

Elevation (ft): +30, 20, 10, 0, -10, -20, -30, -40, -50, -60, -70, -80, -90

R-11-002

Offset 25.27' Lt, Sta. 23+32.77 "A" Line
EL. 22.0'
5"

- 2.0 — Lean CLAY with SAND (CL); very stiff; dark gray; moist; about 15% fine SAND; about 85% low to medium plasticity fines; PP=3.5 tsf (FILL).
- 18 | 2.0 (M)(UW)(UC) — Lean CLAY with SAND (CL); very stiff; medium brown; moist; about 25% fine SAND; about 75% low plasticity fines; brown and red mottling (ALLUVIUM). PP=>4.5 tsf.
- 15 | 2.0 (PA) — SANDY lean CLAY with GRAVEL (CL); medium dense; brown; moist; about 15% fine, subrounded GRAVEL, max. 3/4 in. dia.; about 25% coarse to fine SAND; about 60% low plasticity fines.
- 8 | 2.0 (M)(UW) — Lean CLAY with SAND (CL); stiff; medium brown; moist; about 20% fine SAND; about 80% low to medium plasticity fines. PP=1.25 tsf.
- 11 | 2.0
- 8 | 2.0 (PI)(UW)(C)(UU) — PP=0.5-1.5 tsf.
- push | 2.9 (M) — -calcareous nodules common.
- 15 | 2.0 — Lean CLAY (CL); very stiff to hard; medium brown; moist; about 10% fine SAND; about 90% medium plasticity fines; PP=3.5->4.5 tsf.
- 16 | 2.0 — PP=3.25 tsf.
- 28 | 2.0 — SANDY lean CLAY (CL); very stiff; light brown; moist; about 35% fine SAND; about 65% medium plasticity fines; PP=2.0 tsf. CLAYEY GRAVEL with SAND (GC); medium dense; medium brown; moist; about 40% subrounded GRAVEL, max. 2 in. dia.; about 30% medium to fine SAND; about 30% low plasticity fines.
- 15 | 2.0 — SANDY lean CLAY (CL); stiff; light brown; moist; about 35% fine SAND; about 65% medium plasticity fines; PP=1.75 tsf.

Terminated at El. -29.5'
04-26-11

R-11-001

Offset 25.56' Lt, Sta. 24+23.78 "A" Line
EL. 23.0'
5"

- 17 | 2.0 — Lean CLAY with SAND (CL); very stiff to hard; black and brown; moist; about 5% fine, subangular GRAVEL, max. 1/2 in. dia.; about 20% fine SAND; about 75% low plasticity fines; PP=>4.5 tsf (FILL).
- 8 | 1.4 — -black; very stiff.
- 9 | 2.0 (PI) — -black and brown; PP=2.75 tsf.
- 8 | 2.0 (M)(UW)(UU) — SANDY lean CLAY (CL); very stiff to hard; brown; moist; about 35% medium to fine SAND; about 65% low plasticity fines; PP=>4.5 tsf (ALLUVIUM).
- 12 | 2.0 — -very stiff; about 25% fine sand; about 75% low plasticity fines; PP=2.5 tsf. PP=2.0 tsf.
- 18 | 2.0 — -medium stiff; PP=2.0 tsf.
- 20 | 2.0 — -very stiff; PP=2.0 tsf.
- 12 | 2.0 (M)(UW)(UC) — -about 5% fine subrounded gravel; PP=2.5 tsf. Calcareous nodules common @ 31.5 ft.
- 25 | 2.0 — -hard; no calcareous nodules seen; PP=4.0 tsf.
- 19 | 2.0 — -stiff, about 45% fine sand; about 55% low plasticity fines; PP=2.5-3.5 tsf. Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; brown; moist; about 30% fine, subangular GRAVEL, max. 1/2 in. dia.; about 60% coarse to medium SAND; about 10% fines.
- 21 | 2.0 — Lean CLAY with SAND (CL); hard; brown; moist; about 5% fine, subangular GRAVEL, max. 1/2 in. dia.; about 20% fine SAND; about 75% low to medium plasticity fines; PP=4.5 tsf. SANDY lean CLAY (CL); very stiff to hard; brown and gray; moist; about 5% fine, subrounded GRAVEL, max. 1/4 in. dia.; about 40% fine SAND; about 55% low plasticity fines; PP=2.25 tsf.
- 41 | 1.4 (PA) — -hard; about 25% fine sand; about 75% low plasticity fines; PP=4.0 tsf. Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; wet; about 40% coarse to fine, angular to subangular GRAVEL, max. 1 in. dia.; about 50% coarse to medium SAND; about 10 to 11% nonplastic fines.
- 38 | 1.4 (PA) — Poorly graded SAND (SP); dense; gray; wet; about 10% fine GRAVEL; about 85% medium to fine SAND; about 5% nonplastic fines.
- 70 | 1.4 — Poorly graded SAND with GRAVEL (SP); very dense; gray; wet; about 40% coarse to fine, subrounded GRAVEL, max. 1 in. dia.; about 60% coarse to medium SAND.

Terminated at El. -68.5'
05-04-11

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO.	29TH AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	33-0751	LOG OF TEST BORINGS 4 OF 9
						POST MILES 28.69	

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
5-5-11	1-30-12	3-30-12	6-25-12	55	60

FILE => 33-0751-z-1tb04.dgn

USERNAME => Lynette_D@ARE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:21 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 6/25/12 DATE

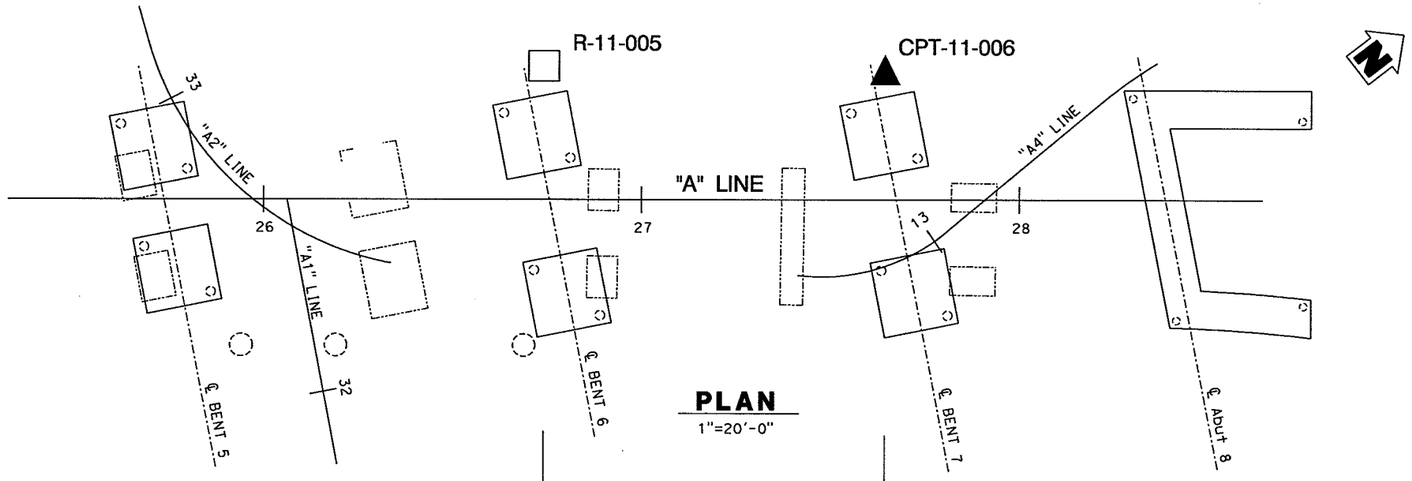
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

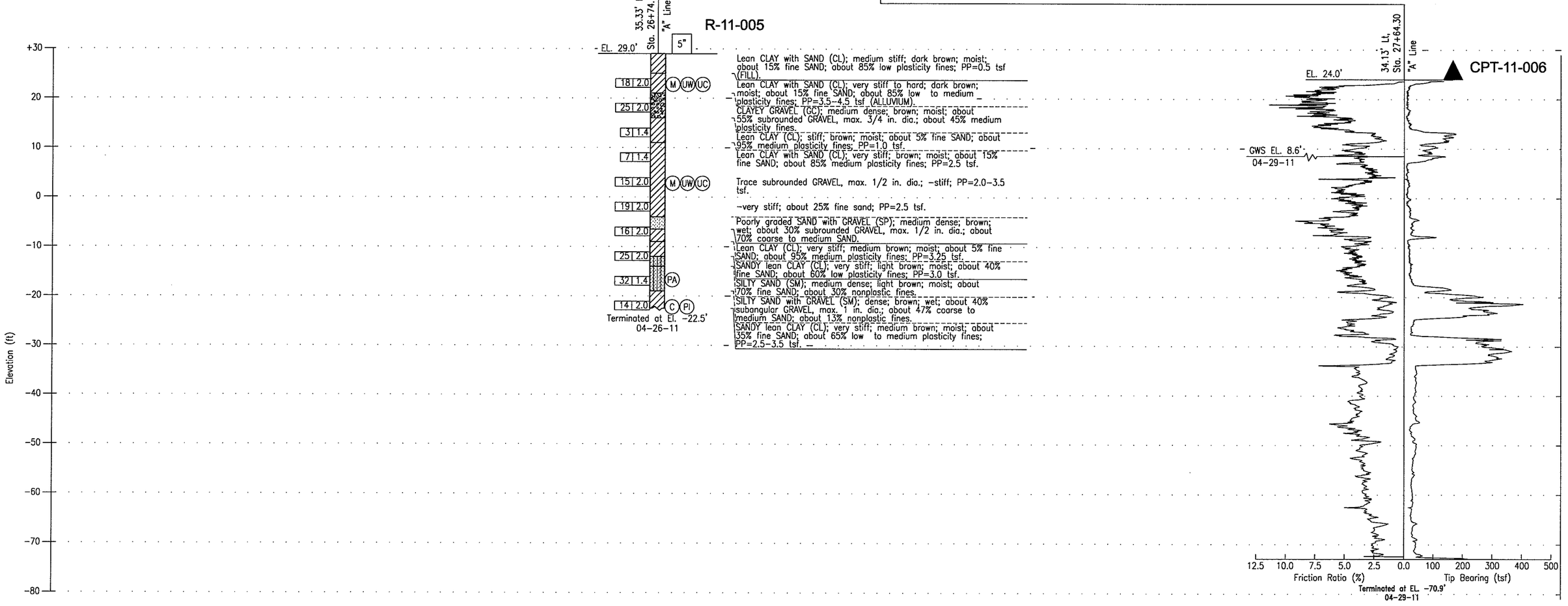
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0751
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69

29TH AVENUE OC (REPLACE)

LOG OF TEST BORINGS 5 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

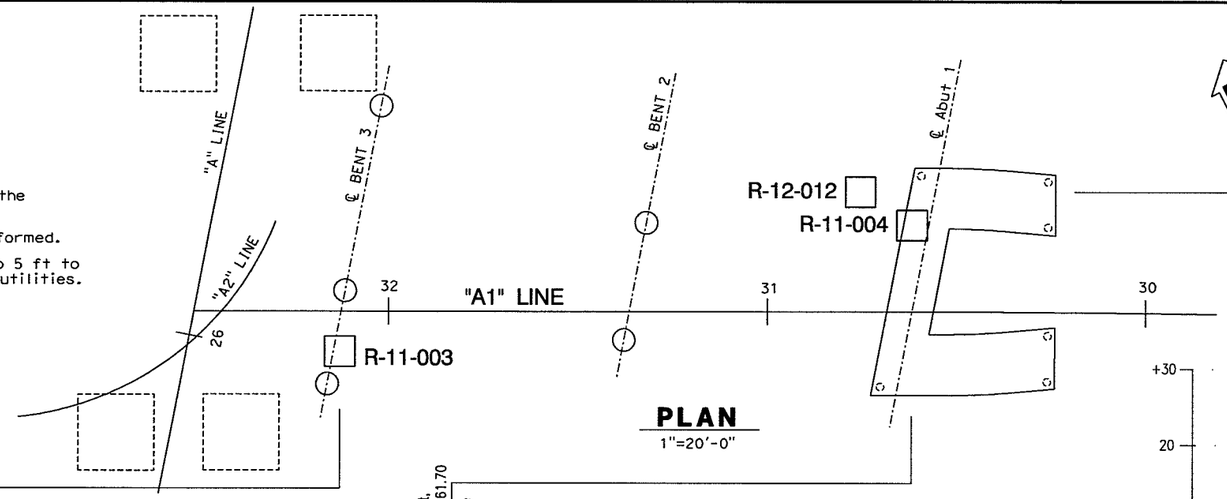
REVISION DATES			SHEET	OF
5-5-11	1-18-12	3-30-12	6-25-12	56	60

FILE => 33-0751-z-1tb05.dgn

USERNAME => Lynette_D@DOT TIME PLOTTED => 7:22:22 AM DATE PLOTTED => 6/20/2012

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



PLAN
1"=20'-0"

R-11-003

EL. 23.0' | 10.51' Lt, Sta. 32+12.79 "A1" Line | 5"

Elevation (ft)			
	5 | 2.0	M UW	Fat CLAY with SAND (CH); very stiff; dark gray; dry to moist; about 10% fine SAND; about 90% medium to high plasticity, very high dry strength fines; (FILL).
	29 | 2.0		Lean CLAY with SAND (CL); very stiff; medium brown; moist; about 20% fine SAND; about 80% medium plasticity fines; black mottles; PP=3.0 tsf (ALLUVIUM).
	7 | 2.0	M UW PI UU	Poorly graded GRAVEL with SILT and SAND (GP-GM); medium dense; brown; moist; about 50% subangular GRAVEL, max. 3/4 in. dia.; about 40% coarse to medium SAND; about 10% low plasticity fines.
	27 | 1.4		Lean CLAY with SAND (CL); medium stiff; medium brown; moist; about 20% fine SAND; about 80% low plasticity fines; PP=1.75 tsf.
	16 | 1.4	PA	SANDY lean CLAY (CL); very stiff; medium brown; moist; about 35% fine SAND; about 65% medium plasticity fines; with occasional gravelly zones; PP=3.25 tsf.
	21 | 2.0		SILTY SAND (SM); medium dense; light brown; moist; about 5% fine, subrounded GRAVEL; about 76% medium to fine SAND; about 19% nonplastic fines.
	16 | 2.0		Lean CLAY with SAND (CL); very stiff; brown; moist; trace fine GRAVEL; about 20% fine SAND; about 80% medium plasticity fines; PP=2.0 tsf. PP=3.0 tsf. PP=2.75 tsf.
	29 | 2.0	PA	
	15 | 1.4		SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 72% fine SAND; about 28% nonplastic to low plasticity fines.
	23 | 2.0	M UW UC	Lean CLAY (CL); very stiff; gray; moist; trace subrounded GRAVEL, max. 1/2 in. dia.; about 10% fine SAND; about 90% medium plasticity fines; PP=3.75 tsf.
			SANDY lean CLAY (CL); very stiff; brown and gray; moist; about 40% fine SAND; about 60% low plasticity fines; PP=2.5 tsf.
	21 | 2.0	M PI	Lean CLAY (CL); very stiff; gray; moist; trace subrounded GRAVEL, max. 1/2 in. dia.; about 10% fine SAND; about 90% medium plasticity fines; PP=3.0 tsf.
	49 | 1.4		Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; wet; about 30% subangular GRAVEL, max. 1/2 in. dia.; about 60% coarse to medium SAND; about 10% nonplastic fines.
	13 | 1.4		Lean CLAY (CL); stiff; gray; moist; about 10% fine SAND; about 90% medium plasticity fines; PP=1.75 tsf.
	23 | 2.0		Lean CLAY with SAND (CL); very stiff; dark gray; moist; about 25% fine SAND; about 75% medium plasticity fines; PP=3.75 tsf.
			SILTY SAND (SM); very dense; light gray; moist; about 55% fine SAND; about 45% nonplastic fines.
	50/5 | 2.0		Poorly graded SAND with SILT and GRAVEL (SP-SM); very dense; medium brown; moist; about 25% subangular GRAVEL, max. 1/2 in. dia.; about 65% coarse to medium SAND; about 10% nonplastic fines.

Terminated at El. -77.9'
05-02-11

R-11-004

EL. 22.0' | 22.77' Rt, Sta. 30+61.70 "A1" Line | 5"

Elevation (ft)			
			Fat CLAY with SAND (CH); dark brown; moist; high plasticity fines; (FILL).
	23 | 2.0	UC	Lean CLAY with SAND (CL); dark brown; moist; about 20% fine SAND; about 80% low plasticity fines; roots and organic detrius common (ALLUVIUM).
	12 | 2.0		-medium brown; very stiff to hard; no roots or organic material; PP=4.5 tsf.
	11 | 2.0		-very stiff; PP=2.0 tsf.
	13 | 2.0	C PI	SANDY lean CLAY with GRAVEL (CL); very stiff; medium brown; moist; about 15% fine, subrounded GRAVEL; about 35% medium to fine SAND; about 50% low to medium plasticity fines; PP=2.5 tsf.
	19 | 2.0		Lean CLAY with SAND (CL); very stiff; medium brown; moist; about 20% fine SAND; about 80% low plasticity fines; PP=3.0 tsf. PP=3.0 tsf.
	26 | 2.0		SANDY lean CLAY (CL); hard; medium brown; moist; about 5% fine GRAVEL; about 30% medium to fine SAND; about 65% low to medium plasticity fines; PP=4.5 tsf.
	18 | 2.0	M PI	-about 40% sand; PP=4.0 tsf.
	22 | 1.4	PA	Fat CLAY (CH); very stiff; medium brown; moist; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; PP=2.75 tsf.
	28 | 2.0	M UW	SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 77% fine SAND; about 23% nonplastic to low plasticity fines.
	28 | 2.0		Lean CLAY (CL); hard; brown and gray; moist; about 5 to 10% fine SAND; about 90 to 95% medium plasticity fines; PP=4.5 tsf.
			Poorly graded SAND (SP); medium dense; dark brown; wet; trace GRAVEL; medium SAND.
	38 | 2.0	M UW PA	Lean CLAY with SAND (CL); very stiff; light brown; moist; about 15% fine SAND; about 85% low plasticity fines; silty.
			SANDY SILT (ML); medium dense; medium brown; moist; about 45% fine SAND; about 55% nonplastic to low plasticity fines.
	50 | 1.4		Lean CLAY (CL); very stiff; gray; moist; about 10% fine SAND; medium plasticity fines; PP=3.25 tsf.
			SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 74% fine SAND; about 26% nonplastic to low plasticity fines.
	12 | 1.4		Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; brown; moist; about 15 to 20% subangular GRAVEL, max. 1/2 in. dia.; about 70% coarse to medium SAND; about 5 to 10% nonplastic fines. -very dense.
	18 | 2.0		SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace coarse, subrounded GRAVEL, max. 1 in. dia.; about 30% fine SAND; medium plasticity, high dry strength fines; PP=3.75 tsf.
			-greenish-gray; high dry strength; PP=2.0-3.0 tsf.
	27 | 2.0		SANDY lean CLAY with GRAVEL (CL); hard; brown and gray; moist; about 15% fine, subrounded GRAVEL, max. 1/2 in. dia.; about 15% coarse to fine SAND; about 70% low plasticity fines; PP=4.25 tsf.

Terminated at El. -79.5'
04-29-11

R-12-012

EL. 22.0' | 31.62' Rt, Sta. 30+75.41 "A1" Line | 4"

Elevation (ft)			
			Fat CLAY with SAND (CH); stiff; dark brown; moist; about 15% fine SAND; about 85% medium to high plasticity fines; PP=1.25 tsf; (FILL).
			Lean CLAY with SAND (CL); very stiff to hard; yellowish-brown; moist; about 20% fine SAND; about 80% medium plasticity fines; PP=2.0-4.5 tsf; (ALLUVIUM).
	51 | 2.5		Lean CLAY (CL); very stiff; gray; moist; about 10% fine SAND; medium plasticity fines; PP=3.25 tsf.
			SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 74% fine SAND; about 26% nonplastic to low plasticity fines.
	64 | 1.4		Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; brown; moist; about 15 to 20% subangular GRAVEL, max. 1/2 in. dia.; about 70% coarse to medium SAND; about 5 to 10% nonplastic fines. -very dense. -clay interbed 68.5' to 69'.
	42 | 2.5	UC	SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace coarse, subrounded GRAVEL, max. 1 in. dia.; about 30% fine SAND; medium plasticity fines; PP=2.0 tsf.
	push | 2.9	UU	-gray; very stiff; PP=1.75 tsf.
	86/12 | 2.5	UC	-very stiff; PP=>4.5 tsf.
			SANDY lean CLAY with GRAVEL (CL); very stiff; brown and gray; moist; about 15% fine, subrounded GRAVEL, max. 1/2 in. dia.; about 15% coarse to fine SAND; about 70% low plasticity fines; PP=3.0 tsf.
	50 | 1.4		
	67 | 1.4		Well-graded SAND with GRAVEL (SW); very dense; brown and gray; moist; about 35% fine GRAVEL, max. 3/4 in. dia.; about 60% coarse to fine SAND; about 5% fines.
	42 | 1.4		Lean CLAY with SAND (CL); hard; gray; moist; about 20% fine SAND; about 80% medium plasticity fines; PP=3.25 tsf->4.5 tsf.
	62 | 2.5	UU	
	67 | 2.5	UC	
			SANDY SILTY CLAY (CL-ML); hard; gray; moist; about 30% fine SAND; about 70% low plasticity fines; PP=2.75 tsf.
	51 | 2.5		

Terminated at El. -109.5'
03-21-12

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Weymand — No. 2596 — EXP. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER

BRIDGE NO. 33-0751 | POST MILES 28.69

29TH AVENUE OC (REPLACE)

LOG OF TEST BORINGS 6 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
9-5-11	1-18-12	3-16-12	6-25-12	57	60

FILE => 33-0751-z-1tb06.dgn

USERNAME => Lynette_D&A PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:22 AM

Appendix C
Laboratory Test Results

MOISTURE & DENSITY TEST

Client : URS Project : I-880 @ 23rd and 29th Ave. Job no : 27560836

	Boring #	R-11-002	R-11-003	R-11-003	R-11-004	R-11-004	R-11-008	R-11-008	R-11-009	
	Sample #	3-3	2-3	12-3	8-2	10-3	6-3	8-3	11-2	
	Depth (ft.)	21-21.5	6-6.5	61-61.5	35.5-36	46-46.5	26-26.5	36-36.5	50.5-51	
	Soil type: (visual)	Brown lean clay	Grayish brown lean clay	Grayish brown lean clay	Dark reddish brown fat clay	Mottled grayish brown lean clay	Grayish brown lean clay	Olive gray fat clay	Dark olive gray fat clay	
1.	Date tested:	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	1.
2.	Tested by:	JH	JH	JH	JH	JH	JH	JH	JH	2.
3.	Specimen height (in.)	5.96	3.75			6.01	5.98			3.
4.	Wt. of specimen + tare (gm)	535.6	275.3			588.5	491.7			4.
5.	Tare wt. (gm)	0.00	0.00			0.00	0.00			5.
6.	Diameter (in.)	1.90	1.88			1.93	1.87			6.
7.	Wet wt. of soil + dish wt. (gm)	221.47	229.57	204.55	169.24	230.11	206.74	164.51	168.69	7.
8.	Dry wt. of soil + dish wt. (gm)	183.03	199.36	174.49	142.09	197.38	163.45	136.53	135.88	8.
9.	Wt. of dish (gm)	43.17	51.47	55.50	60.73	42.51	40.61	51.82	51.64	9.
10.	Dish ID									10.
	Wet Density (pcf)	120.7	100.7			127.4	114.0			
	Dry Density (pcf)	94.6	83.6			105.2	84.3			
	Moisture Content (%)	27.5	20.4	25.3	33.4	21.1	35.2	33.0	38.9	
	Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	
	Void Ratio	0.780	1.016			0.602	0.999			
	Saturation (%)	95.1	54.3			94.8	95.2			

Additional data:

Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

MOISTURE & DENSITY TEST

Client : URS Project : I-880 @ 23rd and 29th Ave. Job no : 27560836

	Boring #	R-11-009	R-11-009	R-11-011						
	Sample #	12-3	14-2	15-3						
	Depth (ft.)	61-61.5	80.5-81	81-81.5						
	Soil type: (visual)	Dark olive lean clay	Brown lean clay with sand	Light olive brown lean clay						
1.	Date tested:	05/25/11	05/25/11	05/25/11						1.
2.	Tested by:	JH	JH	JH						2.
3.	Specimen height (in.)	6.00		5.98						3.
4.	Wt. of specimen + tare (gm)	607.1		573.2						4.
5.	Tare wt. (gm)	0.00		0.00						5.
6.	Diameter (in.)	1.93		1.93						6.
7.	Wet wt. of soil + dish wt. (gm)	220.94	140.74	246.05						7.
8.	Dry wt. of soil + dish wt. (gm)	191.82	127.71	205.76						8.
9.	Wt. of dish (gm)	41.71	58.91	43.29						9.
10.	Dish ID									10.
	Wet Density (pcf)	131.7		124.7						
	Dry Density (pcf)	110.3		99.9						
	Moisture Content (%)	19.4	18.9	24.8						
	Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	
	Void Ratio	0.528		0.686						
	Saturation (%)	99.2		97.6						

Additional data:

Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

ASTM D-1140
PERCENT PASSING NO. 200 SIEVE REPORT

Method A
Specimens Soaked Overnight without Deflocculating Agent
Dry Mass Determined Directly

Client Name URS
Project Name I-880 @ 23rd and 29th Ave.
Project Number 27560836

Boring Number	R-11-001	R-11-001	R-11-003	R-11-003	R-11-004
Sample Number	13	14-1	6	9-3	9
Depth (ft)	70-71.5	80-80.75	25-26	41-41.5	40-41.5
Percent of Soil Finer than No. 200 Sieve	10.4	11.2	18.5	27.5	23.4
Visual Classification	Brown poorly graded gravel with sand	Brown poorly graded gravel with silt and sand	Brown clayey sand with gravel	Olive gray clayey sand	Light olive gray clayey sand with gravel
Date	05/17/11	05/17/11	05/17/11	05/25/11	05/17/11
Weight of Dry Soil + Pan (before wash)	768.1	743.7	760.6	188.2	831.0
Weight of Dry Soil + Pan (after wash)	705.7	694.5	650.9	147.5	675.3
Weight of Pan	166.2	303.9	166.4	40.4	166.0

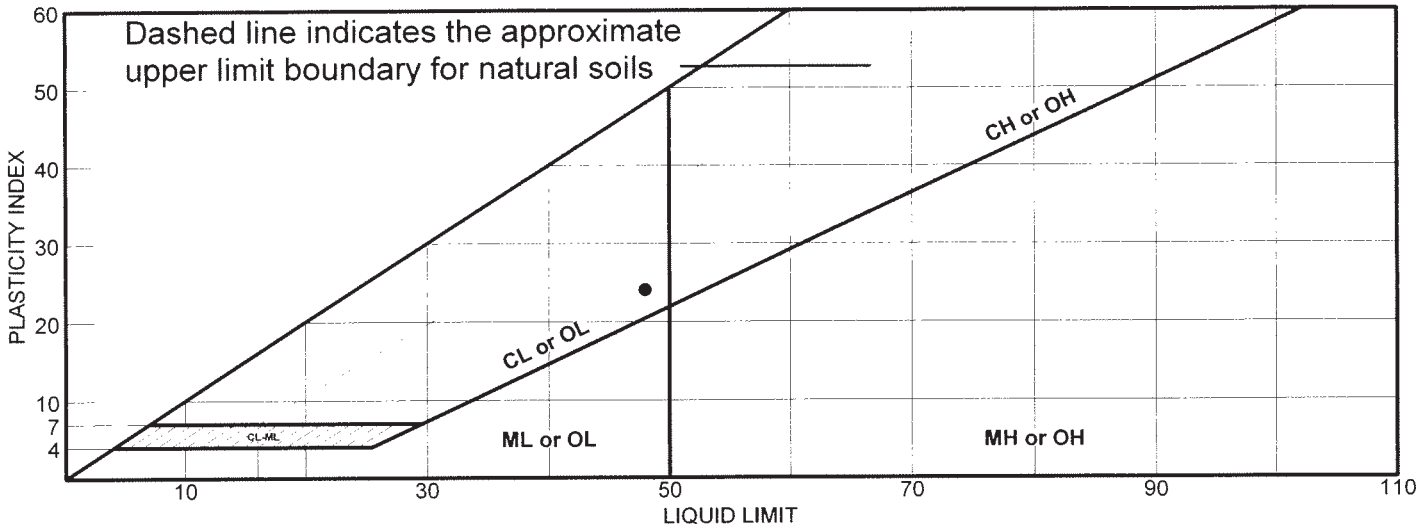
ASTM D-1140
PERCENT PASSING NO. 200 SIEVE REPORT

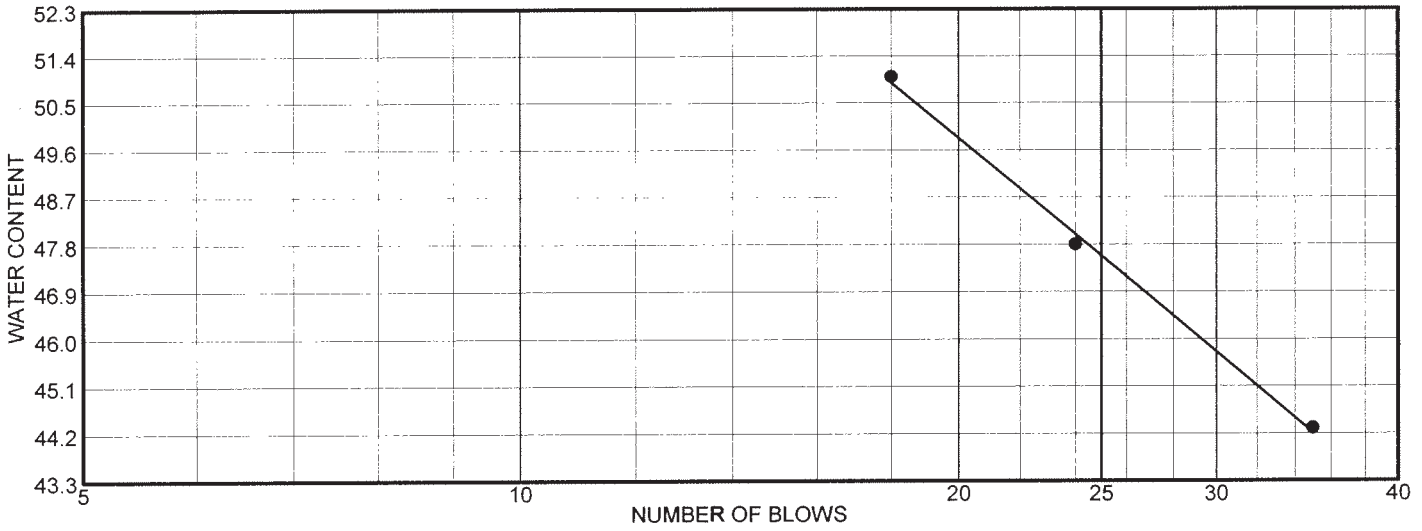
Method A
Specimens Soaked Overnight without Deflocculating Agent
Dry Mass Determined Directly

Client Name URS
Project Name I-880 @ 23rd and 29th Ave.
Project Number 27560836

Boring Number	R-11-004	R-11-005	R-11-008		
Sample Number	12-3	10	9-2		
Depth (ft)	61-61.5	45-46.5	40.5-41		
Percent of Soil Finer than No. 200 Sieve	26.1	13.2	16.6		
Visual Classification	Grayish brown clayey sand	Brown silty gravel with sand	Olive gray clayey sand with gravel		
Date	05/25/11	05/17/11	05/25/11		
Weight of Dry Soil + Pan (before wash)	214.3	762.9	745.7		
Weight of Dry Soil + Pan (after wash)	169.5	684.2	649.3		
Weight of Pan	43.0	167.4	165.4		

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark grayish brown lean clay with sand	48	24	24			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-005 **Sample No.:** 11-2 **Elev./Depth:** 50.5-51

Remarks:

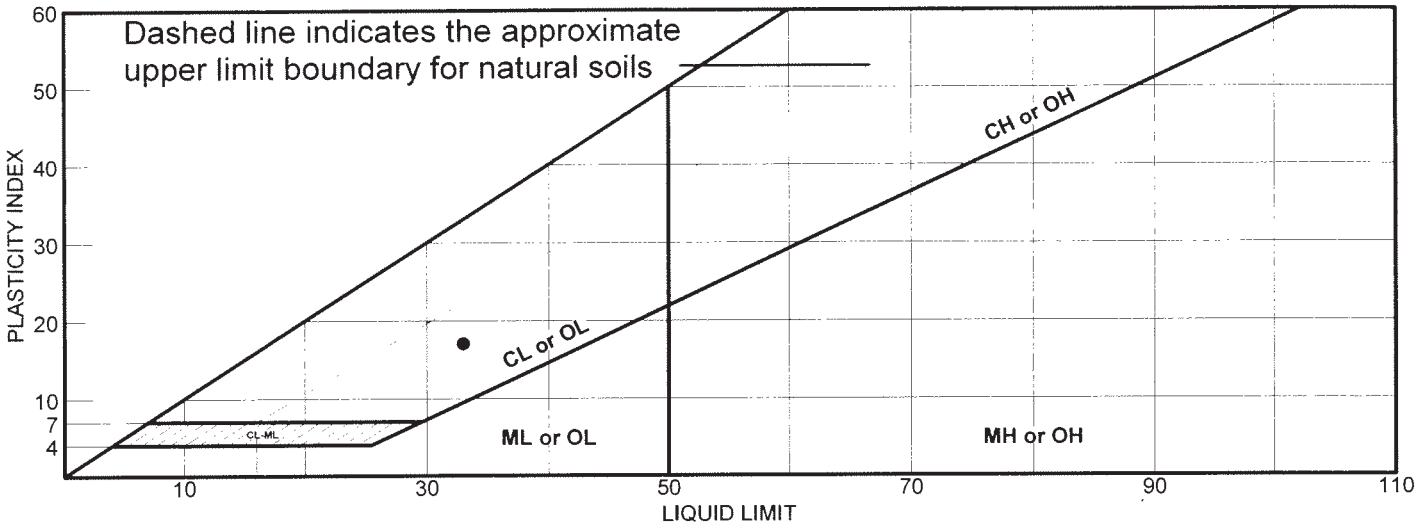
●

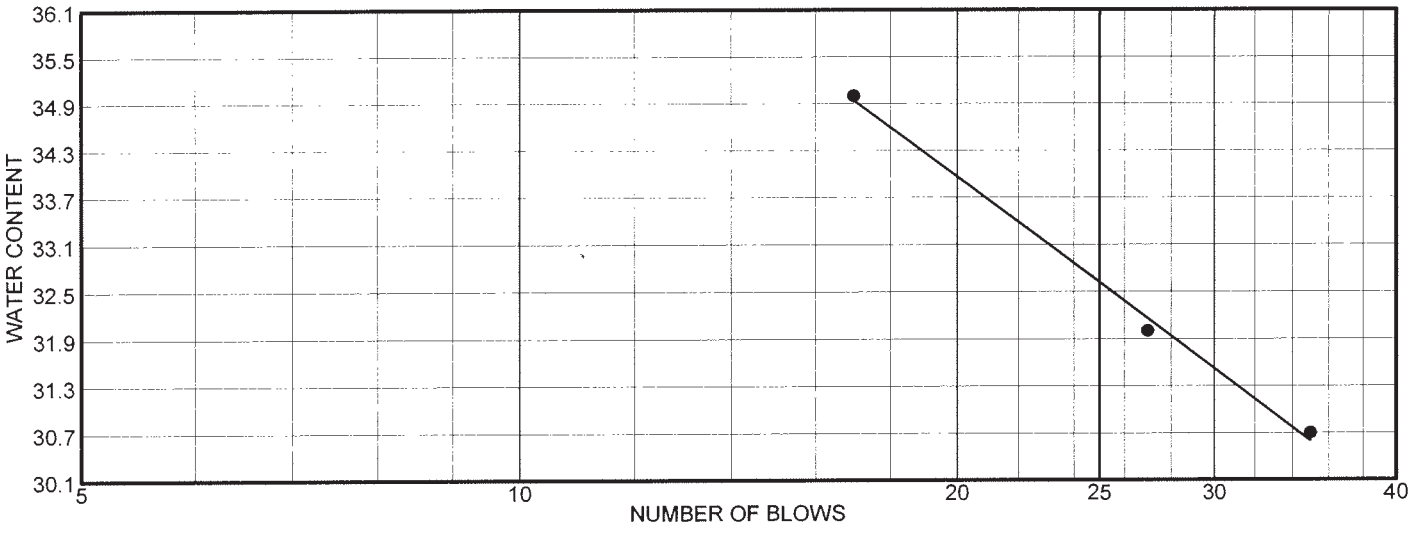
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay with sand	33	16	17			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

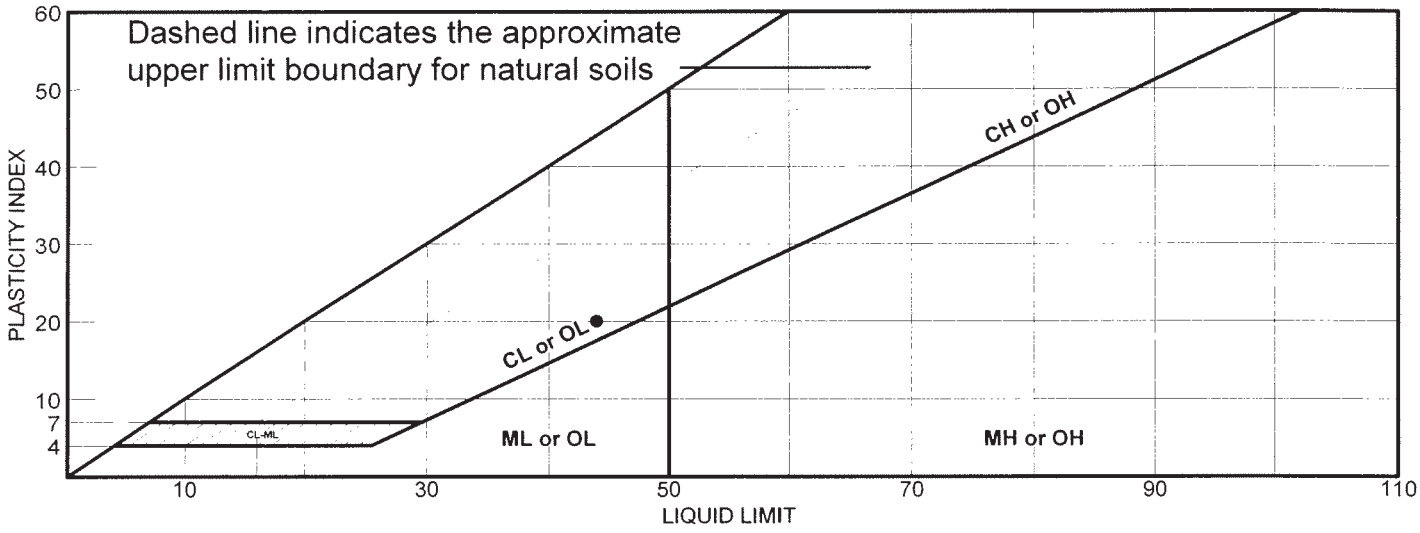
●

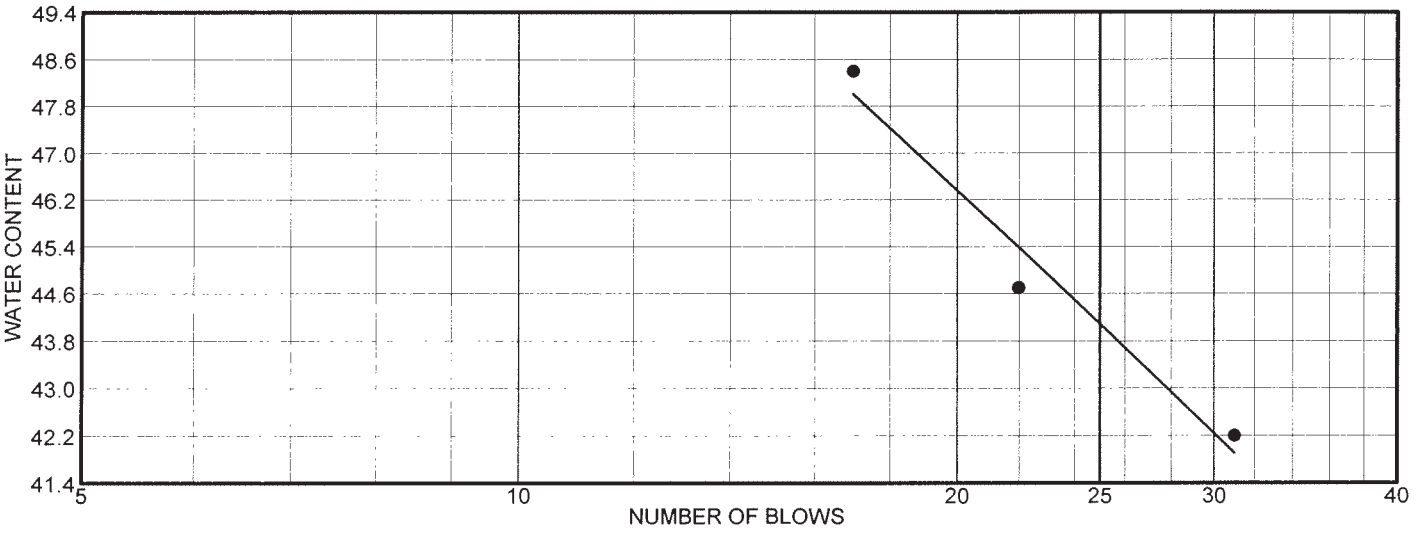
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive brown sandy lean clay	44	24	20			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 5-3 **Elev./Depth:** 21-21.5

Remarks:

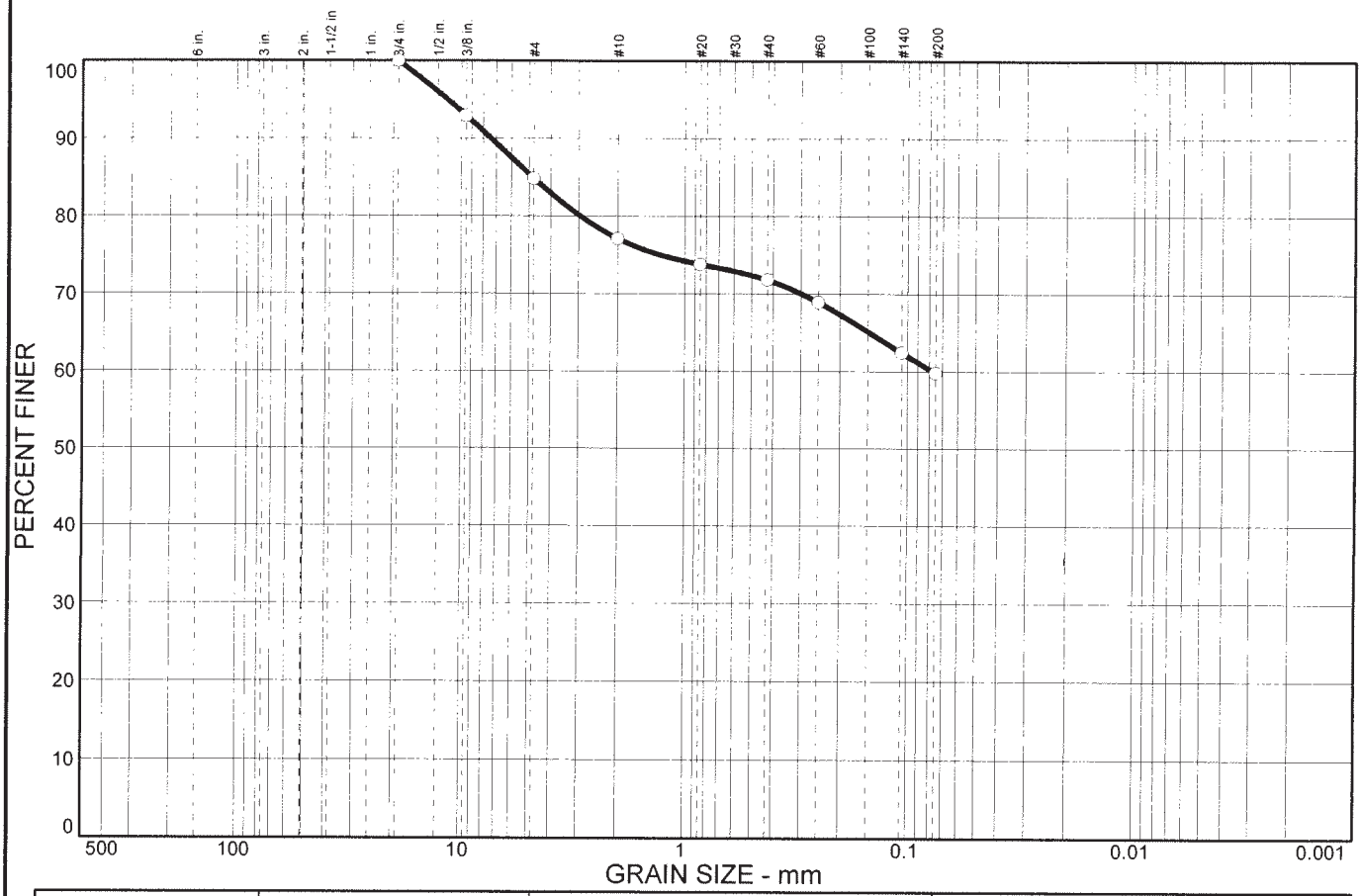
●

LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	15.2	7.7	5.3	12.0	59.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	92.9		
#4	84.8		
#10	77.1		
#20	73.8		
#40	71.8		
#60	68.9		
#140	62.4		
#200	59.8		

* (no specification provided)

Soil Description

Mottled brown sandy lean clay with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 4.84 D_{60}= 0.0770 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

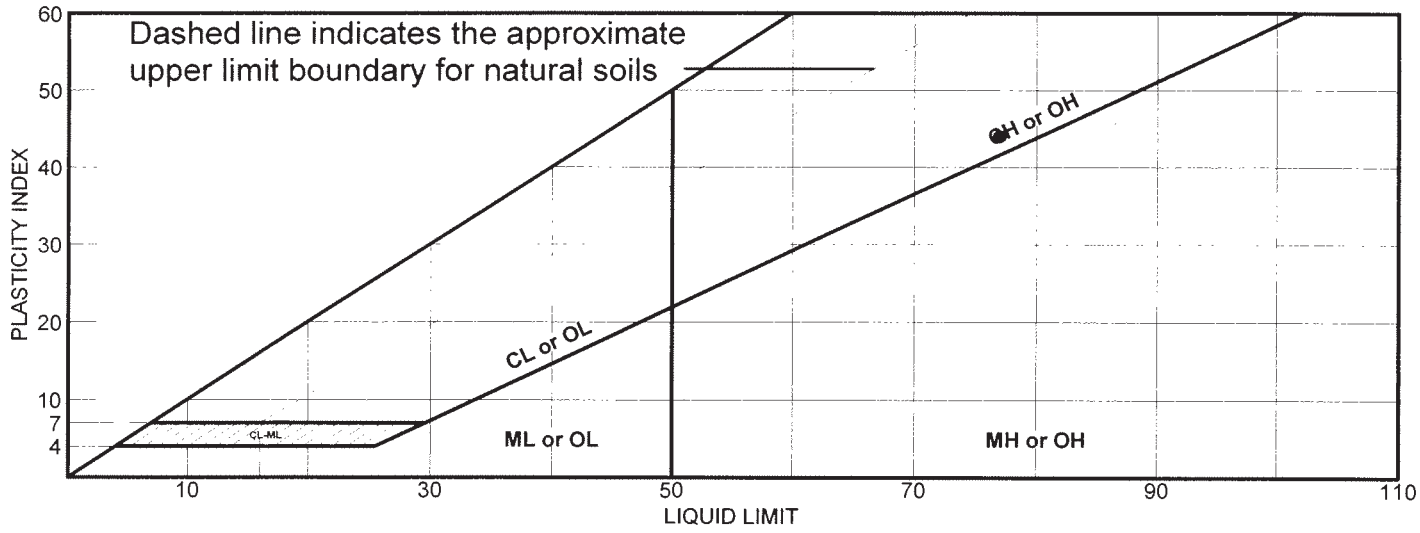
Remarks

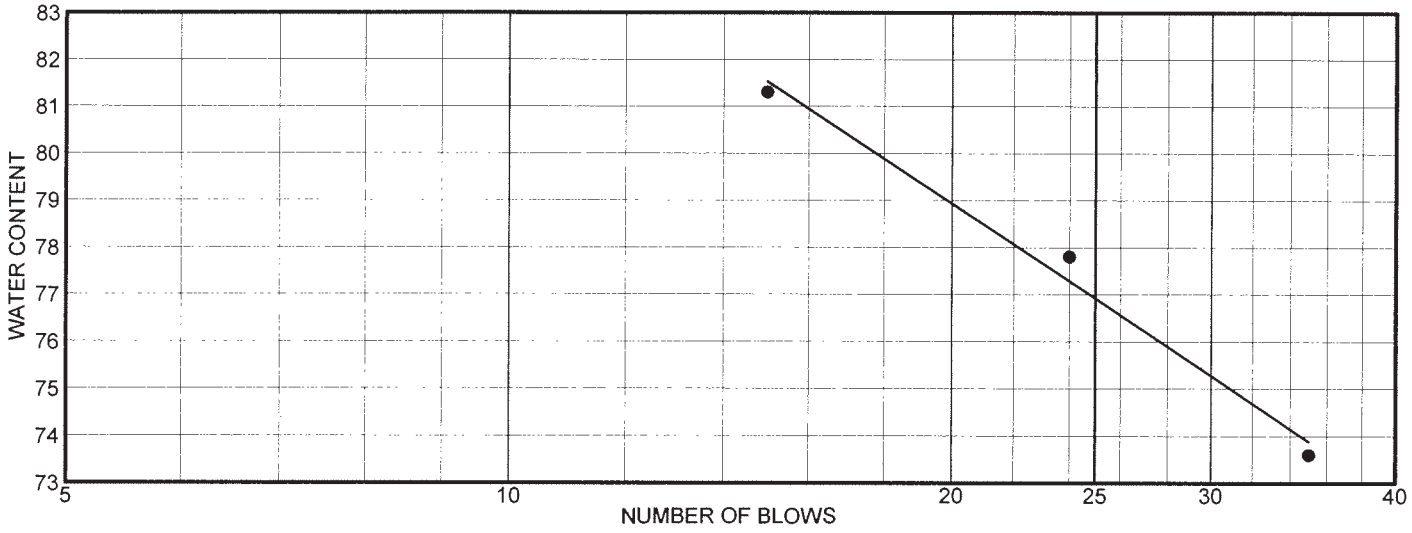
Sample No.: 2-1 **Source of Sample:** R-11-002 **Date:**
Location: **Elev./Depth:** 15-15.5

SIGNET Testing Labs

Client: URS
Project: I-880 @ 23rd and 29th Ave.
Project No: 27560836 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark reddish brown fat clay	77	33	44			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 8-2 **Elev./Depth:** 35.5-36

Remarks:

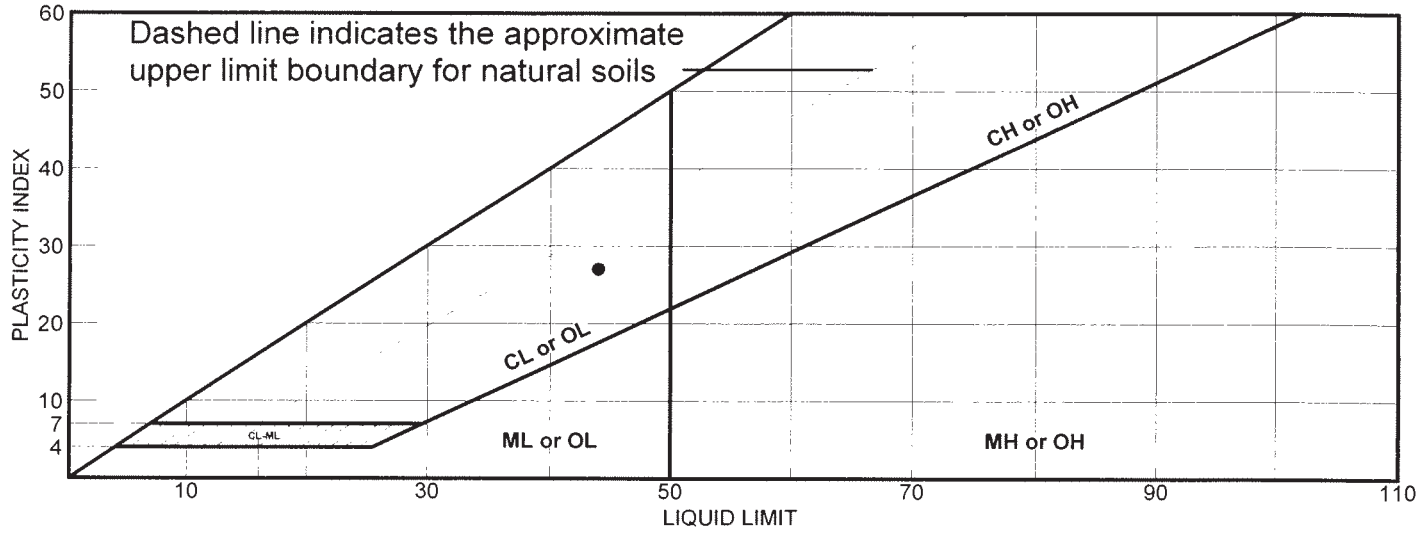
●

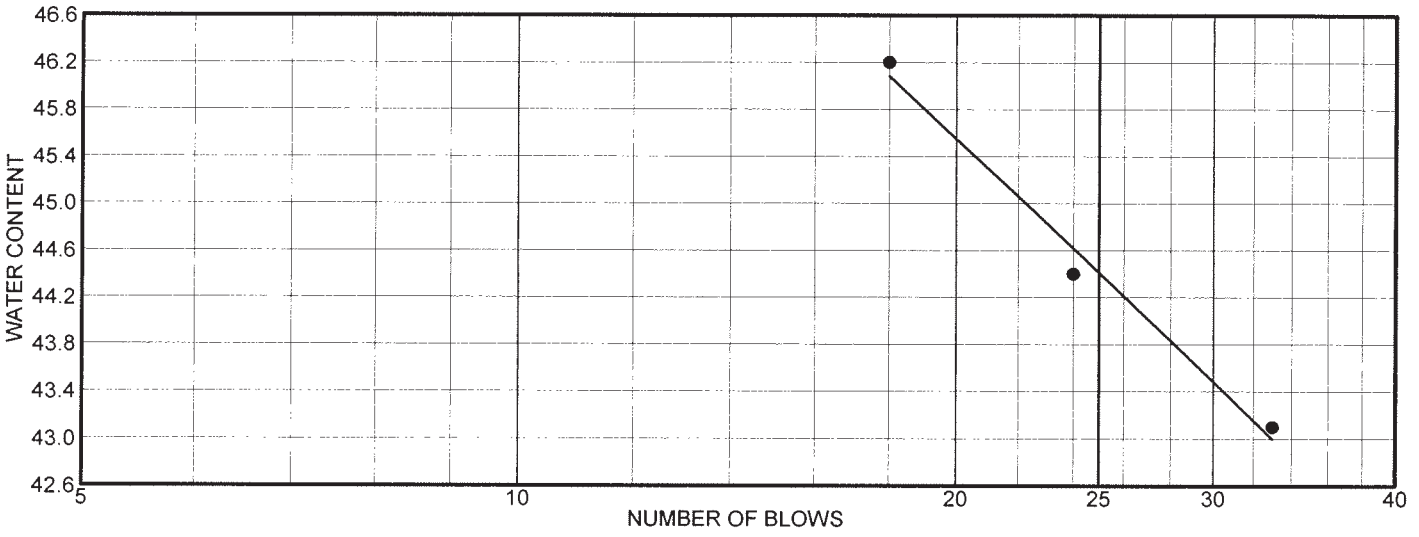
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	44	17	27			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-002 **Sample No.:** 5-3 **Elev./Depth:** 31-31.5

Remarks:

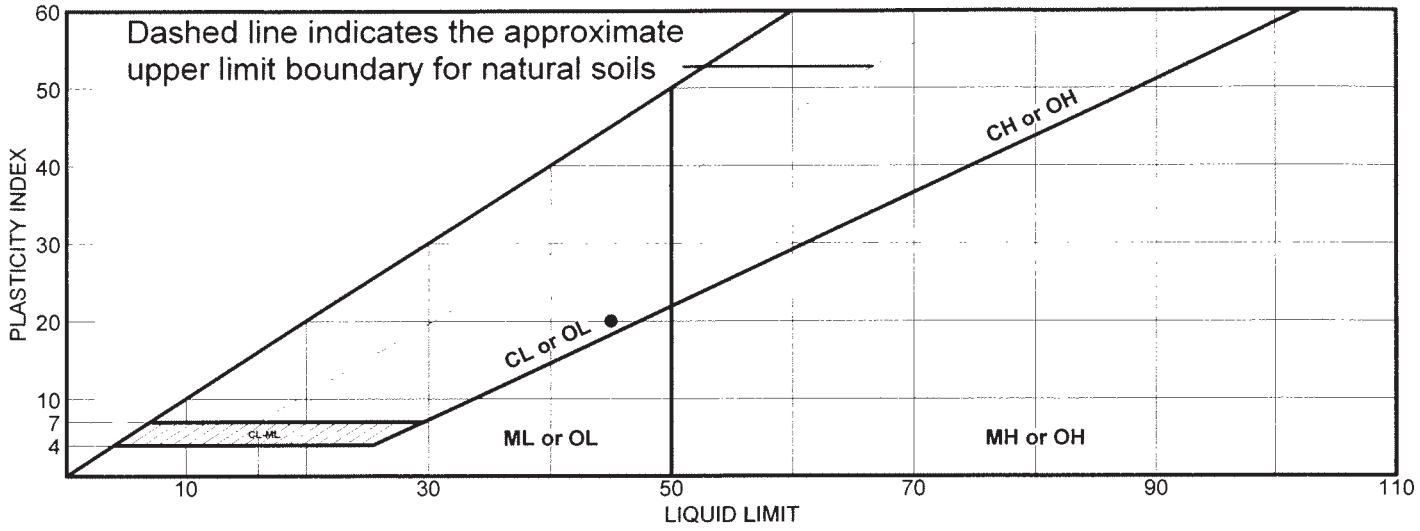
●

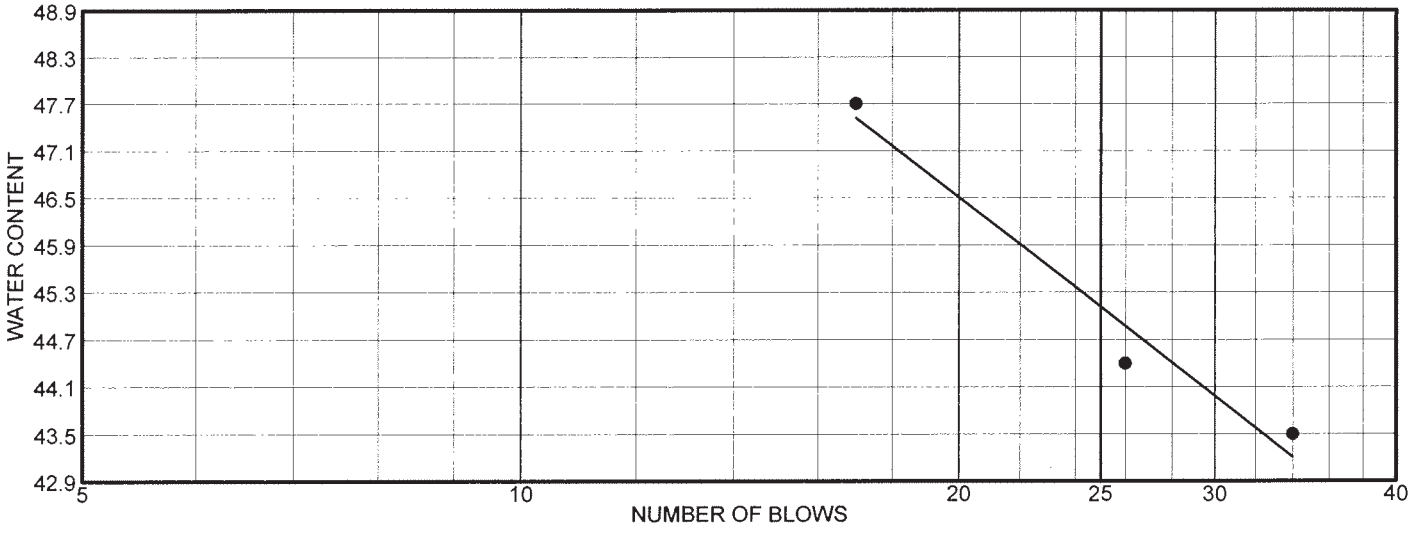
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	45	25	20			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 12-3 **Elev./Depth:** 61-61.5

Remarks:

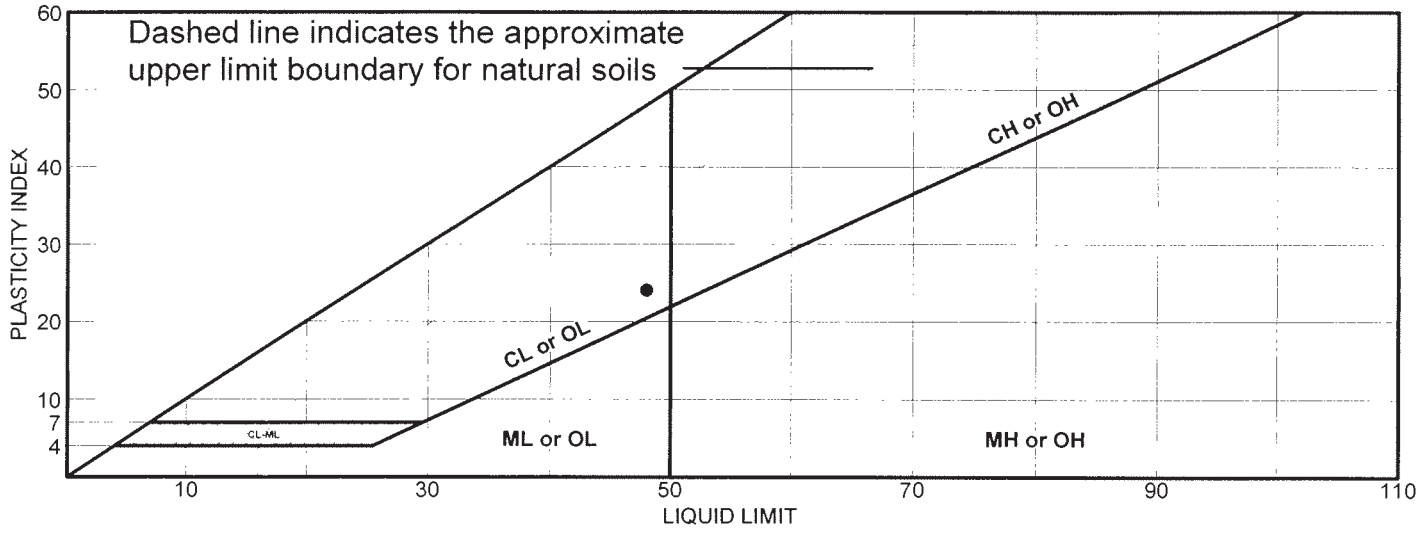
●

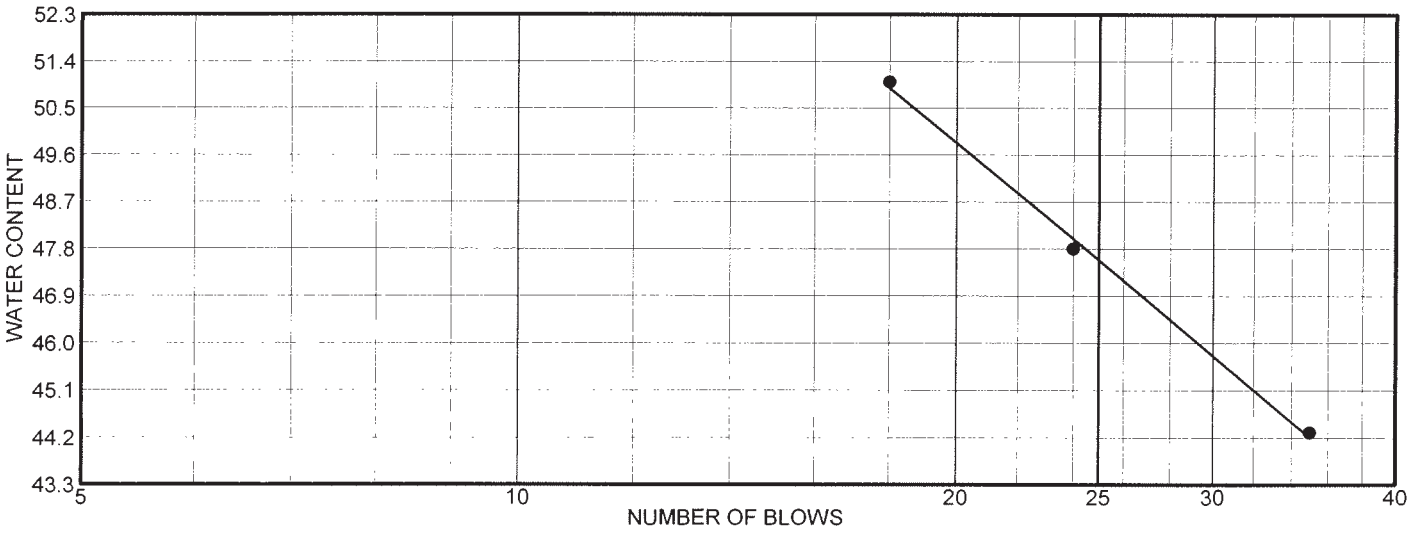
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark grayish brown lean clay with sand	48	24	24			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-005 **Sample No.:** 11-2 **Elev./Depth:** 50.5-51

Remarks:

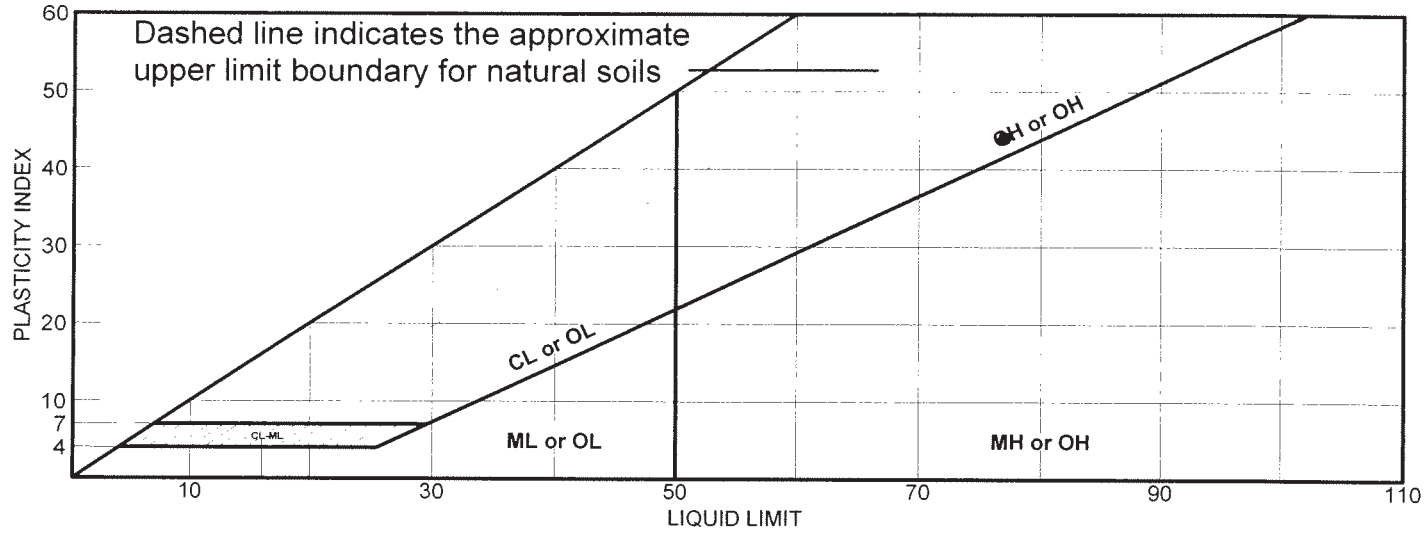
●

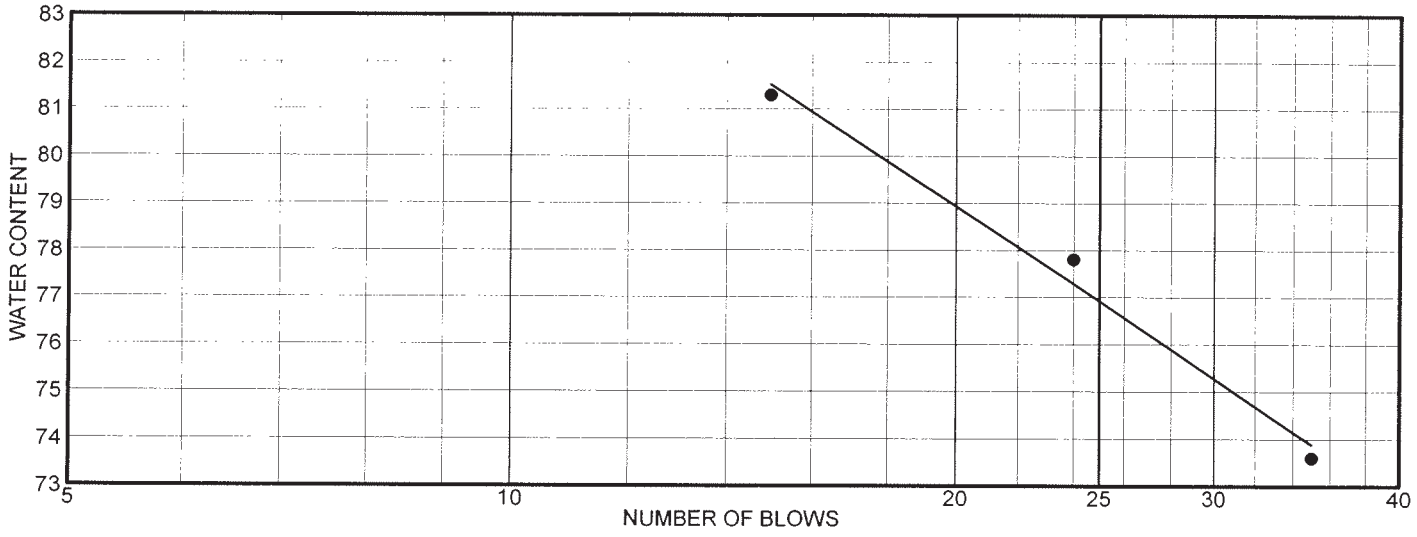
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark reddish brown fat clay	77	33	44			CH

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 8-2 **Elev./Depth:** 35.5-36

Remarks:

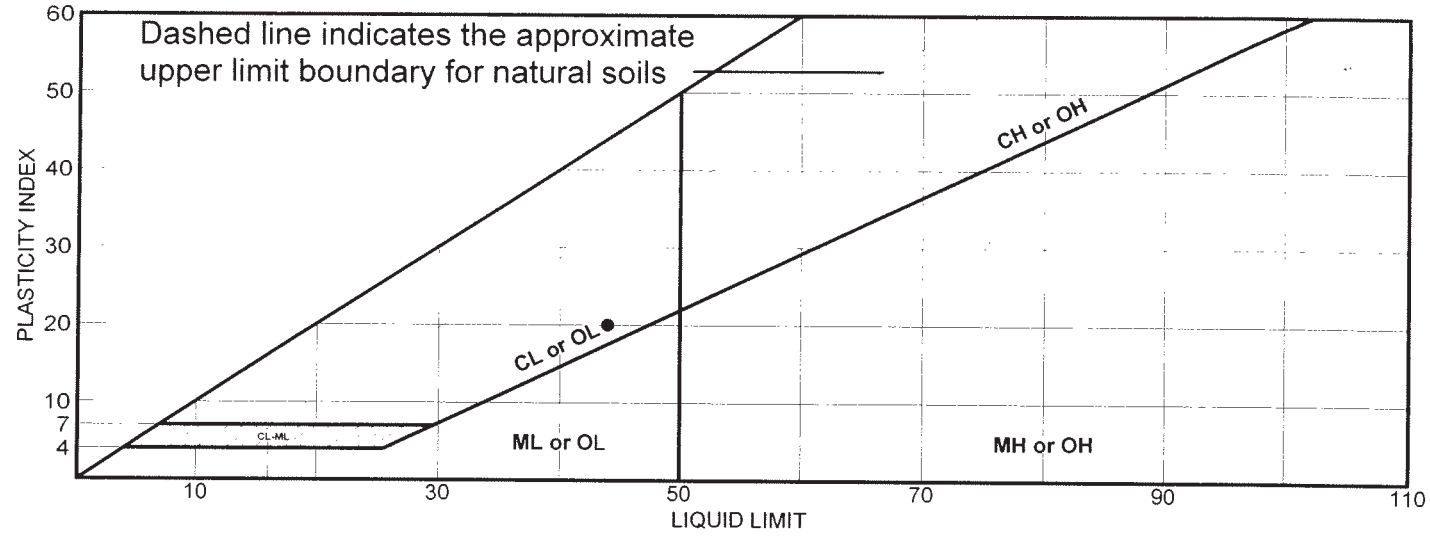
●

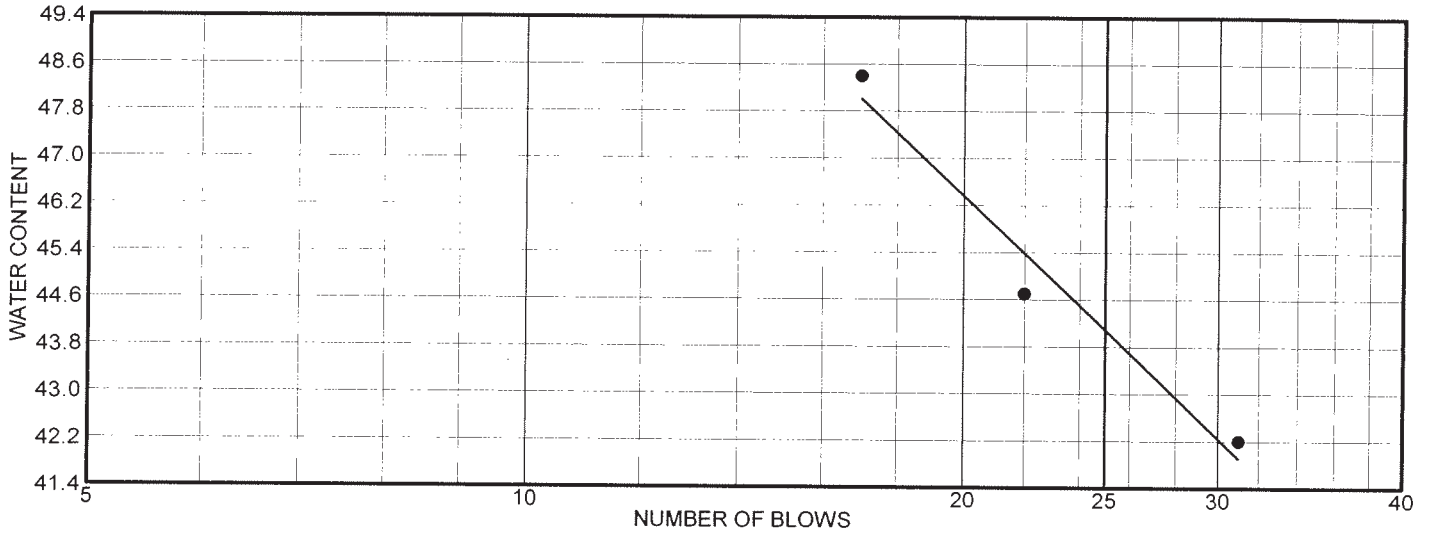
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive brown sandy lean clay	44	24	20			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 5-3 **Elev./Depth:** 21-21.5

Remarks:

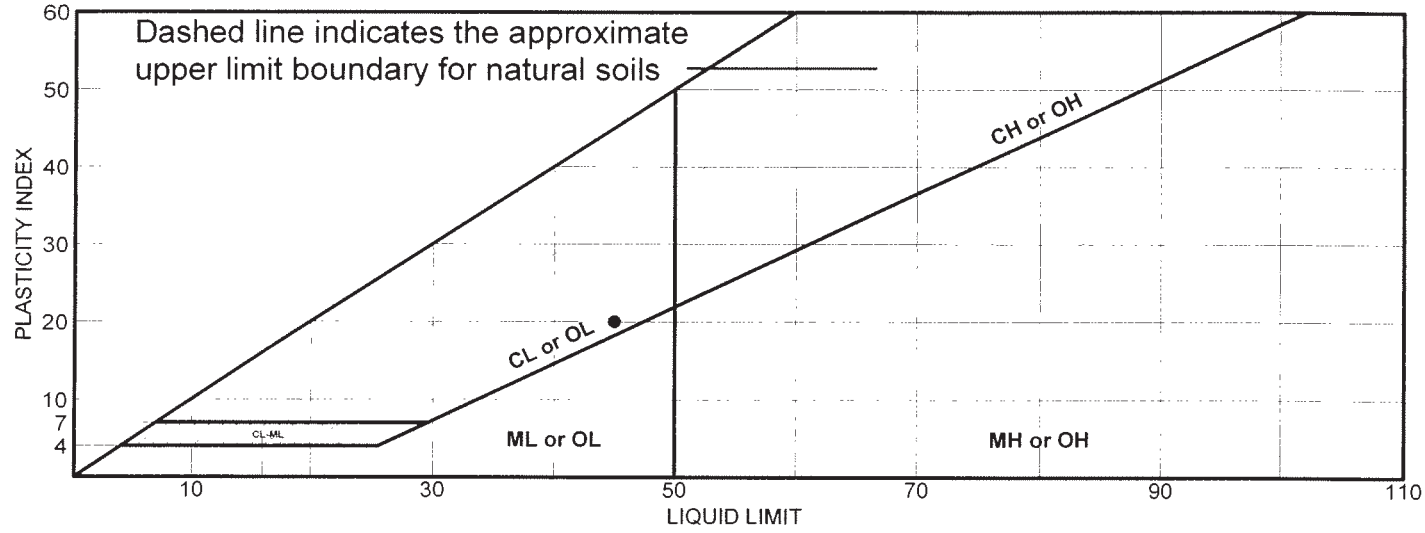
●

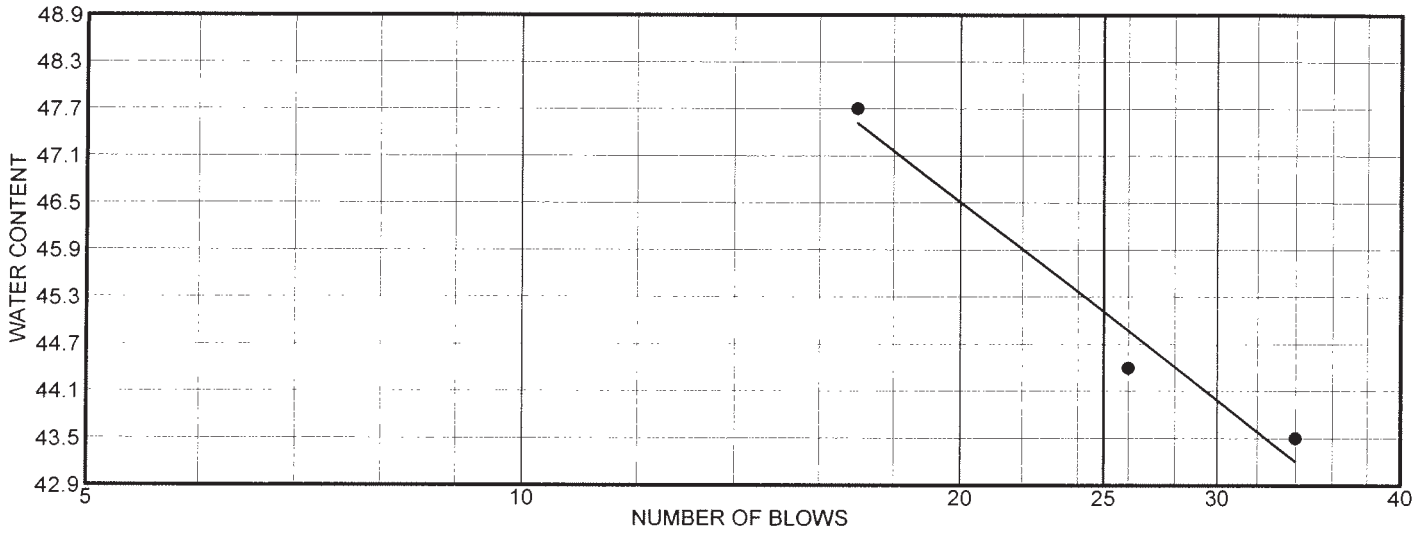
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	45	25	20			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 12-3 **Elev./Depth:** 61-61.5

Remarks:

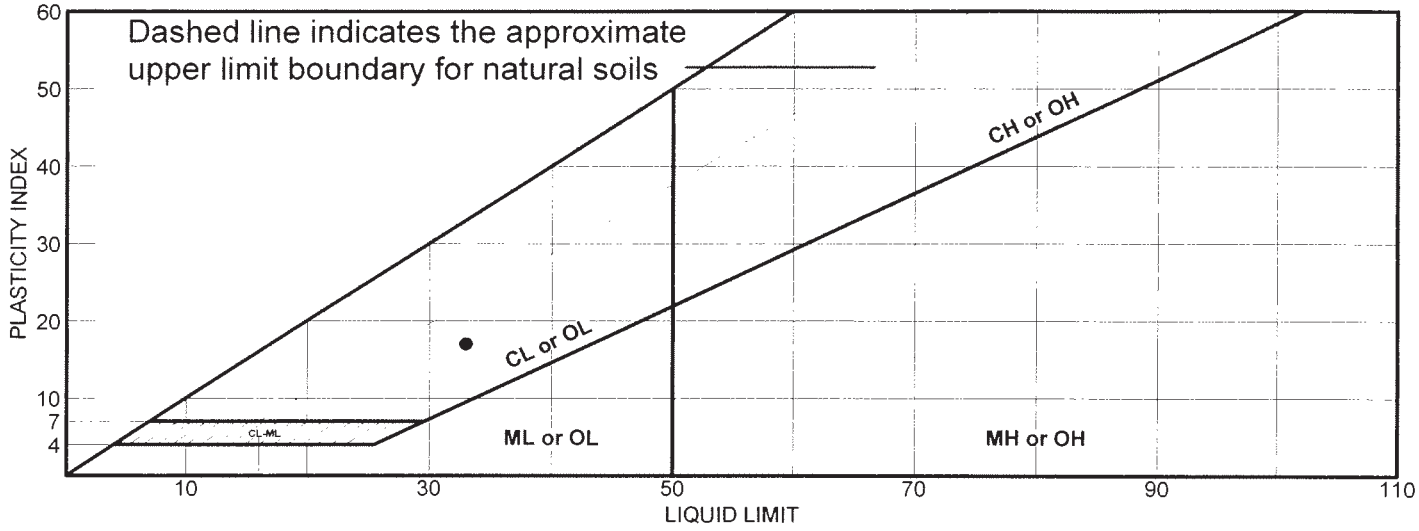
●

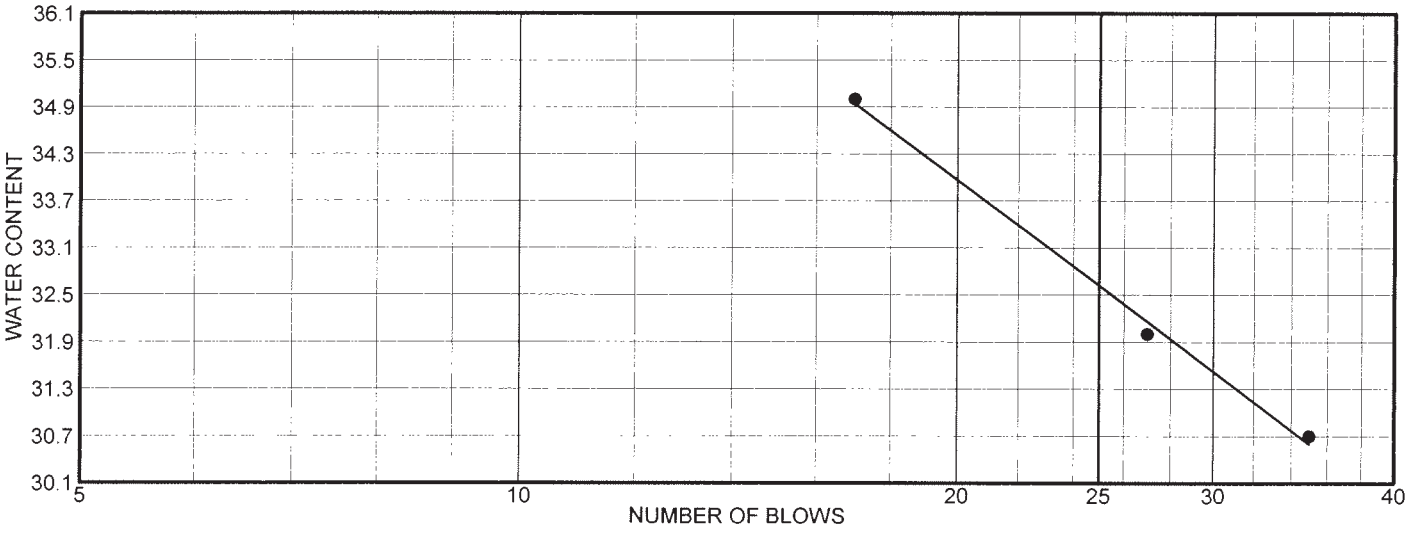
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay with sand	33	16	17			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

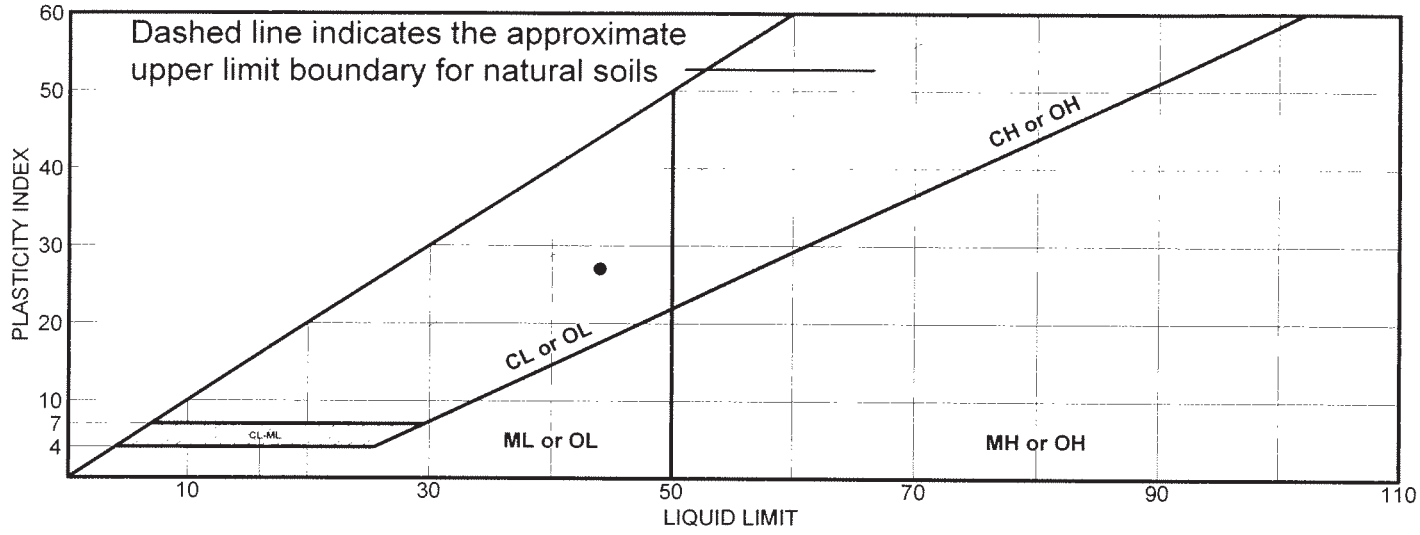
●

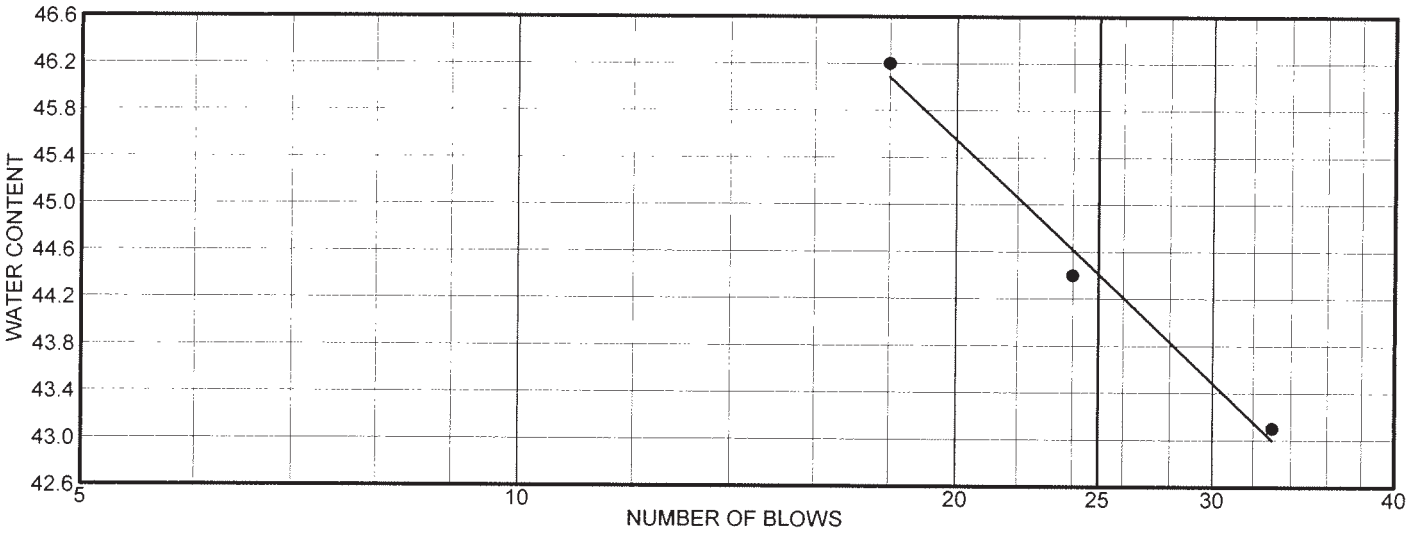
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	44	17	27			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-002 **Sample No.:** 5-3 **Elev./Depth:** 31-31.5

Remarks:

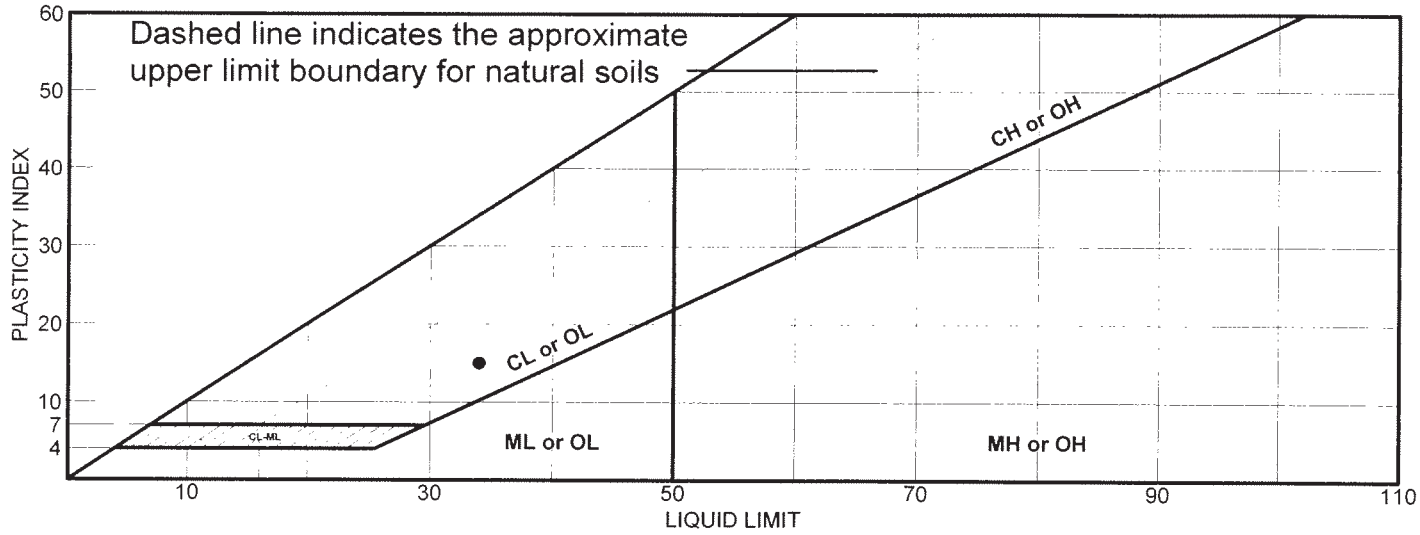
●

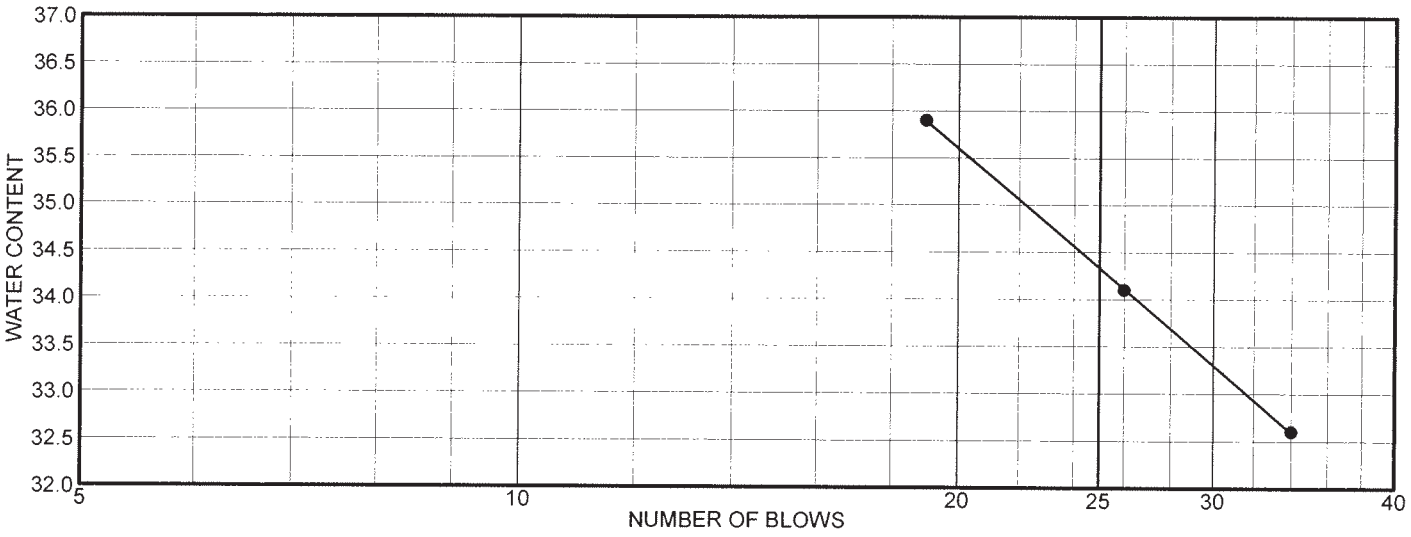
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay	34	19	15			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-001 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

●

LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

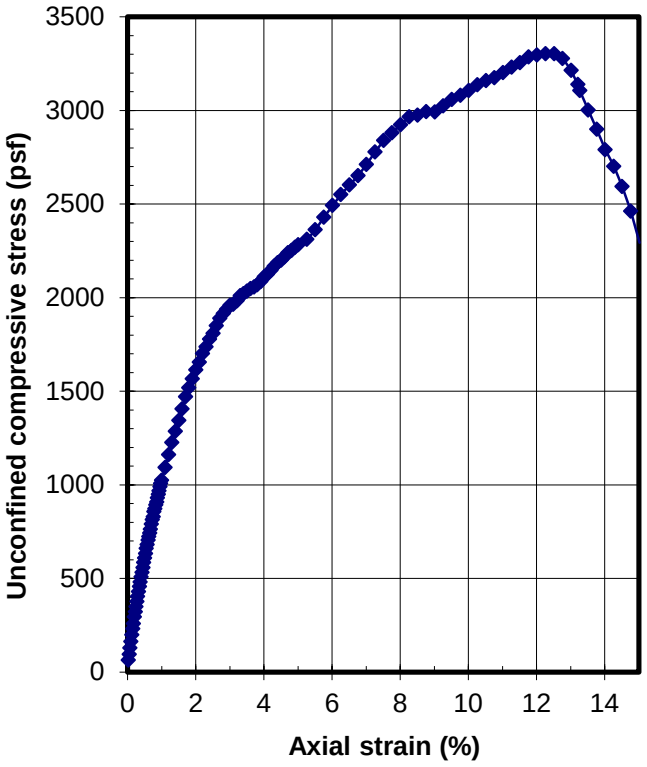
Figure

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-001
Sample No,	9-2
Depth (ft)	40.5-41
Date Tested	05/24/11
Soil Description	Undisturbed olive lean clay
Total wet weight	442.97 gms
Average Height	4.68 in
Average Diameter	1.92 in
Area	2.88 sq.in
Volume	220.77 c.c.
Void ratio	0.690
Ht/Dia ratio	2.44
Moisture	25.61 %
Wet density	125.26 pcf
Dry density	99.73 pcf
Saturation	100.2 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	3303 psf
Shear strength	1652 psf
Strain @ failure	12.52 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	63.13	1.60	1405.49	7.76	2881.05
0.05	93.94	1.70	1469.89	8.01	2923.60
0.07	129.12	1.80	1518.98	8.26	2965.38
0.10	163.42	1.90	1565.29	8.51	2975.14
0.13	198.83	2.00	1613.42	8.76	2993.29
0.15	231.18	2.11	1654.88	9.02	2992.00
0.17	258.44	2.20	1700.71	9.26	3024.21
0.20	294.67	2.31	1737.59	9.51	3058.16
0.23	321.11	2.40	1777.84	9.77	3080.70
0.25	348.49	2.51	1808.94	10.01	3106.87
0.27	376.42	2.61	1850.53	10.26	3137.03
0.30	404.66	2.71	1889.36	10.52	3159.74
0.32	429.86	2.81	1914.80	10.76	3173.96
0.35	456.81	2.90	1937.49	11.01	3201.17
0.37	481.36	3.01	1958.80	11.27	3230.54
0.40	508.62	3.11	1964.43	11.51	3254.37
0.42	532.81	3.21	1983.70	11.76	3284.66
0.45	558.06	3.31	2011.30	12.02	3295.94
0.47	584.59	3.40	2021.30	12.26	3302.78
0.50	609.15	3.51	2033.80	12.52	3303.38
0.53	632.11	3.61	2047.85	12.77	3277.61
0.55	660.01	3.71	2056.93	13.01	3214.02
0.57	681.30	3.81	2068.70	13.21	3137.76
0.60	704.90	3.90	2085.50	13.27	3106.06
0.63	722.77	4.01	2110.70	13.52	3001.19
0.65	741.92	4.11	2125.62	13.76	2899.26
0.67	762.83	4.21	2145.98	14.02	2790.15
0.70	789.78	4.31	2167.06	14.27	2701.62
0.73	813.82	4.41	2187.17	14.51	2592.45
0.75	829.61	4.51	2200.01	14.77	2461.21
0.77	857.50	4.61	2217.26	15.02	2293.21
0.80	871.93	4.71	2239.63		
0.83	893.14	4.81	2251.81		
0.85	908.90	4.91	2267.72		
0.87	929.62	5.01	2282.04		
0.90	948.39	5.26	2311.20		
0.93	968.35	5.51	2362.16		
0.95	990.30	5.76	2429.92		
0.97	1007.03	6.01	2492.29		
1.00	1023.79	6.26	2551.30		
1.10	1093.44	6.51	2601.02		
1.20	1160.59	6.76	2652.06		
1.30	1226.47	7.01	2711.47		
1.40	1286.03	7.26	2778.34		
1.50	1343.93	7.51	2838.57		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

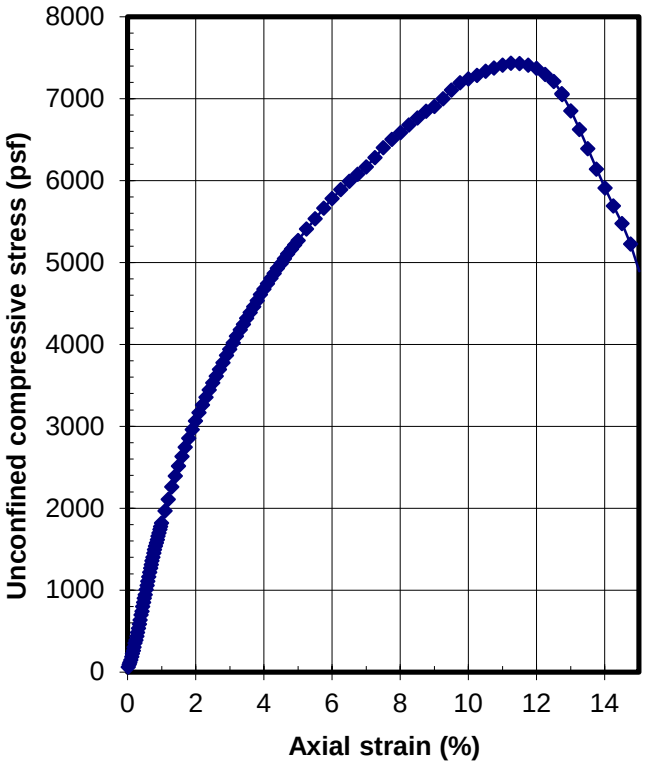
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-002
Sample No,	1-2
Depth (ft)	10.5-11
Date Tested	05/24/11
Soil Description	Undisturbed olive brown lean clay
Total wet weight	450.7 gms
Average Height	4.52 in
Average Diameter	1.92 in
Area	2.89 sq.in
Volume	213.78 c.c.
Void ratio	0.503
Ht/Dia ratio	2.36
Moisture	17.33 %
Wet density	131.62 pcf
Dry density	112.18 pcf
Saturation	93.1 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	7432 psf
Shear strength	3716 psf
Strain @ failure	11.26 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	58.83	1.60	2631.64	7.76	6502.31
0.05	89.87	1.70	2743.25	8.01	6582.49
0.07	113.73	1.79	2852.04	8.25	6675.94
0.09	144.64	1.90	2957.67	8.51	6763.89
0.12	183.82	2.00	3062.38	8.76	6843.95
0.15	222.94	2.10	3163.69	9.00	6905.67
0.17	260.62	2.20	3260.54	9.26	6998.19
0.19	302.82	2.30	3352.90	9.51	7102.83
0.22	351.66	2.40	3443.32	9.76	7192.41
0.25	389.48	2.50	3530.13	10.01	7238.84
0.27	436.14	2.60	3612.44	10.26	7282.39
0.29	482.80	2.70	3694.56	10.51	7335.10
0.32	533.08	2.80	3776.59	10.76	7373.21
0.35	582.38	2.90	3862.97	11.01	7408.45
0.37	634.78	3.00	3939.47	11.26	7431.88
0.39	695.70	3.10	4018.51	11.51	7425.96
0.42	738.66	3.20	4097.39	11.76	7409.35
0.45	798.11	3.30	4176.12	12.01	7370.50
0.47	848.42	3.40	4245.08	12.26	7294.55
0.49	899.02	3.50	4318.25	12.51	7209.34
0.52	944.05	3.60	4388.78	12.74	7060.45
0.55	1003.84	3.70	4457.99	12.76	7047.72
0.57	1054.88	3.80	4532.15	13.01	6850.10
0.59	1107.52	3.90	4606.23	13.26	6622.86
0.62	1160.56	4.01	4673.58	13.51	6388.46
0.65	1216.13	4.10	4738.98	13.76	6140.14
0.67	1264.93	4.21	4806.92	14.01	5908.19
0.69	1309.11	4.30	4866.59	14.26	5687.79
0.72	1358.50	4.40	4926.35	14.51	5473.91
0.75	1400.00	4.51	4984.77	14.76	5222.88
0.77	1450.26	4.60	5043.89	15.01	4895.63
0.79	1491.92	4.70	5101.81		
0.82	1535.10	4.81	5161.35		
0.85	1577.42	4.90	5213.68		
0.87	1616.15	5.01	5268.65		
0.89	1655.95	5.25	5409.63		
0.92	1696.46	5.51	5533.66		
0.95	1739.91	5.76	5661.86		
0.97	1773.70	6.00	5780.04		
0.99	1817.49	6.26	5889.06		
1.10	1965.76	6.51	5989.13		
1.20	2105.73	6.75	6074.02		
1.30	2257.79	7.01	6167.13		
1.40	2392.60	7.26	6279.44		
1.49	2514.16	7.50	6400.57		



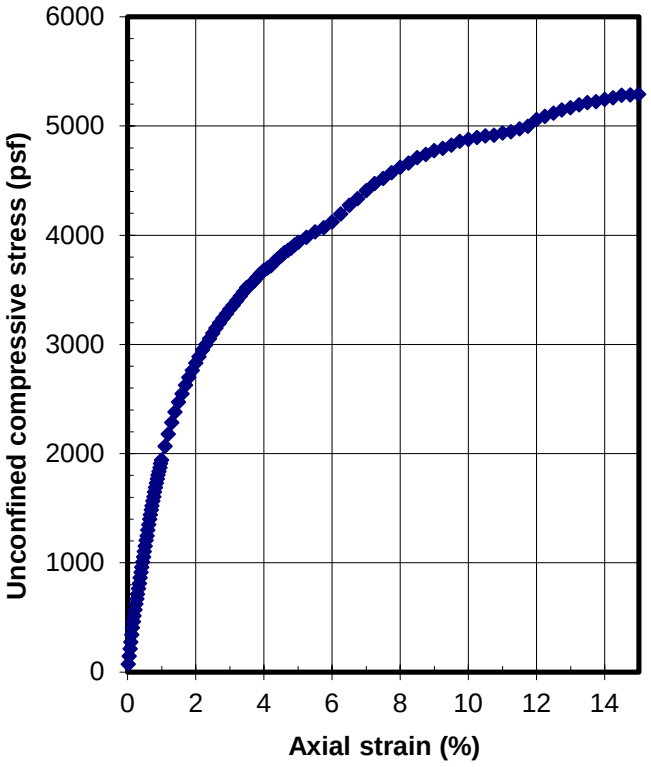
See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-003
Sample No,	11-3
Depth (ft)	51-51.5
Date Tested	05/24/11
Soil Description	Undisturbed grayish brown lean clay
Total wet weight	485.56 gms
Average Height	4.81 in
Average Diameter	1.93 in
Area	2.93 sq.in
Volume	231.31 c.c.
Void ratio	0.536
Ht/Dia ratio	2.49
Moisture	19.44 %
Wet density	131.05 pcf
Dry density	109.72 pcf
Saturation	97.9 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	5292 psf
Shear strength	2646 psf
Strain @ failure	15.00 %



Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	72.10	1.60	2546.79	7.75	4572.68
0.05	143.71	1.70	2625.63	8.01	4620.84
0.07	210.57	1.80	2697.15	8.25	4660.98
0.09	274.74	1.90	2762.22	8.50	4710.61
0.12	340.66	2.00	2828.05	8.75	4738.79
0.15	403.88	2.10	2887.42	9.00	4775.06
0.17	459.91	2.20	2947.66	9.25	4795.47
0.19	514.33	2.30	2998.94	9.50	4822.33
0.22	570.64	2.40	3049.53	9.75	4858.27
0.25	622.29	2.50	3100.73	10.00	4877.27
0.27	669.03	2.60	3147.33	10.25	4894.31
0.29	713.31	2.70	3193.26	10.50	4907.26
0.32	762.56	2.80	3238.90	10.75	4914.34
0.35	808.55	2.90	3278.80	11.00	4936.19
0.37	861.99	3.00	3320.18	11.25	4947.19
0.39	913.21	3.10	3358.88	11.50	4973.47
0.42	958.45	3.20	3400.49	11.75	4996.46
0.45	1004.49	3.31	3440.90	12.00	5057.01
0.47	1053.28	3.40	3477.92	12.25	5088.45
0.49	1101.60	3.50	3518.68	12.50	5116.21
0.52	1151.28	3.60	3546.02	12.75	5146.50
0.55	1203.75	3.70	3574.84	13.00	5164.94
0.57	1245.92	3.81	3612.49	13.25	5193.08
0.59	1299.02	3.90	3646.06	13.50	5214.14
0.62	1348.75	4.01	3677.21	13.75	5221.19
0.65	1397.44	4.10	3699.78	14.00	5241.23
0.67	1439.74	4.21	3719.66	14.25	5256.90
0.69	1482.60	4.30	3752.09	14.50	5281.06
0.72	1522.48	4.40	3781.16	14.75	5284.38
0.75	1565.20	4.51	3809.91	15.00	5289.69
0.77	1603.75	4.60	3839.43	15.00	5292.46
0.79	1648.59	4.71	3858.97		
0.82	1687.22	4.80	3879.84		
0.85	1730.90	4.90	3910.59		
0.87	1767.64	5.01	3931.96		
0.89	1803.50	5.25	3979.11		
0.92	1835.00	5.50	4029.84		
0.95	1870.49	5.76	4066.73		
0.97	1908.42	6.00	4120.77		
0.99	1941.34	6.25	4194.61		
1.10	2066.13	6.51	4273.18		
1.20	2176.49	6.75	4335.37		
1.30	2283.21	7.00	4408.66		
1.40	2379.99	7.26	4473.26		
1.50	2470.99	7.50	4517.98		

See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

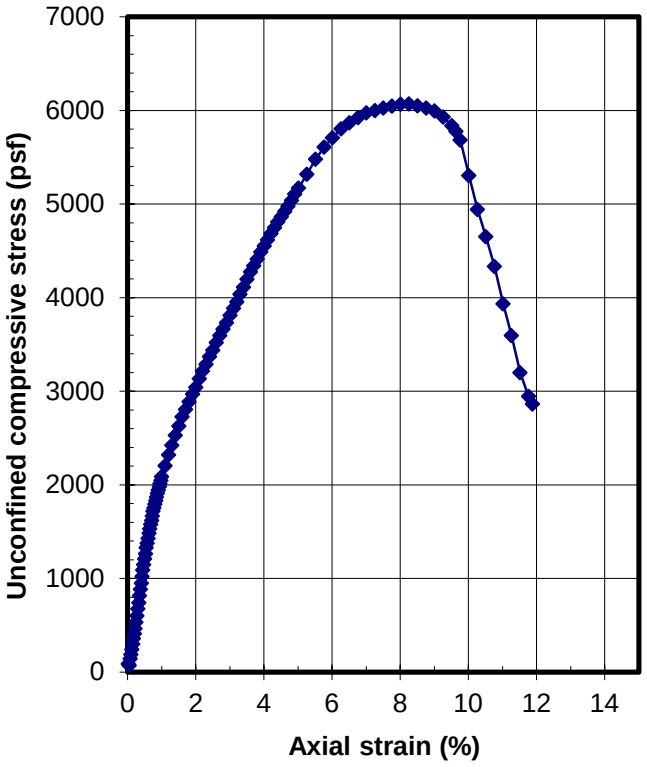
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-004
Sample No,	2-3
Depth (ft)	6-6.5
Date Tested	05/24/11
Soil Description	Undisturbed brown lean clay
Total wet weight	444.51 gms
Average Height	4.62 in
Average Diameter	1.90 in
Area	2.83 sq.in
Volume	213.97 c.c.
Void ratio	0.524
Ht/Dia ratio	2.43
Moisture	17.24 %
Wet density	129.69 pcf
Dry density	110.62 pcf
Saturation	88.9 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	6070 psf
Shear strength	3035 psf
Strain @ failure	8.26 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	87.96	1.60	2726.68	7.76	6046.02
0.05	67.92	1.70	2804.75	8.01	6064.21
0.07	142.18	1.80	2884.33	8.26	6069.95
0.10	185.72	1.91	2968.62	8.51	6049.66
0.12	240.85	2.00	3038.32	8.76	6024.17
0.15	299.11	2.11	3131.31	9.01	5993.00
0.18	355.22	2.20	3215.26	9.26	5929.88
0.20	409.32	2.30	3284.38	9.52	5834.95
0.22	463.46	2.41	3369.34	9.63	5774.13
0.25	531.97	2.50	3435.85	9.76	5682.34
0.28	600.69	2.61	3518.00	10.01	5303.76
0.30	676.04	2.70	3593.16	10.27	4938.83
0.33	740.86	2.80	3661.95	10.51	4651.54
0.35	816.03	2.91	3728.71	10.77	4331.33
0.38	882.53	3.00	3807.96	11.02	3932.68
0.40	948.84	3.11	3883.68	11.26	3594.22
0.43	1017.93	3.21	3952.63	11.52	3197.44
0.45	1086.89	3.30	4034.29	11.77	2945.74
0.48	1146.09	3.41	4108.82	11.88	2861.76
0.50	1208.57	3.50	4193.91		
0.53	1260.86	3.61	4273.44		
0.55	1325.62	3.71	4340.06		
0.58	1375.51	3.81	4410.94		
0.60	1427.13	3.91	4484.55		
0.63	1482.22	4.01	4549.36		
0.65	1527.47	4.11	4615.15		
0.68	1577.42	4.21	4684.17		
0.70	1616.78	4.31	4745.71		
0.73	1664.19	4.41	4805.66		
0.75	1715.42	4.51	4861.20		
0.78	1750.05	4.61	4920.47		
0.80	1793.70	4.71	4974.34		
0.83	1828.56	4.81	5035.63		
0.85	1867.14	4.91	5105.44		
0.88	1909.17	5.01	5168.53		
0.90	1943.24	5.26	5315.02		
0.93	1979.11	5.51	5476.89		
0.95	2012.54	5.76	5606.67		
0.98	2046.82	6.01	5707.32		
1.00	2086.90	6.26	5801.72		
1.10	2203.40	6.51	5867.93		
1.20	2319.51	6.76	5920.05		
1.30	2422.09	7.01	5971.08		
1.41	2525.96	7.26	5998.28		
1.50	2624.57	7.51	6023.80		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

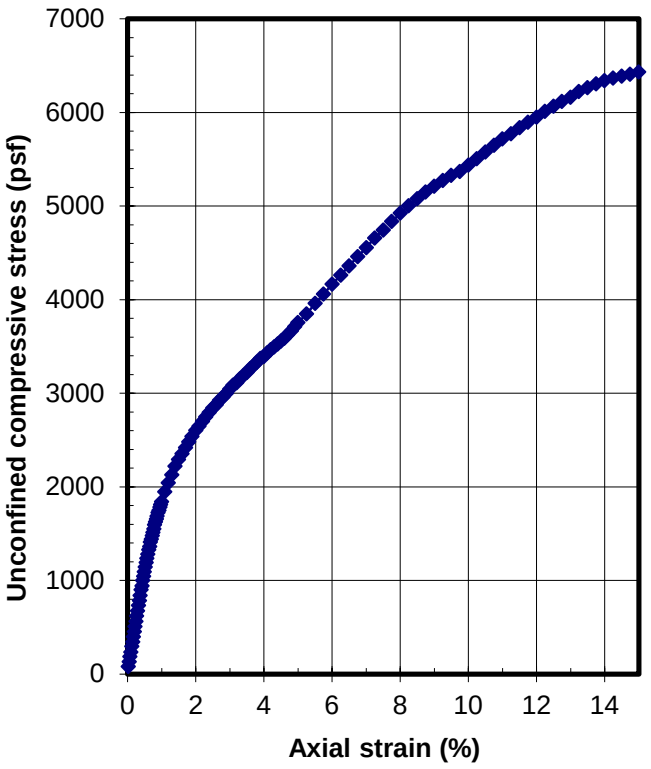
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-005
Sample No,	2-2
Depth (ft)	5.5-6
Date Tested	05/25/11
Soil Description	Undisturbed brown lean clay
Total wet weight	466.99 gms
Average Height	4.71 in
Average Diameter	1.92 in
Area	2.90 sq.in
Volume	223.59 c.c.
Void ratio	0.493
Ht/Dia ratio	2.45
Moisture	15.51 %
Wet density	130.39 pcf
Dry density	112.89 pcf
Saturation	84.9 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	6431 psf
Shear strength	3216 psf
Strain @ failure	15.00 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	78.35	1.60	2354.22	7.75	4833.76
0.05	132.25	1.70	2418.11	8.00	4922.66
0.07	186.79	1.80	2479.95	8.25	5003.11
0.10	234.69	1.89	2536.87	8.50	5077.80
0.12	293.97	2.00	2600.95	8.75	5150.07
0.15	341.24	2.10	2647.60	9.00	5210.36
0.17	397.02	2.20	2696.37	9.25	5270.42
0.20	453.61	2.30	2746.29	9.50	5325.49
0.22	507.97	2.40	2793.90	9.75	5366.80
0.25	560.55	2.50	2842.38	10.00	5434.86
0.27	620.54	2.60	2876.15	10.25	5503.58
0.30	673.20	2.70	2923.95	10.50	5576.24
0.32	732.44	2.80	2956.72	10.75	5648.36
0.35	782.39	2.90	2998.44	11.00	5716.08
0.37	838.12	3.00	3044.80	11.25	5772.57
0.40	898.60	3.10	3083.81	11.50	5836.01
0.42	940.40	3.20	3113.31	11.75	5895.50
0.45	997.66	3.30	3152.75	12.00	5949.12
0.47	1043.25	3.40	3185.49	12.25	6008.94
0.50	1092.51	3.50	3220.18	12.50	6064.20
0.52	1143.65	3.60	3261.28	12.75	6117.15
0.55	1190.43	3.70	3295.78	13.00	6159.69
0.57	1234.26	3.80	3330.98	13.25	6223.35
0.60	1278.13	3.90	3371.15	13.50	6262.48
0.62	1327.65	4.00	3393.09	13.75	6305.93
0.65	1362.07	4.10	3429.23	14.00	6337.28
0.67	1409.28	4.20	3462.39	14.25	6364.29
0.70	1441.68	4.30	3496.06	14.50	6387.01
0.72	1478.77	4.40	3525.87	14.75	6406.82
0.75	1511.94	4.50	3555.97	15.00	6431.15
0.77	1549.06	4.60	3586.11	15.01	6430.22
0.80	1592.76	4.70	3625.27		
0.82	1623.14	4.81	3666.68		
0.85	1654.68	4.90	3711.34		
0.87	1687.08	5.00	3755.93		
0.90	1724.48	5.25	3847.17		
0.92	1748.52	5.50	3959.09		
0.95	1782.30	5.75	4059.05		
0.97	1809.60	6.00	4162.96		
1.00	1838.50	6.25	4260.37		
1.09	1945.65	6.50	4360.29		
1.20	2041.31	6.75	4457.84		
1.30	2127.67	7.00	4554.39		
1.39	2219.31	7.25	4658.16		
1.50	2292.38	7.50	4741.22		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

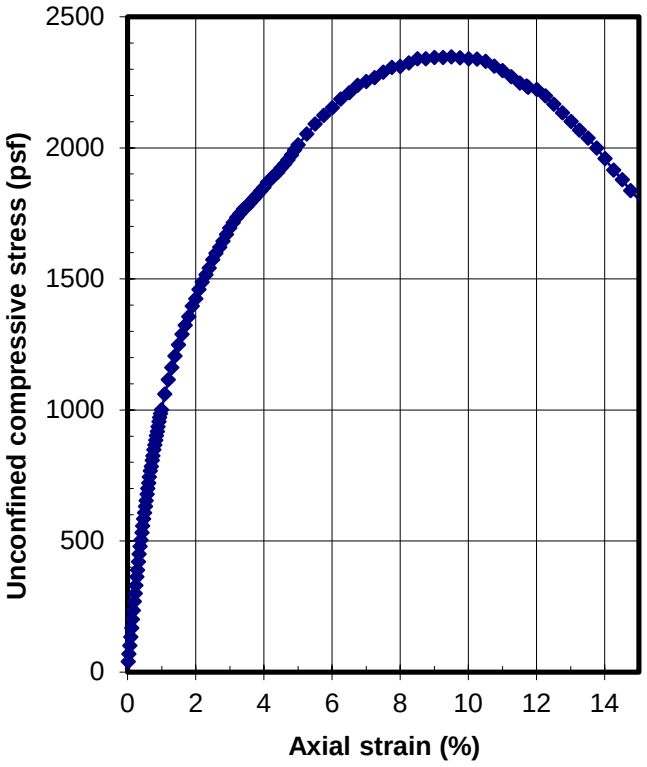
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-005
Sample No,	6-2
Depth (ft)	25.5-26
Date Tested	05/24/11
Soil Description	Undisturbed brown lean clay
Total wet weight	444.18 gms
Average Height	4.56 in
Average Diameter	1.93 in
Area	2.93 sq.in
Volume	218.49 c.c.
Void ratio	0.622
Ht/Dia ratio	2.36
Moisture	22.11 %
Wet density	126.92 pcf
Dry density	103.94 pcf
Saturation	96.0 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	2347 psf
Shear strength	1173 psf
Strain @ failure	9.51 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	39.92	1.60	1288.13	7.76	2306.99
0.04	68.49	1.69	1322.39	8.01	2310.03
0.07	99.95	1.80	1356.00	8.26	2323.78
0.10	133.32	1.90	1395.20	8.51	2338.98
0.12	167.27	2.00	1424.26	8.76	2339.46
0.14	201.04	2.10	1459.68	9.01	2343.75
0.17	234.50	2.20	1487.37	9.26	2343.95
0.20	268.41	2.30	1514.89	9.51	2346.53
0.22	299.16	2.40	1541.32	9.76	2343.50
0.24	330.15	2.50	1572.38	10.01	2339.68
0.27	362.94	2.60	1596.59	10.26	2337.80
0.30	388.78	2.70	1620.09	10.51	2329.45
0.32	420.34	2.80	1643.17	10.76	2311.41
0.34	450.14	2.90	1668.73	11.01	2294.68
0.37	479.10	3.00	1693.28	11.26	2270.99
0.40	503.19	3.10	1713.89	11.51	2247.00
0.42	531.38	3.20	1733.67	11.71	2235.40
0.44	556.91	3.30	1748.75	11.76	2231.41
0.47	584.16	3.41	1765.28	12.01	2222.23
0.50	607.48	3.50	1776.34	12.26	2197.42
0.52	631.65	3.60	1790.58	12.51	2165.72
0.54	653.34	3.70	1804.96	12.76	2132.96
0.57	677.38	3.80	1819.76	13.01	2099.92
0.60	699.64	3.91	1835.78	13.26	2067.12
0.62	720.95	4.00	1848.59	13.51	2036.35
0.64	743.34	4.11	1868.81	13.76	1999.10
0.67	766.43	4.20	1880.68	14.01	1958.28
0.70	783.95	4.31	1894.56	14.26	1914.41
0.72	807.73	4.41	1905.61	14.52	1878.16
0.74	824.87	4.50	1921.87	14.76	1836.25
0.77	847.30	4.61	1937.49	15.01	1802.04
0.80	865.38	4.71	1953.57		
0.82	884.61	4.81	1971.42		
0.85	901.12	4.91	1991.84		
0.87	917.22	5.00	2010.81		
0.90	935.86	5.26	2053.05		
0.92	954.91	5.51	2089.89		
0.94	970.90	5.76	2122.80		
0.97	985.16	6.01	2152.89		
1.00	1000.47	6.26	2185.26		
1.10	1060.26	6.51	2210.50		
1.20	1115.04	6.76	2238.24		
1.30	1161.27	7.01	2252.90		
1.39	1205.61	7.26	2267.81		
1.50	1247.95	7.51	2287.70		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

Signet Testing Labs, Inc.

UNCONFINED COMPRESSION TEST - Uc
ASTM D-2166

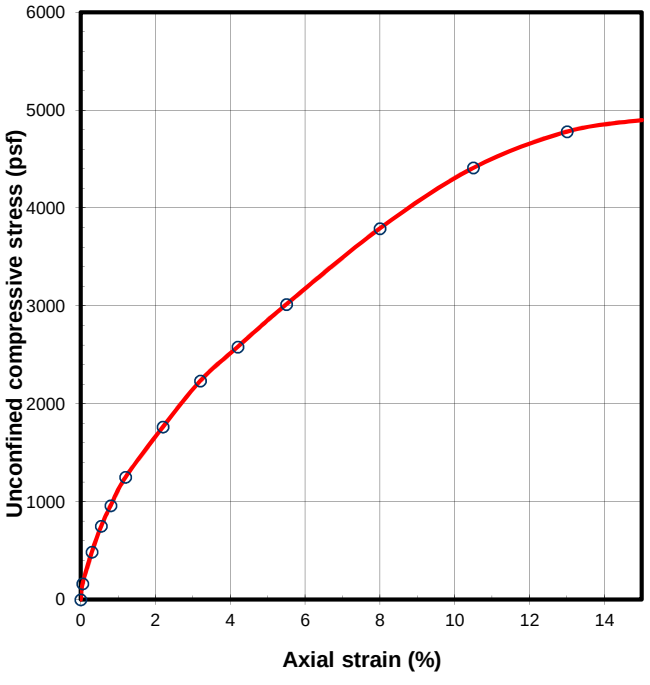
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job No. : 27560836
Boring # : R-12-012
Sample # : 3-2
Depth (ft) : 75.5-76
Date tested : 04/18/12
Soil (Visual Description) : Grayish brown lean clay with sand

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 802.7 gms
Ht. = 5.28 in
Ave dia. = 2.397 in
Area = 4.513 sq.in
Volume = 390.5 c.c.
Shearing rate = 0.11 inch/min
Shearing rate = 0.50 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.606
Ht/Dia ratio = 2.20
Moisture = 22.3 %
Total density = 128.3 pcf
Dry density = 104.9 pcf
Saturation = 99.2 %
Unconfined compressive strength = 4900 psf
Shear strength = 2450 psf
Strain @ failure = 15.00 %

Dial Read.	Load Read.	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.003	5.1	0.05	163.4
0.016	15.2	0.30	484.8
0.029	23.7	0.55	752.5
0.042	30.3	0.80	959.7
0.063	39.7	1.20	1250.6
0.116	56.5	2.20	1763.4
0.169	72.4	3.20	2236.0
0.222	84.5	4.20	2583.0
0.290	100.1	5.50	3016.8
0.422	129.2	8.00	3793.1
0.554	154.5	10.50	4412.5
0.686	172.3	13.00	4781.7
0.792	180.7	15.00	4900.0



(see worksheet for sketch of failure)

UNCONFINED COMPRESSION TEST - Uc
ASTM D-2166

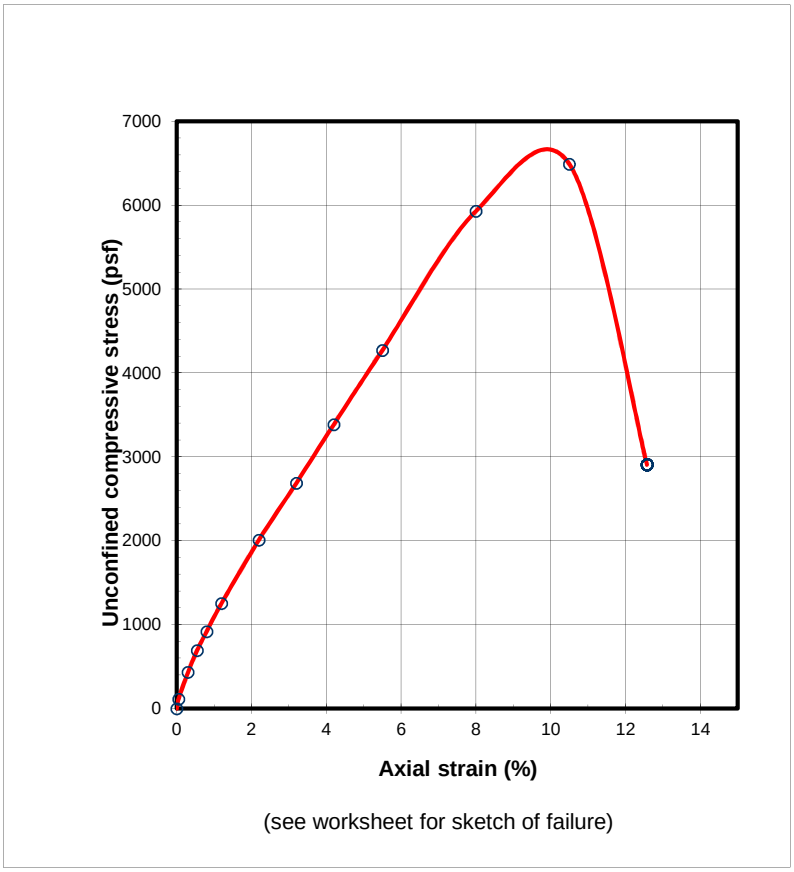
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job No. : 27560836
Boring # : R-12-012
Sample # : 5-2
Depth (ft) : 95.5-96
Date tested : 04/18/12
Soil (Visual Description) : Olive sandy lean clay

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 921.2 gms
Ht. = 5.79 in
Ave dia. = 2.393 in
Area = 4.501 sq.in
Volume = 427.0 c.c.
Shearing rate = 0.12 inch/min
Shearing rate = 0.50 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.459
Ht/Dia ratio = 2.42
Moisture = 16.5 %
Total density = 134.6 pcf
Dry density = 115.5 pcf
Saturation = 97.4 %
Unconfined compressive strength = 6491 psf
Shear strength = 3246 psf
Strain @ failure = 10.50 %

Dial Read.	Load Read.	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.003	3.6	0.05	115.0
0.017	13.6	0.30	432.4
0.032	21.8	0.55	693.6
0.046	28.9	0.80	917.4
0.069	39.7	1.20	1253.9
0.127	64.2	2.20	2010.1
0.185	86.8	3.20	2687.8
0.243	110.5	4.20	3385.9
0.318	141.3	5.50	4271.7
0.463	201.4	8.00	5929.7
0.608	226.7	10.50	6491.1
0.728	103.9	12.57	2907.8



(see worksheet for sketch of failure)

UNCONFINED COMPRESSION TEST - Uc
ASTM D-2166

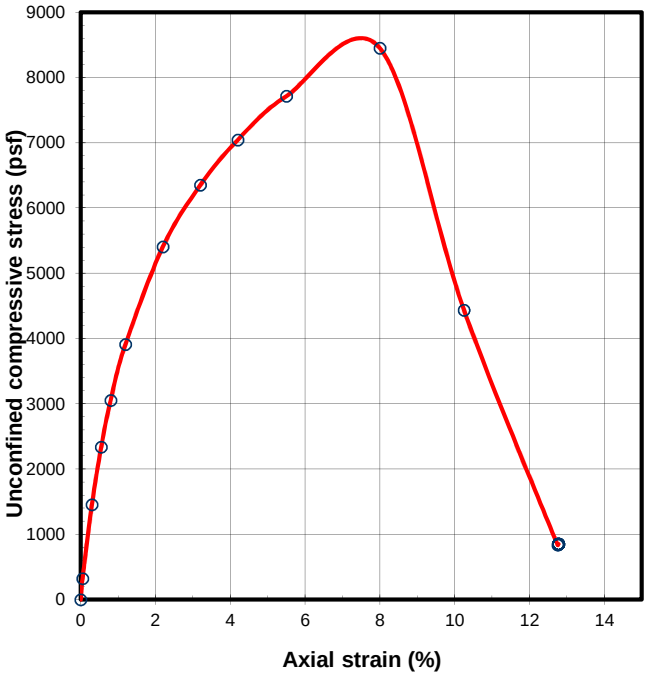
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job No. : 27560836
Boring # : R-12-012
Sample # : 10-2
Depth (ft) : 125.5-126
Date tested : 04/18/12
Soil (Visual Description) : Yellowish brown lean to fat clay

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 890.1 gms
Ht. = 5.80 in
Ave dia. = 2.420 in
Area = 4.601 sq.in
Volume = 437.3 c.c.
Shearing rate = 0.12 inch/min
Shearing rate = 0.50 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.649
Ht/Dia ratio = 2.40
Moisture = 24.3 %
Total density = 127.0 pcf
Dry density = 102.1 pcf
Saturation = 101.2 %
Unconfined compressive strength = 8451 psf
Shear strength = 4226 psf
Strain @ failure = 8.00 %

Dial Read.	Load Read.	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.003	10.3	0.05	321.8
0.017	46.6	0.30	1454.0
0.032	75.1	0.55	2336.2
0.046	98.3	0.80	3053.2
0.069	126.6	1.20	3913.6
0.127	176.7	2.20	5409.2
0.186	209.8	3.20	6354.2
0.243	235.0	4.20	7046.0
0.319	260.9	5.50	7716.6
0.464	293.5	8.00	8451.0
0.594	157.9	10.25	4435.7
0.739	30.7	12.75	837.2
0.741	31.2	12.77	852.7



(see worksheet for sketch of failure)

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-001
Sample # : 5-2
Depth (ft) : 20.5-21
Date tested : 05/18/11
Soil : Brown lean clay

Data Reduction:

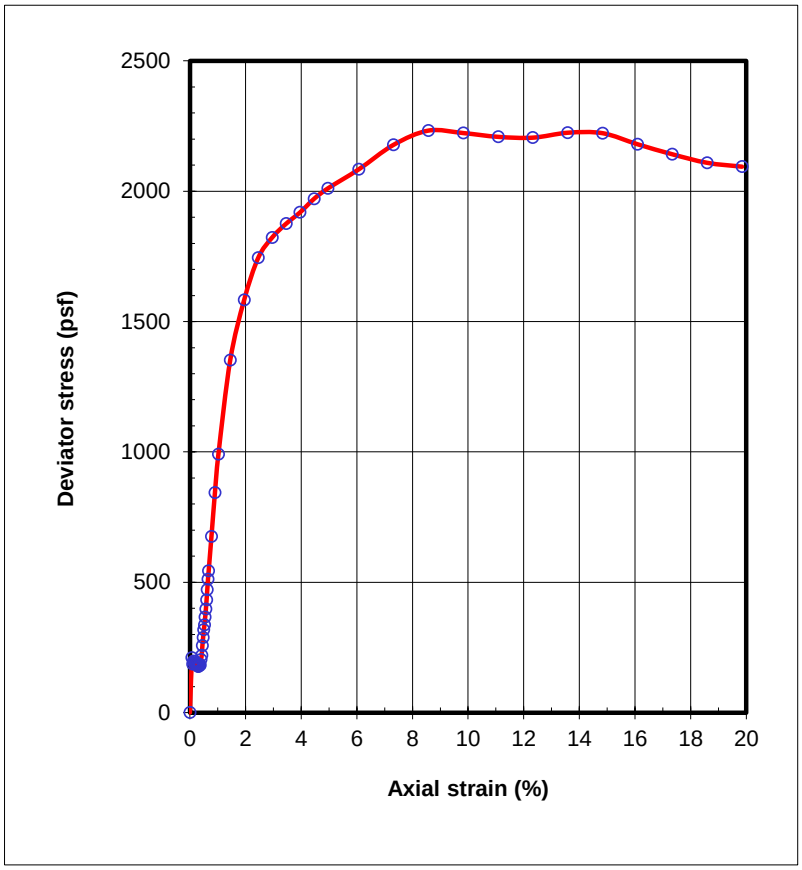
Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:

Total wt. =	382.6	gms	
Ht. =	4.050	in	
Ave dia. =	1.930	in	
Area =	2.927	sq.in	
Volume =	194.2	c.c.	
Shearing rate =	0.03	inch/min	
Shearing rate =	0.75	%/min	
Gs (assumed) =	2.70		

Test Report:

Void ratio =	0.737	
Ht/Dia ratio =	2.10	
Moisture =	26.7	%
Total density =	122.9	pcf
Dry density =	97.0	pcf
Saturation =	97.9	%
Chamber pressure =	1900	psf
Max. deviator stress =	2233	psf
Strain @ failure =	8.58	%



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	4.3	0.07	210.4
0.002	3.8	0.10	185.9
0.003	4.0	0.13	196.8
0.004	3.9	0.15	190.5
0.005	3.8	0.17	187.7
0.006	4.0	0.20	196.0
0.007	3.8	0.23	187.6
0.008	3.7	0.25	183.5
0.009	3.8	0.28	184.0
0.010	3.6	0.30	177.5
0.011	3.7	0.33	181.2
0.012	3.8	0.35	184.2
0.013	3.7	0.38	181.6
0.014	4.2	0.40	203.4
0.015	4.5	0.43	219.9
0.016	5.2	0.45	256.9
0.017	5.9	0.48	287.4
0.018	6.5	0.50	317.2
0.019	6.9	0.53	336.6
0.020	7.5	0.55	366.4
0.021	8.1	0.58	396.8
0.022	8.8	0.60	432.3
0.023	9.6	0.63	471.6
0.024	10.5	0.65	511.1
0.025	11.1	0.68	543.3
0.029	13.8	0.78	675.8
0.034	17.3	0.90	844.0
0.039	20.3	1.03	990.9
0.057	27.9	1.45	1351.9
0.077	32.8	1.95	1583.2
0.097	36.4	2.46	1744.7
0.118	38.2	2.96	1822.6
0.138	39.5	3.46	1875.4
0.158	40.6	3.96	1918.7
0.179	41.9	4.46	1970.9
0.199	43.0	4.96	2011.1
0.244	45.1	6.07	2084.3
0.294	47.8	7.32	2178.0
0.345	49.6	8.58	2232.7
0.396	50.1	9.82	2223.1
0.447	50.5	11.08	2208.6
0.497	51.1	12.33	2205.5
0.548	52.3	13.58	2224.4
0.599	53.0	14.83	2222.6
0.649	52.8	16.09	2180.3
0.700	52.7	17.33	2141.9
0.751	52.7	18.59	2109.0

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

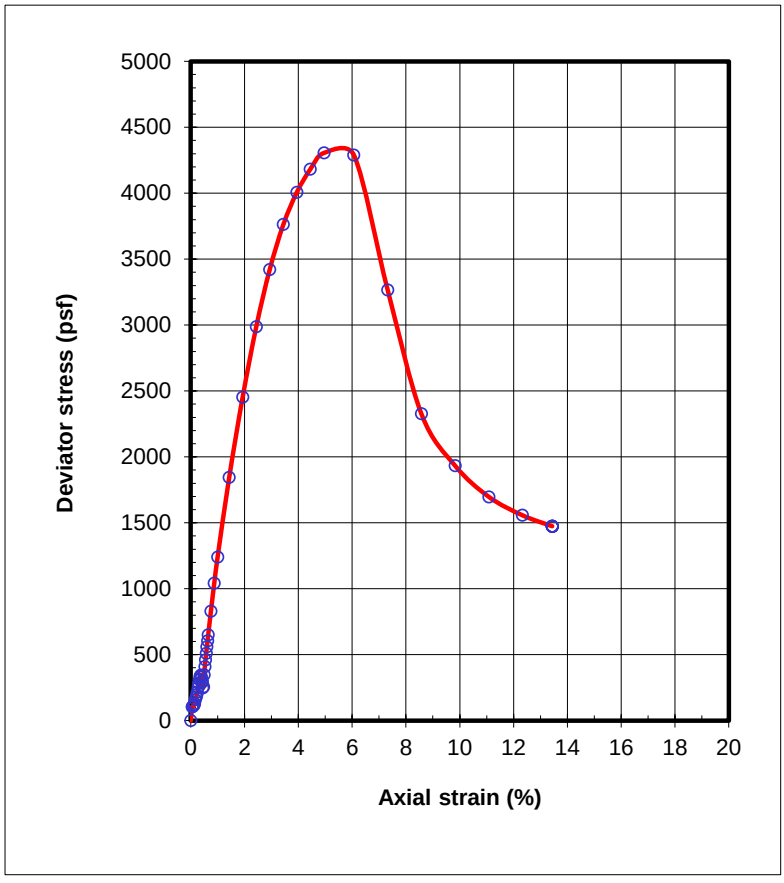
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-002
Sample # : 6
Depth (ft) : 31.5-34
Date tested : 05/19/11
Soil : Brown lean clay

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 1201.6 gms
Ht. = 5.760 in
Ave dia. = 2.853 in
Area = 6.397 sq.in
Volume = 603.8 c.c.
Shearing rate = 0.04 inch/min
Shearing rate = 0.75 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.668
Ht/Dia ratio = 2.02
Moisture = 23.0 %
Total density = 124.2 pcf
Dry density = 101.0 pcf
Saturation = 92.8 %
Chamber pressure = 2750 psf
Max. deviator stress = 4305 psf
Strain @ failure = 4.95 %



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.001		0.00	0.0
0.002	4.6	0.05	104.2
0.003	4.8	0.08	108.4
0.004	4.9	0.10	110.7
0.006	5.2	0.12	117.3
0.007	5.8	0.15	130.4
0.009	7.1	0.17	159.1
0.010	7.9	0.20	177.3
0.011	8.8	0.22	196.8
0.013	9.7	0.25	217.1
0.014	11.2	0.27	251.6
0.016	12.6	0.30	283.5
0.017	13.8	0.32	310.6
0.019	14.9	0.35	334.4
0.020	15.4	0.37	345.7
0.022	14.7	0.40	328.8
0.023	13.3	0.42	298.3
0.025	11.0	0.45	247.4
0.026	11.4	0.47	256.4
0.027	15.5	0.50	347.6
0.029	18.2	0.52	408.0
0.030	20.6	0.55	460.4
0.032	22.8	0.57	510.0
0.033	25.0	0.60	558.4
0.035	27.0	0.62	604.2
0.036	29.1	0.65	649.8
0.042	37.1	0.75	829.0
0.049	46.7	0.87	1042.3
0.056	55.7	1.00	1241.0
0.081	83.1	1.43	1844.4
0.110	111.2	1.93	2454.1
0.139	136.0	2.44	2987.5
0.168	156.5	2.93	3419.9
0.197	173.1	3.44	3762.5
0.226	185.2	3.94	4005.7
0.255	194.4	4.44	4181.3
0.284	201.2	4.95	4305.0
0.348	202.8	6.06	4289.5
0.420	156.5	7.32	3265.3
0.492	113.1	8.57	2326.7
0.565	95.2	9.83	1933.0
0.637	84.7	11.08	1696.3
0.709	78.9	12.33	1556.8
0.773	75.7	13.44	1474.2

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

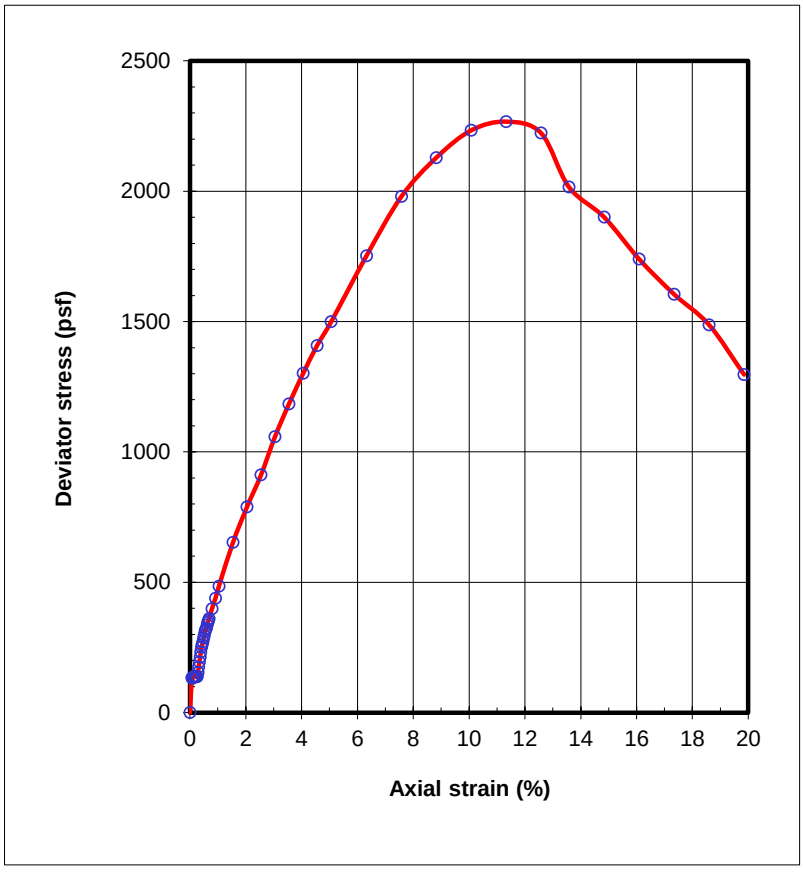
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-003
Sample # : 4-2
Depth (ft) : 15.5-16
Date tested : 05/18/11
Soil : Brown lean clay with sand

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 426.3 gms
Ht. = 4.330 in
Ave dia. = 1.923 in
Area = 2.907 sq.in
Volume = 206.2 c.c.
Shearing rate = 0.03 inch/min
Shearing rate = 0.75 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.599
Ht/Dia ratio = 2.25
Moisture = 22.5 %
Total density = 129.0 pcf
Dry density = 105.3 pcf
Saturation = 101.2 %
Chamber pressure = 1700 psf
Max. deviator stress = 2267 psf
Strain @ failure = 11.33 %



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	2.7	0.07	133.5
0.002	2.6	0.09	130.8
0.003	2.7	0.12	135.1
0.004	2.8	0.14	136.1
0.005	2.8	0.16	140.7
0.006	2.8	0.19	137.7
0.007	2.8	0.21	138.7
0.009	2.8	0.24	137.5
0.010	2.8	0.26	138.6
0.011	3.1	0.29	153.7
0.012	3.5	0.31	174.6
0.013	3.9	0.34	193.9
0.014	4.3	0.36	212.8
0.015	4.7	0.39	232.6
0.016	5.1	0.41	251.2
0.017	5.3	0.44	259.8
0.018	5.5	0.46	271.0
0.019	5.8	0.49	286.1
0.020	6.0	0.51	296.4
0.022	6.3	0.54	309.6
0.023	6.4	0.57	317.6
0.024	6.6	0.59	322.8
0.025	6.8	0.61	336.1
0.026	7.0	0.64	345.8
0.027	7.2	0.66	352.7
0.028	7.3	0.69	359.5
0.032	8.1	0.79	398.6
0.038	8.9	0.91	438.5
0.043	9.9	1.04	485.1
0.065	13.4	1.54	653.1
0.087	16.3	2.04	788.9
0.109	18.9	2.55	911.7
0.130	22.0	3.05	1058.5
0.152	24.8	3.55	1184.0
0.174	27.4	4.06	1301.4
0.195	29.8	4.55	1407.8
0.217	31.9	5.06	1499.0
0.272	37.8	6.33	1752.3
0.326	43.2	7.58	1979.9
0.380	47.1	8.82	2128.3
0.435	50.1	10.08	2233.7
0.489	51.6	11.33	2266.9
0.543	51.3	12.58	2223.1
0.586	47.1	13.58	2016.0
0.641	45.0	14.84	1900.4
0.695	41.8	16.09	1739.4
0.749	39.2	17.34	1604.6
0.803	36.9	18.60	1487.3

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-12-012
Sample # : 4
Depth (ft) : 85-87.5
Date tested : 04/16/12
Soil : Olive gray fat clay

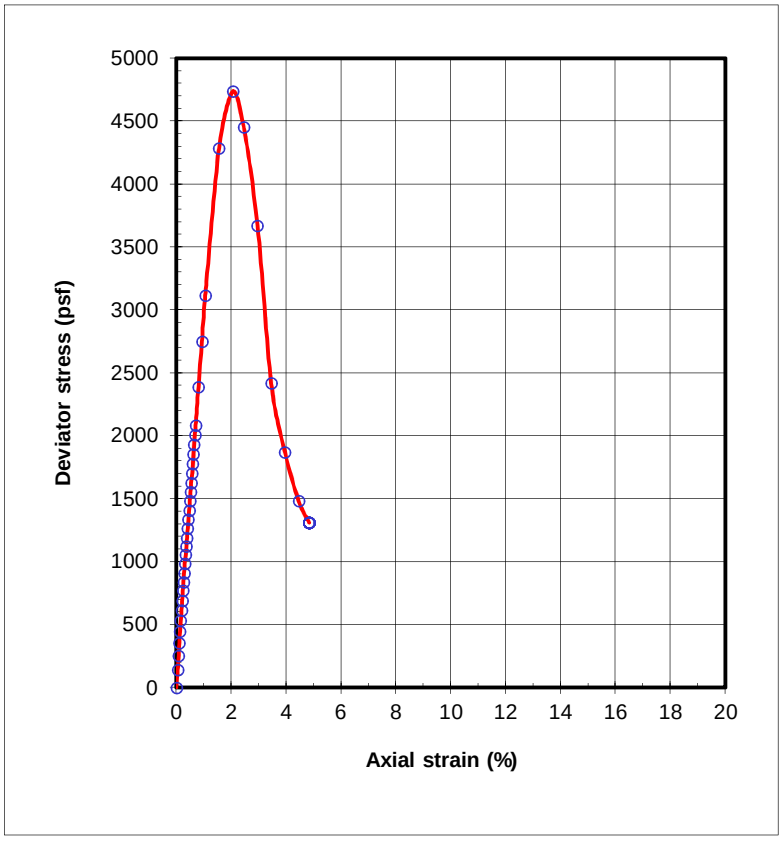
Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 1183.7 gms
Ht. = 5.980 in
Ave dia. = 2.873 in
Area = 6.487 sq.in
Volume = 635.7 c.c.
Shearing rate = 0.03 inch/min
Shearing rate = 0.5 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.958
Ht/Dia ratio = 2.08
Moisture = 35.1 %
Total density = 116.2 pcf
Dry density = 86.0 pcf
Saturation = 98.8 %
Chamber pressure = 4500 psf
Max. deviator stress = 4738 psf
Strain @ failure = 2.05 %

Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	6.3	0.05	140.5
0.003	11.4	0.08	253.7
0.005	16.1	0.10	356.0
0.006	20.1	0.13	445.5
0.008	24.0	0.16	532.0
0.009	27.8	0.18	615.2
0.011	31.1	0.21	688.2
0.012	34.7	0.23	769.3
0.014	37.8	0.26	837.7
0.015	41.1	0.28	909.5
0.017	44.5	0.30	984.4
0.018	47.7	0.33	1055.4
0.020	50.9	0.36	1124.8
0.021	53.8	0.38	1190.0
0.023	57.1	0.41	1263.1
0.024	60.3	0.43	1333.7
0.026	63.7	0.46	1406.6
0.028	67.2	0.49	1485.4
0.029	70.3	0.51	1552.9
0.031	73.6	0.54	1626.0
0.032	77.1	0.56	1701.3
0.034	80.6	0.59	1778.1
0.035	84.1	0.62	1854.5
0.037	87.6	0.64	1931.7
0.038	91.1	0.67	2009.8
0.040	94.6	0.70	2085.4
0.046	108.5	0.80	2389.1
0.054	125.1	0.93	2751.4
0.061	141.8	1.05	3115.1
0.091	196.0	1.55	4283.4
0.121	217.9	2.05	4738.1
0.145	205.6	2.45	4453.1
0.175	170.5	2.95	3672.1
0.205	112.9	3.45	2418.9
0.235	87.8	3.95	1872.5
0.265	69.9	4.45	1483.4
0.288	62.1	4.84	1312.4



UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

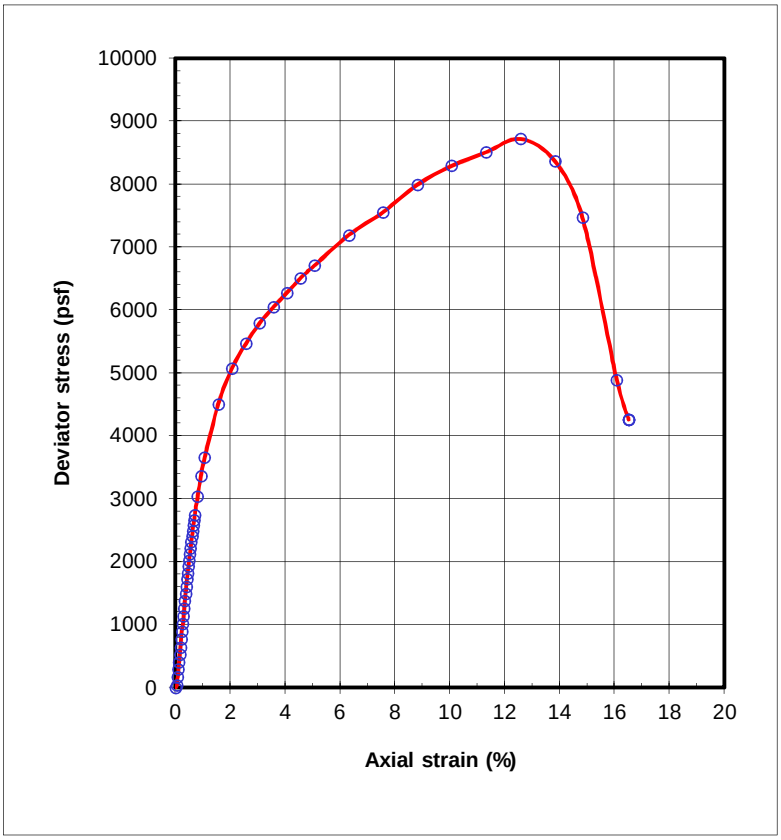
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-12-012
Sample # : 9-2
Depth (ft) : 120.5-121
Date tested : 04/18/12
Soil : Light grayish brown lean clay

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 843.5 gms
Ht. = 5.620 in
Ave dia. = 2.400 in
Area = 4.526 sq.in
Volume = 416.8 c.c.
Shearing rate = 0.03 inch/min
Shearing rate = 0.5 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.657
Ht/Dia ratio = 2.34
Moisture = 24.2 %
Total density = 126.3 pcf
Dry density = 101.7 pcf
Saturation = 99.5 %
Chamber pressure = 6000 psf
Max. deviator stress = 8721 psf
Strain @ failure = 12.57 %

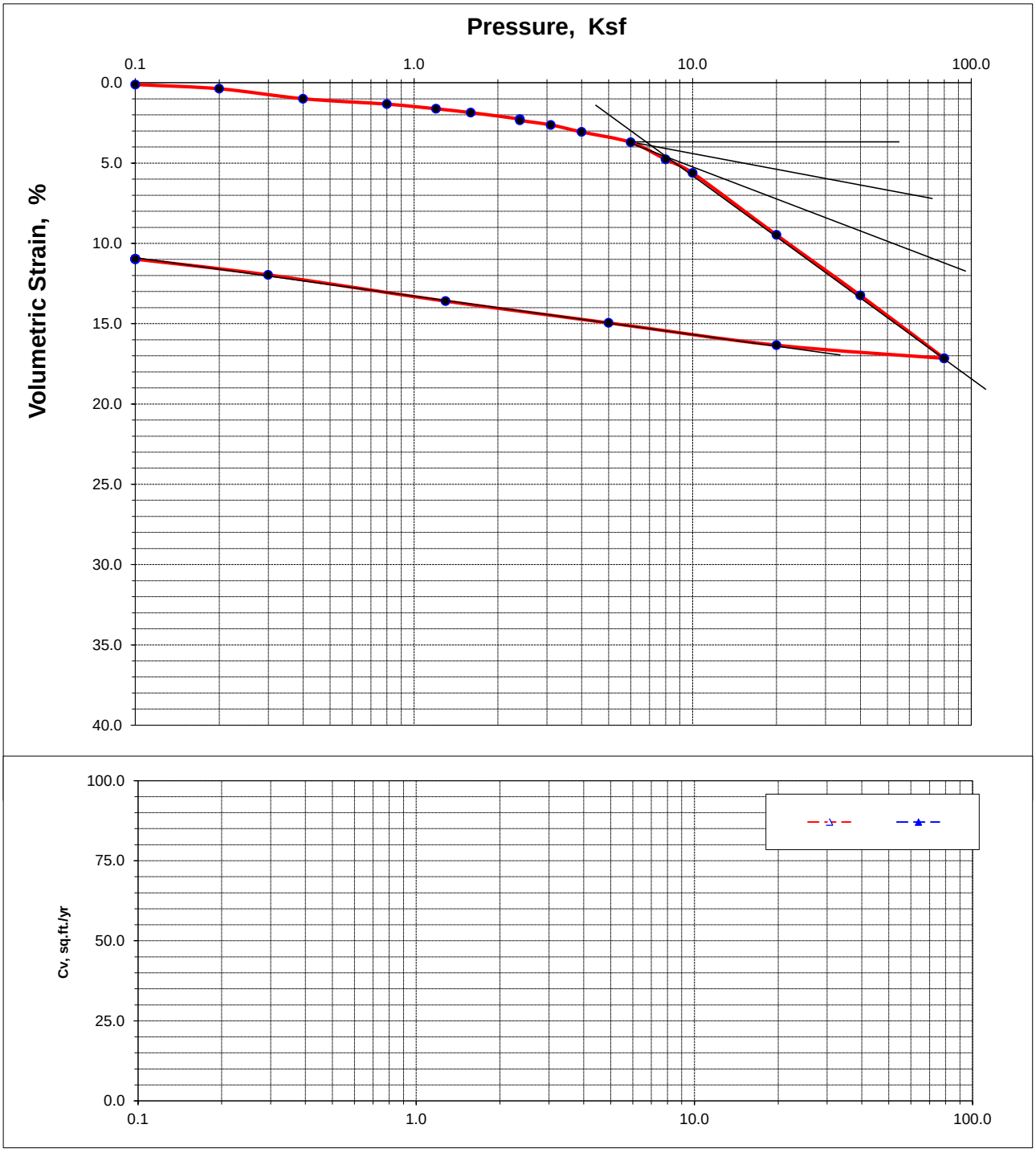


Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	1.3	0.05	41.2
0.003	5.2	0.08	166.7
0.004	9.1	0.11	289.6
0.006	12.8	0.13	406.3
0.007	16.5	0.16	525.7
0.009	20.2	0.18	642.4
0.010	24.1	0.21	765.7
0.012	28.0	0.24	890.1
0.013	31.8	0.26	1010.6
0.015	35.8	0.29	1136.1
0.016	39.7	0.32	1258.0
0.018	43.6	0.34	1381.3
0.019	47.2	0.37	1497.5
0.021	50.7	0.39	1607.7
0.022	54.3	0.42	1721.8
0.023	57.5	0.45	1822.6
0.025	60.9	0.47	1928.3
0.026	63.9	0.49	2022.0
0.028	67.1	0.52	2122.8
0.029	70.1	0.55	2216.7
0.031	73.1	0.57	2313.1
0.032	76.1	0.60	2407.7
0.034	78.9	0.63	2493.8
0.035	81.6	0.65	2578.4
0.036	84.3	0.68	2665.5
0.038	86.8	0.70	2742.4
0.044	96.3	0.80	3040.4
0.051	106.9	0.94	3368.7
0.058	116.2	1.06	3656.9
0.086	143.9	1.56	4506.9
0.114	162.8	2.06	5074.5
0.142	176.3	2.56	5464.6
0.170	187.7	3.06	5789.6
0.199	197.0	3.56	6045.0
0.227	205.5	4.06	6273.6
0.255	214.4	4.56	6509.7
0.283	222.0	5.06	6707.2
0.353	241.2	6.31	7191.4
0.423	256.9	7.56	7556.4
0.494	275.4	8.81	7991.7
0.564	289.8	10.06	8292.1
0.635	301.6	11.32	8509.0
0.705	313.5	12.57	8720.9
0.775	305.1	13.83	8364.4
0.832	275.6	14.83	7470.1
0.902	183.0	16.08	4887.7
0.926	160.3	16.51	4257.6

CONSOLIDATION TEST

Boring Number	R-11-002	Sample Number	6	Depth (ft)	31.5-34	
Soil Description	Brown sandy lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	20.8	124.1	0.641	87.6	1.00	2.420	(assumed) 2.70		
Final	16.9	135.7	0.452	100.7	0.885				



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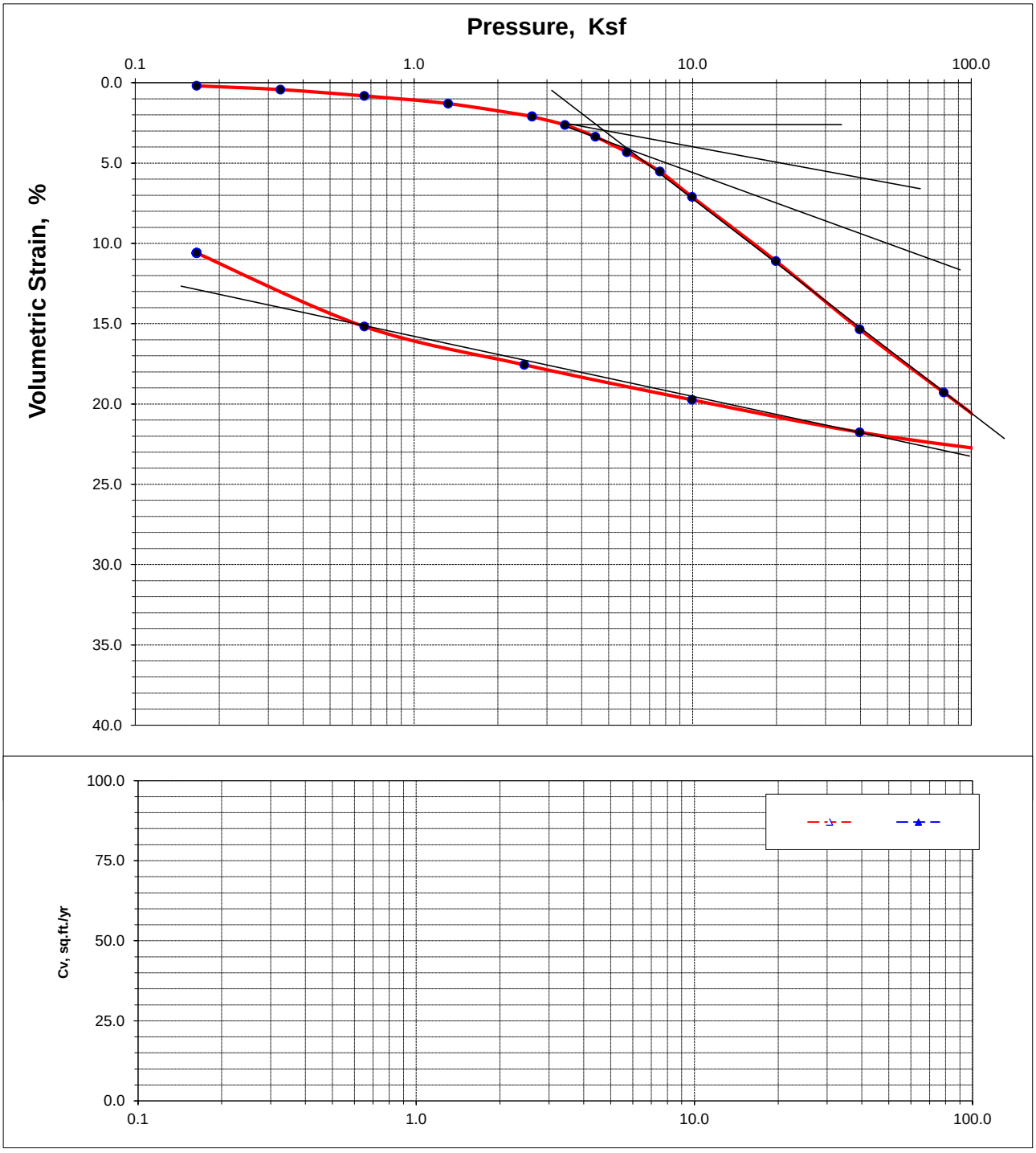
CONSOLIDATION TEST

Boring Number	R-11-004	Sample Number	5-3	Depth (ft)	21-21.5	
Soil Description	Olive brown sandy lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	24.6	126.9	0.656	101.1	0.69	1.880	(assumed) 2.70		
Final	18.2	135.5	0.470	104.4	0.613				

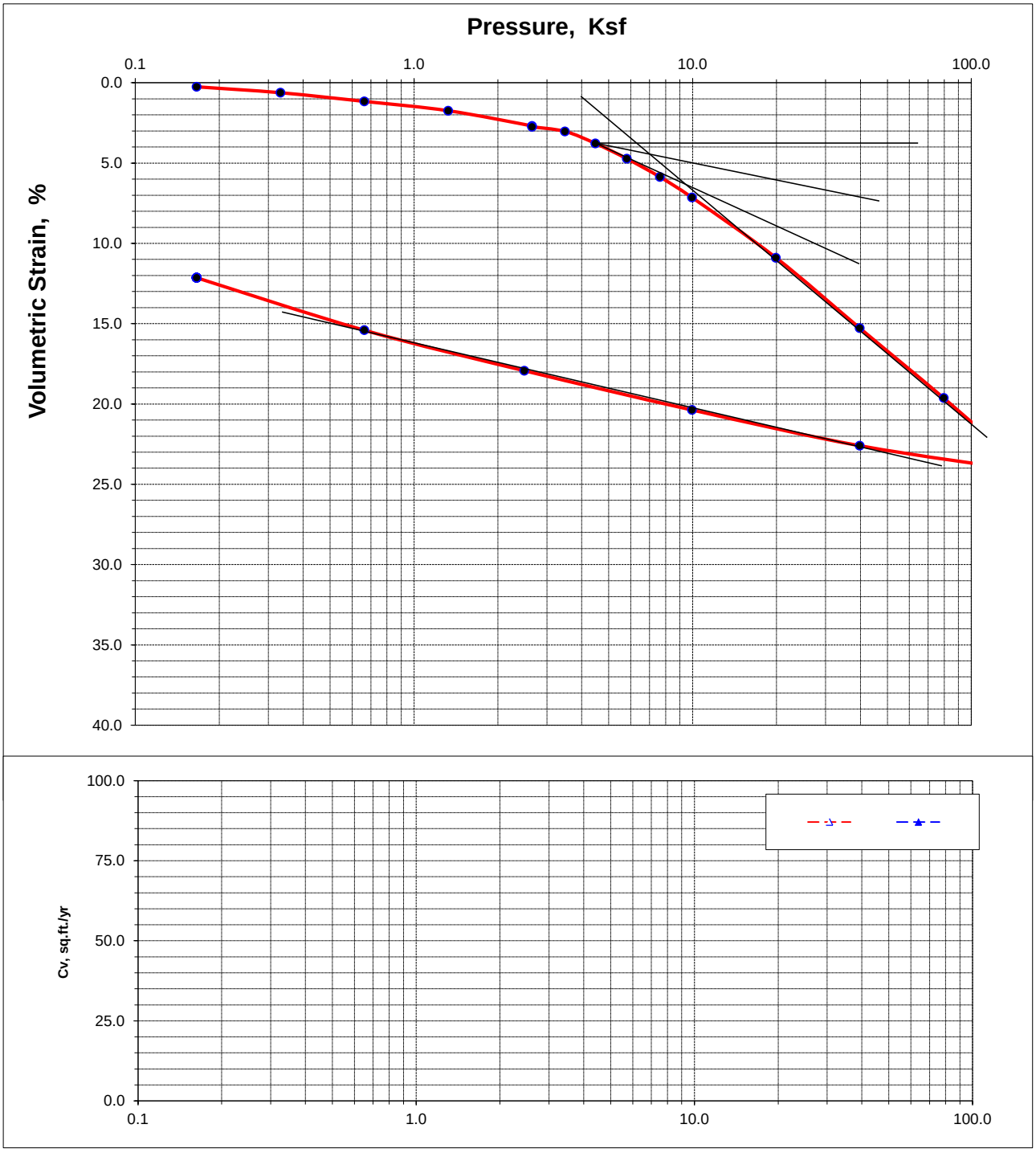


27560836

CONSOLIDATION TEST

Boring Number	R-11-005	Sample Number	11-2	Depth (ft)	50.5-51	
Soil Description	Dark grayish brown lean clay with sand					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	25.4	123.0	0.719	95.5	0.70	1.880	(assumed) 2.70		
Final	19.2	133.0	0.511	101.5	0.615				



27560836

Appendix D

Analysis and Calculations

URS CALCULATION SHEET		Sheet No. 1 of 3	
		Project No. 27560836.60203	
Project Title: ACMMA I-880 23rd & 29th Subject/Feature: Caltrans ARS.		Calc By CCT	Date 10/28/2010
		Checked By EN	Date 12/6/2010

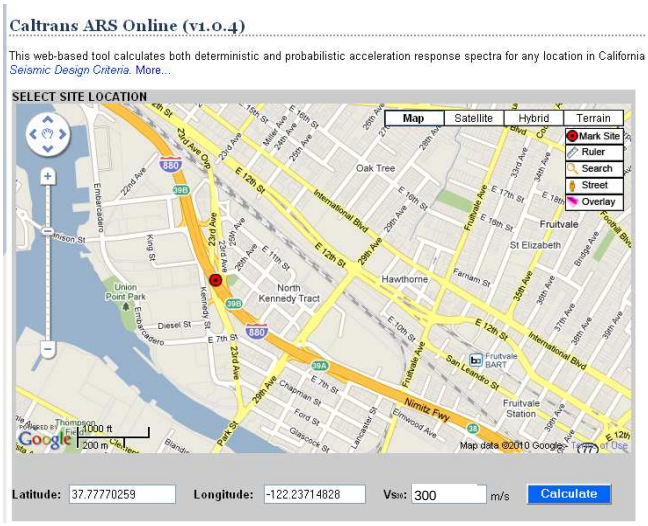
Rev: 2

Introduction

Caltrans ARS curve was calculated following the Caltran's procedure (seismic design criteria, Caltrans 2009).

Approach

-Site location coordinate is (37.778, -122.237)
-Use Caltrans ARS online tool



- Vs30 of is estimated using
  1. Vs measurement of 3 S-CPTs (X:\x_geo\ACCMA 23rd and 29th Ave\04 Analysis\01 seismic criteria\Vs30_rev2)

Elevation	Vs, 30 (m/sec)
B-6	251
B-7	255
B-10	236

2. Empirical correlation by $V_s = 132\ N^{0.271}$ (Pitilakis, 1999) for clay which is mostly encountered at the project site .

Elevation	N60*	Vs (m/sec)	d/vs (t)
20	10	246	
10	10	246	0.040591
0	10	246	0.040591
-10	10	246	0.040591
-20	10	246	0.040591
-30	12.85714	264	0.039209
-40	15.71429	278	0.036887
-50	18.57143	291	0.035098
-60	21.42857	303	0.033656
-70	24.28571	313	0.032456
-80	27.14286	323	0.031434
-90	30	332	0.030548
		Vs30	249

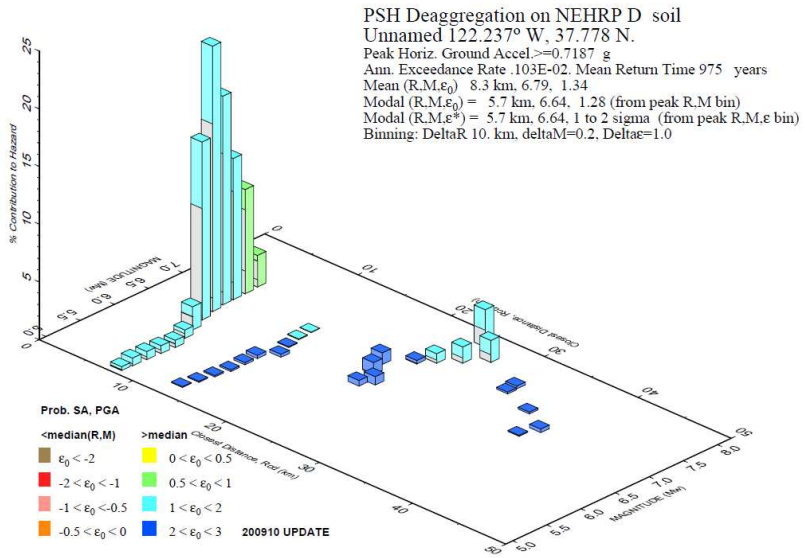
*The represented N60 profile is shown in attached figure

3. Vs estimated by empirical correlation and the filed measurement are consistent. Vs=250m/s is selected for design

- Since Vs30 =250 is less than 300m/s, additional USGS deaggregation analysis was performed to get 5%-50yr PSHA and compared with those by ARS online. The comparison is performed using attached spreadsheet provided by Caltrans. The envelope will be the design ARS

- R=5.7km is selected for perform PSHA based on USGS deaggregation tool

URS *CALCULATION SHEET*		Sheet No. 3 of 3	
		Project No. 27560836.60203	
Project Title: ACMMA I-880 23rd & 29th Subject/Feature: Caltrans ARS.		Calc By CCT	Date 10/28/2010
		Checked By EN	Date 12/6/2010

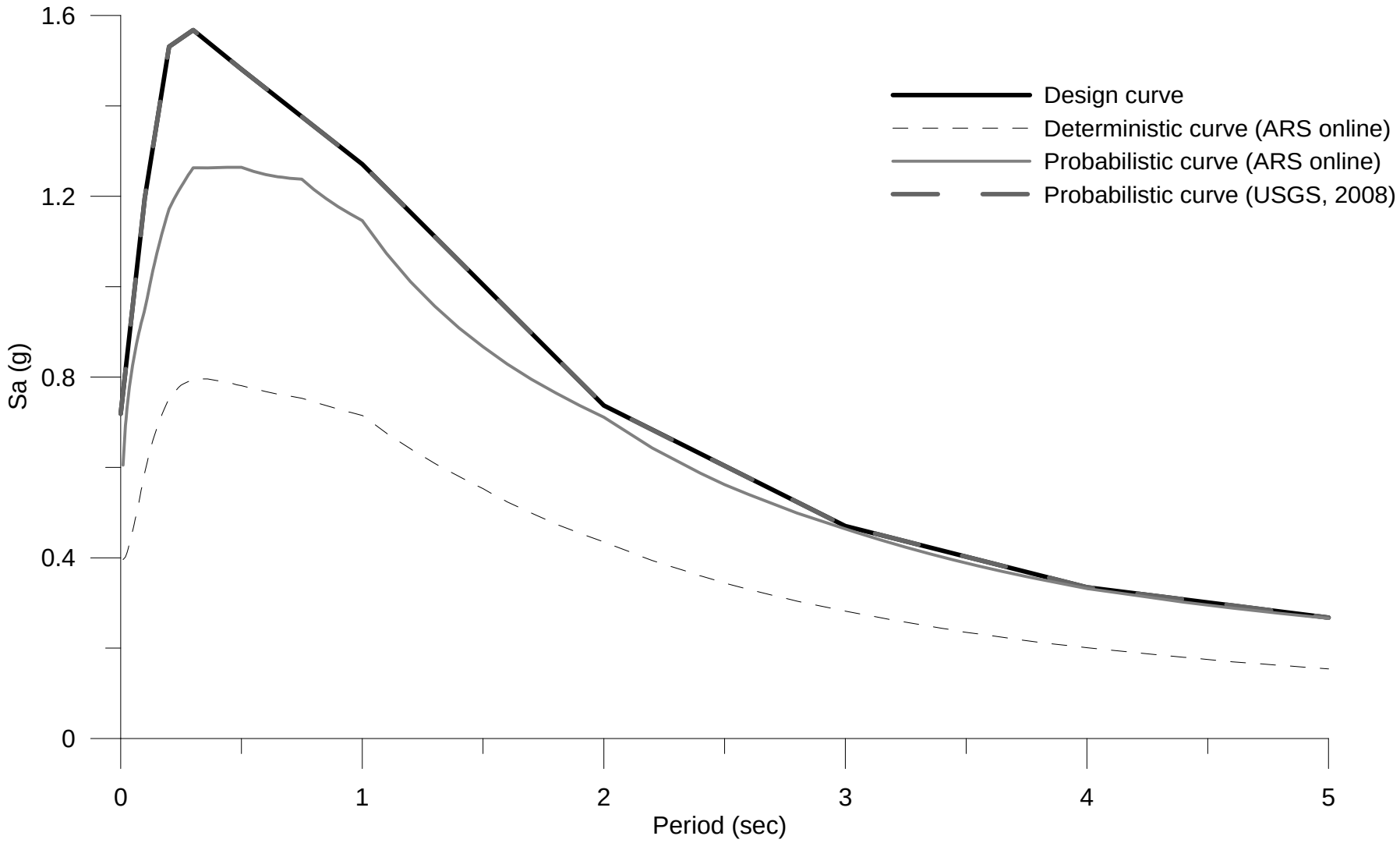


-Near fault effect is applied automatically by ARS online since R <25km

- No basin effect is considered

Results

See attached



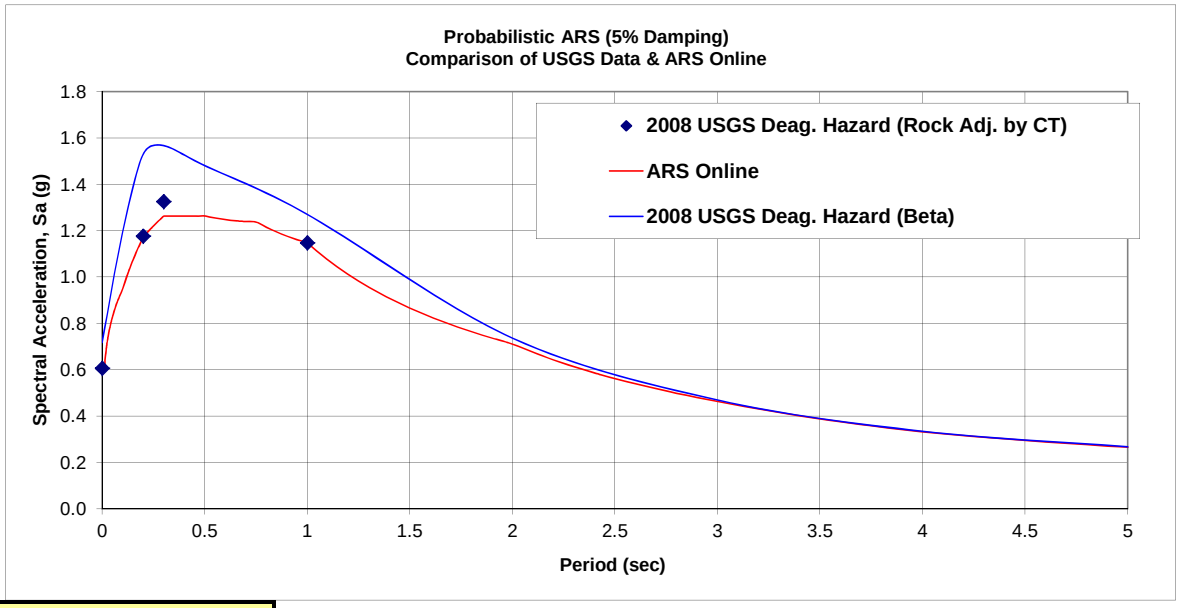
Note: 1. 5% damping spectrum
2. Near fault effects are included

URS	ACMMA I-880 23rd and 29th Project # 27560836	ARS Curve $V_{s,30}$=250 m/sec	Figure 9

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
37.7778	-122.2371
V_{S30} (m/s) =	250
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.7
$Z_{1.0}$ (m) =	309
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.605	1	1	0.605
0.02	0.693	1	1	0.693
0.022	0.706	1	1	0.706
0.025	0.723	1	1	0.723
0.029	0.745	1	1	0.745
0.03	0.75	1	1	0.75
0.032	0.759	1	1	0.759
0.035	0.773	1	1	0.773
0.036	0.777	1	1	0.777
0.04	0.793	1	1	0.793
0.042	0.801	1	1	0.801
0.044	0.808	1	1	0.808
0.045	0.812	1	1	0.812
0.046	0.815	1	1	0.815
0.048	0.822	1	1	0.822
0.05	0.828	1	1	0.828
0.055	0.844	1	1	0.844
0.06	0.858	1	1	0.858
0.065	0.872	1	1	0.872
0.067	0.877	1	1	0.877
0.07	0.885	1	1	0.885
0.075	0.897	1	1	0.897
0.08	0.908	1	1	0.908
0.085	0.919	1	1	0.919
0.09	0.929	1	1	0.929
0.095	0.939	1	1	0.939
0.1	0.949	1	1	0.949
0.11	0.977	1	1	0.977
0.12	1.003	1	1	1.003
0.13	1.028	1	1	1.028
0.133	1.035	1	1	1.035
0.14	1.051	1	1	1.051
0.15	1.074	1	1	1.074
0.16	1.095	1	1	1.095
0.17	1.116	1	1	1.116
0.18	1.135	1	1	1.135
0.19	1.154	1	1	1.154
0.2	1.172	1	1	1.172
0.22	1.193	1	1	1.193
0.24	1.212	1	1	1.212
0.25	1.221	1	1	1.221

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.747	1.000	0.812	1.000	0.606	0.605	0.2%
0.2	1.876	1.000	0.628	1.000	1.178	1.172	0.5%
0.3	1.572	1.000	0.843	1.000	1.326	1.263	4.8%
1	0.590	1.200	1.620	1.000	1.148	1.146	0.1%

Max % Difference = 4.8%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.7187	1.000	1.000	0.719	0.605	*15.8%*
0.1	1.196	1.000	1.000	1.196	0.949	*20.7%*
0.2	1.531	1.000	1.000	1.531	1.172	*23.4%*
0.3	1.5677	1.000	1.000	1.568	1.263	*19.4%*
0.5	1.481	1.000	1.000	1.481	1.264	14.7%
1	1.0591	1.200	1.000	1.271	1.146	9.8%
2	0.614	1.200	1.000	0.737	0.711	3.5%
3	0.3917	1.200	1.000	0.470	0.464	1.3%
4	0.279	1.200	1.000	0.335	0.332	0.8%
5	0.2231	1.200	1.000	0.268	0.266	0.6%

Max % Difference = 14.7%

SITE DATA

Shear Wave Velocity, Vs_{30}:	250 m/s
Latitude:	37.777777
Longitude:	-122.237105
Depth to Vs = 1.0 km/s:	332 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Hayward fault zone (Northern section)

Fault ID:	353
Maximum Magnitude (MMax):	7.3
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	12.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.61 km
Rjb:	4.61 km
Rx:	4.61 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.396	1.000	1.000	0.396
0.02	0.402	1.000	1.000	0.402
0.022	0.405	1.000	1.000	0.405
0.025	0.410	1.000	1.000	0.410
0.029	0.416	1.000	1.000	0.416
0.03	0.418	1.000	1.000	0.418
0.032	0.422	1.000	1.000	0.422
0.035	0.429	1.000	1.000	0.429
0.036	0.431	1.000	1.000	0.431
0.04	0.439	1.000	1.000	0.439
0.042	0.443	1.000	1.000	0.443
0.044	0.448	1.000	1.000	0.448
0.045	0.450	1.000	1.000	0.450
0.046	0.452	1.000	1.000	0.452
0.048	0.457	1.000	1.000	0.457
0.05	0.461	1.000	1.000	0.461
0.055	0.473	1.000	1.000	0.473
0.06	0.485	1.000	1.000	0.485
0.065	0.497	1.000	1.000	0.497
0.067	0.502	1.000	1.000	0.502

0.07	0.510	1.000	1.000	0.510
0.075	0.522	1.000	1.000	0.522
0.08	0.536	1.000	1.000	0.536
0.085	0.550	1.000	1.000	0.550
0.09	0.563	1.000	1.000	0.563
0.095	0.576	1.000	1.000	0.576
0.1	0.589	1.000	1.000	0.589
0.11	0.613	1.000	1.000	0.613
0.12	0.634	1.000	1.000	0.634
0.13	0.654	1.000	1.000	0.654
0.133	0.660	1.000	1.000	0.660
0.14	0.671	1.000	1.000	0.671
0.15	0.687	1.000	1.000	0.687
0.16	0.702	1.000	1.000	0.702
0.17	0.716	1.000	1.000	0.716
0.18	0.729	1.000	1.000	0.729
0.19	0.741	1.000	1.000	0.741
0.2	0.752	1.000	1.000	0.752
0.22	0.765	1.000	1.000	0.765
0.24	0.777	1.000	1.000	0.777
0.25	0.782	1.000	1.000	0.782
0.26	0.785	1.000	1.000	0.785
0.28	0.790	1.000	1.000	0.790
0.29	0.792	1.000	1.000	0.792
0.3	0.794	1.000	1.000	0.794
0.32	0.796	1.000	1.000	0.796
0.34	0.796	1.000	1.000	0.796
0.35	0.796	1.000	1.000	0.796
0.36	0.796	1.000	1.000	0.796
0.38	0.794	1.000	1.000	0.794
0.4	0.792	1.000	1.000	0.792
0.42	0.790	1.000	1.000	0.790
0.44	0.788	1.000	1.000	0.788
0.45	0.787	1.000	1.000	0.787
0.46	0.786	1.000	1.000	0.786
0.48	0.783	1.000	1.000	0.783
0.5	0.781	1.000	1.000	0.781
0.55	0.758	1.000	1.020	0.774
0.6	0.738	1.000	1.040	0.768
0.65	0.719	1.000	1.060	0.762
0.667	0.713	1.000	1.067	0.761
0.7	0.701	1.000	1.080	0.758
0.75	0.685	1.000	1.100	0.753
0.8	0.665	1.000	1.120	0.745
0.85	0.646	1.000	1.140	0.737
0.9	0.629	1.000	1.160	0.729
0.95	0.612	1.000	1.180	0.722
1	0.596	1.000	1.200	0.715
1.1	0.564	1.000	1.200	0.676
1.2	0.534	1.000	1.200	0.641
1.3	0.508	1.000	1.200	0.609

1.4	0.483	1.000	1.200	0.580
1.5	0.461	1.000	1.200	0.553
1.6	0.437	1.000	1.200	0.524
1.7	0.415	1.000	1.200	0.499
1.8	0.396	1.000	1.200	0.475
1.9	0.378	1.000	1.200	0.454
2	0.362	1.000	1.200	0.435
2.2	0.329	1.000	1.200	0.394
2.4	0.300	1.000	1.200	0.360
2.5	0.287	1.000	1.200	0.344
2.6	0.275	1.000	1.200	0.330
2.8	0.254	1.000	1.200	0.304
3	0.235	1.000	1.200	0.282
3.2	0.218	1.000	1.200	0.262
3.4	0.203	1.000	1.200	0.244
3.5	0.196	1.000	1.200	0.235
3.6	0.190	1.000	1.200	0.228
3.8	0.178	1.000	1.200	0.213
4	0.167	1.000	1.200	0.201
4.2	0.158	1.000	1.200	0.190
4.4	0.150	1.000	1.200	0.180
4.6	0.142	1.000	1.200	0.170
4.8	0.135	1.000	1.200	0.162
5	0.128	1.000	1.200	0.154

To use above data in Excel, copy/paste:

```
0.01    0.396    1.000    1.000    0.396
0.02    0.402    1.000    1.000    0.402
```

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.605	1.000	1.000	0.605
0.02	0.693	1.000	1.000	0.693
0.022	0.706	1.000	1.000	0.706
0.025	0.723	1.000	1.000	0.723
0.029	0.745	1.000	1.000	0.745
0.03	0.750	1.000	1.000	0.750
0.032	0.759	1.000	1.000	0.759
0.035	0.773	1.000	1.000	0.773
0.036	0.777	1.000	1.000	0.777
0.04	0.793	1.000	1.000	0.793
0.042	0.801	1.000	1.000	0.801
0.044	0.808	1.000	1.000	0.808
0.045	0.812	1.000	1.000	0.812
0.046	0.815	1.000	1.000	0.815
0.048	0.822	1.000	1.000	0.822
0.05	0.828	1.000	1.000	0.828

0.055	0.844	1.000	1.000	0.844
0.06	0.858	1.000	1.000	0.858
0.065	0.872	1.000	1.000	0.872
0.067	0.877	1.000	1.000	0.877
0.07	0.885	1.000	1.000	0.885
0.075	0.897	1.000	1.000	0.897
0.08	0.908	1.000	1.000	0.908
0.085	0.919	1.000	1.000	0.919
0.09	0.929	1.000	1.000	0.929
0.095	0.939	1.000	1.000	0.939
0.1	0.949	1.000	1.000	0.949
0.11	0.977	1.000	1.000	0.977
0.12	1.003	1.000	1.000	1.003
0.13	1.028	1.000	1.000	1.028
0.133	1.035	1.000	1.000	1.035
0.14	1.051	1.000	1.000	1.051
0.15	1.074	1.000	1.000	1.074
0.16	1.095	1.000	1.000	1.095
0.17	1.116	1.000	1.000	1.116
0.18	1.135	1.000	1.000	1.135
0.19	1.154	1.000	1.000	1.154
0.2	1.172	1.000	1.000	1.172
0.22	1.193	1.000	1.000	1.193
0.24	1.212	1.000	1.000	1.212
0.25	1.221	1.000	1.000	1.221
0.26	1.230	1.000	1.000	1.230
0.28	1.247	1.000	1.000	1.247
0.29	1.255	1.000	1.000	1.255
0.3	1.263	1.000	1.000	1.263
0.32	1.263	1.000	1.000	1.263
0.34	1.263	1.000	1.000	1.263
0.35	1.263	1.000	1.000	1.263
0.36	1.263	1.000	1.000	1.263
0.38	1.263	1.000	1.000	1.263
0.4	1.263	1.000	1.000	1.263
0.42	1.264	1.000	1.000	1.264
0.44	1.264	1.000	1.000	1.264
0.45	1.264	1.000	1.000	1.264
0.46	1.264	1.000	1.000	1.264
0.48	1.264	1.000	1.000	1.264
0.5	1.264	1.000	1.000	1.264
0.55	1.230	1.000	1.020	1.255
0.6	1.200	1.000	1.040	1.248
0.65	1.173	1.000	1.060	1.243
0.667	1.164	1.000	1.067	1.242
0.7	1.148	1.000	1.080	1.240
0.75	1.125	1.000	1.100	1.238
0.8	1.085	1.000	1.120	1.215
0.85	1.048	1.000	1.140	1.195
0.9	1.014	1.000	1.160	1.177
0.95	0.984	1.000	1.180	1.161

1	0.955	1.000	1.200		1.146
1.1	0.895	1.000	1.200		1.074
1.2	0.843	1.000	1.200		1.011
1.3	0.797	1.000	1.200		0.957
1.4	0.758	1.000	1.200		0.909
1.5	0.723	1.000	1.200		0.867
1.6	0.691	1.000	1.200		0.829
1.7	0.663	1.000	1.200		0.795
1.8	0.637	1.000	1.200		0.765
1.9	0.614	1.000	1.200		0.737
2	0.593	1.000	1.200		0.711
2.2	0.536	1.000	1.200		0.643
2.4	0.489	1.000	1.200		0.587
2.5	0.469	1.000	1.200		0.562
2.6	0.450	1.000	1.200		0.540
2.8	0.416	1.000	1.200		0.499
3	0.387	1.000	1.200		0.464
3.2	0.359	1.000	1.200		0.431
3.4	0.335	1.000	1.200		0.402
3.5	0.324	1.000	1.200		0.388
3.6	0.313	1.000	1.200		0.376
3.8	0.294	1.000	1.200		0.353
4	0.277	1.000	1.200		0.332
4.2	0.264	1.000	1.200		0.317
4.4	0.252	1.000	1.200		0.302
4.6	0.241	1.000	1.200		0.289
4.8	0.231	1.000	1.200		0.277
5	0.222	1.000	1.200		0.266

To use above data in Excel, copy/paste:

```
0.01    0.605    1.000    1.000    0.605
0.02    0.693    1.000    1.000    0.693
```

Envelope Data

Period	SA
0.01	0.605
0.02	0.693
0.022	0.706
0.025	0.723
0.029	0.745
0.03	0.750
0.032	0.759
0.035	0.773
0.036	0.777
0.04	0.793
0.042	0.801
0.044	0.808
0.045	0.812
0.046	0.815
0.048	0.822

0.05	0.828
0.055	0.844
0.06	0.858
0.065	0.872
0.067	0.877
0.07	0.885
0.075	0.897
0.08	0.908
0.085	0.919
0.09	0.929
0.095	0.939
0.1	0.949
0.11	0.977
0.12	1.003
0.13	1.028
0.133	1.035
0.14	1.051
0.15	1.074
0.16	1.095
0.17	1.116
0.18	1.135
0.19	1.154
0.2	1.172
0.22	1.193
0.24	1.212
0.25	1.221
0.26	1.230
0.28	1.247
0.29	1.255
0.3	1.263
0.32	1.263
0.34	1.263
0.35	1.263
0.36	1.263
0.38	1.263
0.4	1.263
0.42	1.264
0.44	1.264
0.45	1.264
0.46	1.264
0.48	1.264
0.5	1.264
0.55	1.255
0.6	1.248
0.65	1.243
0.667	1.242
0.7	1.240
0.75	1.238
0.8	1.215
0.85	1.195

0.9	1.177
0.95	1.161
1	1.146
1.1	1.074
1.2	1.011
1.3	0.957
1.4	0.909
1.5	0.867
1.6	0.829
1.7	0.795
1.8	0.765
1.9	0.737
2	0.711
2.2	0.643
2.4	0.587
2.5	0.562
2.6	0.540
2.8	0.499
3	0.464
3.2	0.431
3.4	0.402
3.5	0.388
3.6	0.376
3.8	0.353
4	0.332
4.2	0.317
4.4	0.302
4.6	0.289
4.8	0.277
5	0.266

To use above data in Excel, copy/paste:

```
0.01    0.605
0.02    0.693
```

I-880 at 23rd and 29th Ave.
Liquefaction Evaluation
Seed et al. (2003) Procedure

Earthquake Magnitude M = 7.30 (MCE)
Peak Ground Acceleration: 0.71 (g) MSF (Seed et, al., 2003) = 1.10
Vs,40 = 695 (fps) (S-CPT measurements)

Boring ID	USCS class from boring log	Depth to Sample (ft)	Layer Thickness (ft)	GS Elev	γ_m (pcf)	Blows foot, N	Sampler code	% finer than No200	USCS class lab	PI	GWT Elev. Ft	Assigned Class.	Sample Elev. (ft)	σ_v, psf	σ_v', psf	Sampler Correction	Rod Length, m	CR	FC, %	C_N	ER	$N_{1,60}$	Capped FC	C_{Fines}	$(N_1)_{60cs}$	f	K_σ	CRR	Rd	CSR	CSR*	FS_L	FS_L < 1	P_L	Liquefaction Susceptibility	Below GWT	Assessment		FS_L	P_L		Lookup Num	Vol. Strain (%)	Settlement (inches)	PI	Final Enginering Judgment	Liquefied Layer Thickness (ft)
URS-1	CL	2.0		14.3	120	NA	NA		CL		5	CL	12	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-1	CL	5.0		14.3	120	14	MC		CL		5	CL	9	600	600	0.8	3.0	0.80	0	1.70	75	19	5	1.03	20	0.70	1.00	0.214	0.99	0.460	0.418	0.5	Yes	1.00	No	No	No		-	-						No	0
URS-1	CL	10.0		14.3	120	8	SPT		CL		5	CL	4	1200	1156	1.0	4.6	0.85	0	1.32	75	11	5	1.04	12	0.66	1.00	0.098	0.99	0.473	0.430	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-1	CL	15.0		14.3	120	9	MC		CL		5	CL	-1	1800	1444	0.8	6.1	0.95	0	1.18	75	10	5	1.04	11	0.65	1.00	0.084	0.97	0.560	0.509	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	20.0		14.3	120	8	MC		CL		5	CL	-6	2400	1732	0.8	7.6	0.95	0	1.07	75	8	5	1.05	9	0.64	1.00	0.069	0.95	0.608	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	25.0		14.3	120	12	MC		CL		5	CL	-11	3000	2020	0.8	9.1	0.95	0	0.99	75	11	5	1.04	12	0.66	1.00	0.085	0.92	0.630	0.573	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	30.0		14.3	120	18	MC		CL		5	CL	-16	3600	2308	0.8	10.7	1.00	0	0.93	75	17	5	1.03	17	0.69	0.97	0.124	0.87	0.632	0.590	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	35.0		14.3	120	20	MC		CL		5	CL	-21	4200	2596	0.8	12.2	1.00	0	0.88	75	18	5	1.03	18	0.69	0.94	0.127	0.82	0.617	0.598	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	40.0		14.3	120	12	MC		CL		5	CL	-26	4800	2884	0.8	13.7	1.00	0	0.83	75	10	5	1.05	10	0.65	0.90	0.069	0.77	0.593	0.601	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	SP-SM/CL	45.0	2.50	14.3	120	25	MC	10	SP-SM/CL		5	SP-SM/CL	-31	5400	3172	0.8	15.2	1.00	10	0.79	75	20	10	1.07	21	0.71	0.89	0.151	0.72	0.568	0.581	0.3	Yes	1.00	Yes	Yes	Yes		0.3	1.0		2158	2.32	0.7		Yes	2.5
URS-1	CL	50.0		14.3	120	19	MC		CL		5	CL	-36	6000	3460	0.8	16.8	1.00	0	0.76	75	14	5	1.04	15	0.67	0.85	0.093	0.68	0.545	0.582	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	60.0		14.3	120	21	MC		CL		5	CL	-46	7200	4036	0.8	19.8	1.00	0	0.70	75	15	5	1.04	15	0.68	0.81	0.091	0.63	0.519	0.581	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	SP-SM	70.0	15.00	14.3	120	41	SPT	10.4	SP-SM		5	SP-SM	-56	8400	4612	1.0	22.9	1.00	10	0.66	75	34	10	1.06	36	0.78	0.84	0.404	0.61	0.518	0.560	0.8	Yes	0.58	Yes	Yes	Yes		0.8	0.6		3656	0.75	0.0		No	0
URS-1	SP	80.0	5.00	14.3	120	38	SPT	11.2	SP-SM		5	SP-SM	-66	9600	5188	1.0	25.9	1.00	11	0.62	75	29	11	1.06	31	0.76	0.80	0.283	0.61	0.526	0.595	0.5	Yes	0.98	Yes	Yes	Yes		0.5	1.0		3160	1.30	0.0		No	0
URS-1	SP	90.0	5.00	14.3	120	70	SPT	5	SP		5	SP	-76	10800	5764	1.0	29.0	1.00	5	0.59	75	52	5	1.02	53	0.80	0.82	0.600	0.61	0.533	0.592	1.1		0.00	Yes	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.7		Total=	2.5
URS-2	CL	10.0		18.1	120	18	MC		CL		5	CL	8.1	1200	1200	0.8	4.6	0.85	0	1.29	75	20	5	1.03	20	0.70	1.00	0.187	0.99	0.456	0.415	0.4	Yes	1.00	No	No	No		-	-						No	0
URS-2	CL	15.0		18.1	120	15	MC	59.8	CL		5	CL	3.1	1800	1681	0.8	6.1	0.95	60	1.09	75	16	35	1.25	19	0.70	1.00	0.158	0.97	0.481	0.437	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	20.0		18.1	120	8	MC		CL		5	CL	-1.9	2400	1969	0.8	7.6	0.95	0	1.01	75	8	5	1.05	8	0.64	1.00	0.064	0.95	0.535	0.487	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	25.0		18.1	120	11	MC		CL		5	CL	-6.9	3000	2257	0.8	9.1	0.95	0	0.94	75	10	5	1.05	10	0.65	0.98	0.073	0.92	0.564	0.525	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	30.0		18.1	120	8	MC		CL		5	CL	-11.9	3600	2545	0.8	10.7	1.00	0	0.89	75	7	5	1.06	7	0.64	0.94	0.057	0.87	0.573	0.557	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	32.0		18.1	120		Shelby		CL		5	CL	-13.9	3840	2661	1.0	11.3	1.00	0	0.87	75	0	5	0.00	0	0.60	0.91	0.033	0.86	0.571	0.569	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	35.0		18.1	120	15	MC		CL		5	CL	-16.9	4200	2833	0.8	12.2	1.00	0	0.84	75	13	5	1.04	13	0.67	0.91	0.085	0.82	0.565	0.567	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	40.0		18.1	120	16	MC		CL		5	CL	-21.9	4800	3121	0.8	13.7	1.00	0	0.80	75	13	5	1.04	13	0.67	0.88	0.084	0.77	0.548	0.568	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	GC	45.0	5.00	18.1	120	28	MC	30	GC		5	GC	-26.9	5400	3409	0.8	15.2	1.00	30	0.77	75	21	30	1.19	26	0.73	0.88	0.205	0.72	0.528	0.547	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2655	1.72	1.0		Yes	5
URS-2	CL	50.0		18.1	120	15	MC		CL		5	CL	-31.9	6000	3697	0.8	16.8	1.00	0	0.74	75	11	5	1.04	12	0.66	0.83	0.070	0.68	0.510	0.562	0.1	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.0		Total=	5.0
URS-3	CH	2.0		17.9	120	NA	NA		CH		5	CH	15.9	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-3	CL	5.0		17.9	120	5	MC		CL		5	CL	12.9	600	600	0.8	3.0	0.80	0	1.70	75	7	5	1.06	7	0.64	1.00	0.084	0.99	0.460	0.418	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-3	GP-GM	10.0		17.9	120	29	MC	10	GP-GM		5	GP-GM	7.9	1200	1200	0.8	4.6	0.85	10	1.29	75	32	10	1.06	34	0.77	1.00	0.502	0.99	0.456	0.415	1.1		0.06	Yes	No	No		-	-						No	0
URS-3	CL	15.0		17.9	120	7	MC		CL		5	CL	2.9	1800	1669	0.8	6.1	0.95	0	1.09	75	7	5	1.05	8	0.64	1.00	0.065	0.97	0.485	0.441	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	20.0		17.9	120	27	SPT		CL		5	CL	-2.1	2400	1957	1.0	7.6	0.95	0	1.01	75	32	5	1.03	33	0.77	1.00	0.429	0.95	0.539	0.490	0.8	Yes	0.66	No	Yes	No		-	-						No	0
URS-3	SP-SM/CL	25.0	3.00	17.9	120	16	SPT	18.5	SC/CL		5	SC/CL	-7.1	3000	2245	1.0	9.1	0.95	19	0.94	75	18	19	1.13	20	0.70	0.98	0.154	0.92	0.567	0.525	0.3	Yes	1.00	Yes	Yes	Yes		0.3	1.0		2052	2.35	0.8		Yes	3
URS-3	CL	30.0		17.9	120	21	MC		CL		5	CL	-12.1	3600	2533	0.8	10.7	1.00	0	0.89	75	19	5	1.03	19	0.70	0.95	0.139	0.87	0.576	0.553	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	35.0		17.9	120	16	MC		CL		5	CL	-17.1	4200	2821	0.8	12.2	1.00	0	0.84	75	13	5	1.04	14	0.67	0.91	0.091	0.82	0.568	0.568	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SM	40.0	5.00	17.9	120	29	MC	27.5	SC		5	SC	-22.1	4800	3109	0.8	13.7	1.00	28	0.80	75	23	28	1.17	27	0.74	0.90	0.239	0.77	0.551	0.554	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2755	1.62	1.0		Yes	5
URS-3	CL	45.0		17.9	120	15	SPT		CL		5	CL	-27.1	5400	3397	1.0	15.2	1.00	0	0.77	75	14	5	1.04	15	0.67	0.86	0.093	0.72	0.530	0.562	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	50.0		17.9	120	23	MC		CL		5	CL	-32.1	6000	3685	0.8	16.8	1.00	0	0.74	75	17	5	1.03	18	0.69	0.84	0.110	0.68	0.512	0.554	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	60.0		17.9	120	21	MC		CL		5	CL	-42.1	7200	4261	0.8	19.8	1.00	0	0.69	75	14	5	1.04	15	0.67	0.80	0.087	0.63	0.491	0.561	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SP-SM	70.0		17.9	120	49	SPT	10	SP-SM		5	SP-SM	-52.1	8400	4837	1.0	22.9	1.00	10	0.64	75	39	10	1.05	41	0.80	0.85	0.600	0.61	0.494	0.530	1.2		0.02	Yes	Yes	No		-	-						No	0
URS-3	CL	80.0		17.9	120	13	SPT		CL		5	CL	-62.1	9600	5413	1.0	25.9	1.00	0	0.61	75	10	5	1.05	10	0.65	0.72	0.058	0.61	0.504	0.636	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	90.0		17.9	120	23	MC		CL		5	CL	-72.1	10800	5989	0.8	29.0	1.00	0	0.58	75	13	5	1.04	14	0.67	0.71	0.073	0.61	0.513	0.658	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SM	100.0		17.9	120	100	MC	45	SM		5	SM	-82.1	12000	6565	0.8	32.0	1.00	45	0.55	75	55	35	1.17	65	0.80	0.80	0.600	0.61	0.520	0.593	1.2		0.00	Yes	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.8		Total=	8.0
URS-4	CL	2.0		21.5	120		NA		CL		5	CL	19.5	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-4	CL	5.0		21.5	120	23	MC		CL		5	CL	16.5	600	600	0.8	3.0	0.80	0	1.70	75	31	5	1.03	32	0.76	1.00	0.547	0.99	0.460	0.418	1.2		0.06	No	No	No		-	-						No	0
URS-4	CL	10.0		21.5	120	12	MC		CL		5	CL	11.5	1200	1200	0.8	4.6	0.85	0	1.29	75	13	5	1.04	14	0.67	1.00	0.113	0.99	0.456	0.415	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-4	CL	15.0		21.5	120	11	MC		CL		5	CL	6.5	1800	1800	0.8	6.1	0.95	0	1.05	75	11	5	1.04	11	0.66	1.00	0.085	0.97	0.449	0.408	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-4	CL	20.0		21.5	120	13	MC		CL		5	CL	1.5	2400	2182	0.8	7.6	0.95	0	0.96	75	12	5	1.04	12	0.66	0.99	0.086	0.95	0.483	0.444	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	25.0		21.5	120	19	MC		CL		5	CL	-3.5	3000	2470	0.8	9.1	0.95	0	0.90	75	16	5	1.04	17	0.68	0.95	0.117	0.92	0.516	0.492	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	30.0		21.5	120	26	MC		CL		5	CL	-8.5	3600	2758	0.8	10.7	1.00	0	0.85	75	22	5	1.03	23	0.71	0.93	0.178	0.87	0.529	0.518	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CH	35.0		21.5	120	18	MC		CH		5	CH	-13.5	4200	3046	0.8	12.2	1.00	0	0.81	75	15	5	1.04	15	0.68	0.89	0.097	0.82	0.526	0.538	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	SM	40.0	5.00	21.5	120	22	SPT	23.4	SC		5	SC	-18.5	4800	3334	1.0	13.7	1.00	23	0.77	75	21	23	1.15	24	0.72	0.88	0.191	0.77	0.513	0.530	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2453	1.88	1.1		Yes	5
URS-4	CL	45.0		21.5	120	28	MC		CL		5	CL	-23.5	5400	3622	0.8	15.2	1.00	0	0.74	75	21	5	1.03	21	0.71	0.85	0.149	0.72	0.497	0.529	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	50.0		21.5	120	28	MC		CL		5	CL	-28.5	6000	3910	0.8	16.8	1.00	0	0.72	75	20	5	1.03	21	0.70	0.83	0.137	0.68	0.483	0.526	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	SM	60.0	5.00	21.5	120	38	MC	26.1	SC		5	SC	-38.5	7200	4486	0.8	19.8	1.00	26	0.67	75	25	26	1.16	29	0.75	0.83	0.253	0.63	0.467	0.513	0.5	Yes	0.98	Yes	Yes	Yes		0.5	1.0		2951	1.34	0.0		No	0
URS-4	SP-SM	70.0		21.5	120	50	SPT	12	SP-SM		5	SP-SM	-48.5	8400	5062	1.0	22.9	1.00	12	0.63	75	39	12	1.06	42	0.80	0.84	0.600	0.61	0.472	0.511	1.3		0.01	Yes	Yes	No		-	-						No	0
URS-4	CL	80.0		21.5	120	12	SPT		CL		5	CL	-58.5	9600	5638	1.0	25.9	1.00	0	0.60	75	9	5	1.05	9	0.65	0.71	0.053	0.61	0.484	0.622	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	90.0		21.5	120	18	MC		CL		5	CL	-68.5	10800	6214	0.8	29.0	1.00	0	0.57	75	10	5	1.04	11	0.65	0.69	0.057	0.61	0.494	0.653	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	100.0		21.5	120	27	MC		CL		5	CL	-78.5	12000	6790	0.8	32.0	1.00	0	0.54	75	15	5	1.04	15	0.68	0.69	0.078	0.61	0.503	0.667	0.2	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.1		Total=	5.0
URS-5	CL	1.0		16.5	120	NA	bag		CL		5	CL	15.5	120	120	Check	1.8	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-5	CL	5.0		16.5	120	18	MC		CL		5	CL	11.5	600	600	0.8	3.0	0.80	0	1.70	75	24	5	1.03	25	0.73	1.00	0.325	0.99	0.460	0.418	0.7	Yes	0.83	No	No	No		-	-						No	0
URS-5	GC	10.0		16.5	120	25	MC	45	GC		5	GC	6.5	1200	1200	0.8	4.6	0.85	45	1.29	75	27	35	1.20	33	0.77	1.00	0.481	0.99	0.456	0.415	1.1		0.03	Yes	No	No		-	-						No	0
URS-5	CL	15.0		16.5	120	3	SPT		CL		5	CL	1.5	1800	1582	1.0	6.1	0.95	0	1.12	75	4	5	1.08	4	0.62	1.00	0.052	0.97	0.511	0.465	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	20.0		16.5	120	7	SPT		CL		5	CL	-3.5	2400	1870	1.0	7.6	0.95	0	1.03	75	9	5	1.05	9	0.65	1.00	0.070	0.95	0.564	0.513	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	25.0		16.5	120	15	MC		CL		5	CL	-8.5	3000	2158	0.8	9.1	0.95	0	0.96	75	14	5	1.04	14	0.67	0.99	0.100	0.92	0.590	0.540	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	30.0		16.5	120	19	MC		CL		5	CL	-13.5	3600	2446	0.8	10.7	1.00	0	0.90	75	17	5	1.03	18	0.69	0.96	0.126	0.87	0.596	0.567	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	SP/CL	35.0	2.50	16.5	120	20	MC	5	SP/CL		5	SP/CL	-18.5	4200	2734	0.8	12.2	1.00	5	0.86	75	17	5	1.03	18	0.69	0.92	0.121	0.82	0.586	0.577	0.2	Yes	1.00	Yes	Yes	Yes		0.2	1.0		1858	2.68	0.8		Yes	2.5
URS-5	CL	40.0		16.5	120	25	MC		CL		5	CL	-23.5	4800	3022	0.8	13.7	1.00	0	0.81	75	20	5	1.03	21	0.70	0.90	0.151	0.77	0.566	0.572	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	SP	45.0	5.00	16.5	120	32	SPT	13.2	SM		5	SM	-28.5	5400	3310	1.0	15.2	1.00	13	0.78	75	31	13	1.07	33	0.77	0.90	0.373	0.72	0.544	0.549	0.7	Yes	0.79	Yes	Yes	Yes		0.7	0.8		3355	1.00	0.0		no	0
URS-5	CL	50.0		16.5	120	14	MC		CL		5	CL	-33.5	6000	3598	0.8	16.8	1.00	0	0.75	75	10	5	1.04	11	0.65	0.83	0.067	0.68	0.525	0.573	0.1	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.8		Total=	2.5
URS-8	CH	2.0		19.9	120	NA	NA		CH		5	CH	17.9	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-8	CL	5.0		19.9	120	26	MC		CL		5	CL	14.9	600	600	0.8	3.0	0.80	0	1.70	75	35	5	1.03	36	0.78	1.00	0.600	0.99	0.460	0.418	1.3		0.00	No	No	No		-	-						No	0
URS-8	CL	10.0		19.9	120	12	MC		CL		5	CL	9.9	1200	1200	0.8	4.6	0.85	0	1.29	75	13	5	1.04	14	0.67	1.00	0.113	0.99	0.456	0.415	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-8	CL	15.0		19.9	120	9	SPT		CL		5	CL	4.9	1800	1794	1.0	6.1	0.95	0	1.06	75	11	5	1.04	12	0.66	1.00	0.087	0.97	0.451	0.410	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	20.0		19.9	120	12	MC		CL		5	CL	-0.1	2400	2082	0.8	7.6	0.95	0	0.98	75	11	5	1.04	12	0.66	1.00	0.083	0.95	0.506	0.460	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	25.0		19.9	120	11	MC		CL		5	CL	-5.1	3000	2370	0.8	9.1	0.95	0	0.92	75	10	5	1.05	10	0.65	0.96	0.071	0.92	0.537	0.508	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	30.0		19.9	120	19	MC		CL		5	CL	-10.1	3600	2658	0.8	10.7	1.00	0	0.87	75	16	5	1.04	17	0.69	0.93	0.116	0.87	0.548	0.536	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CH	35.0		19.9	120	14	MC		CH		5	CH	-15.1	4200	2946	0.8	12.2	1.00	0	0.82	75	12	5	1.04	12	0.66	0.89	0.077	0.82	0.544	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	SP	40.0	5.00	19.9	120	32	MC	16.6	SC		5	SC	-20.1	4800	3234	0.8	13.7	1.00	17	0.79	75	25	17	1.10	28	0.74	0.89	0.244	0.77	0.529	0.538	0.5	Yes	1.00	Yes	Yes	Yes		0.5	1.0		2854	1.51	0.9		Yes	5
URS-8	CL	45.0		19.9	120	12	SPT		CL		5	CL	-25.1	5400	3522	1.0	15.2	1.00	0	0.75	75	11	5	1.04	12	0.66	0.84	0.072	0.72	0.511	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	50.0		19.9	120	55	MC		CL		5	CL	-30.1	6000	3810	0.8	16.8	1.00	0	0.72	75	40	5	1.03	41	0.80	0.89	0.600	0.68	0.495	0.507	1.2		0.03	No	Yes	No		-	-						No	0
URS-8	CL/SP	60.0		19.9	120	47	MC	15	CL/SP		5	CL/SP	-40.1	7200	4386	0.8	19.8	1.00	15	0.68	75	32	15	1.08	34	0.77	0.85	0.372	0.63	0.477	0.512	0.8	Yes	0.58	No	Yes	No		-	-						No	0
URS-8	CL	70.0		19.9	120	14	SPT		CL		5	CL	-50.1	8400	4962	1.0	22.9	1.00	0	0.63	75	11	5	1.04	12	0.66	0.75	0.065	0.61	0.482	0.586	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	80.0		19.9	120	35	MC		CL		5	CL	-60.1	9600	5538	0.8	25.9	1.00	0	0.60	75	21	5	1.03	22	0.71	0.76	0.135	0.61	0.493	0.593	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	90.0		19.9	120	22	SPT		CL		5	CL	-70.1	10800	6114	1.0	29.0	1.00	0	0.57	75	16	5	1.04	16	0.68	0.71	0.087	0.61	0.502	0.640	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	100.0		19.9	120	30	SPT		CL		5	CL	-80.1	12000	6690	1.0	32.0	1.00	0	0.55	75	21	5	1.03	21	0.71	0.71	0.123	0.61	0.510	0.651	0.2	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.9		Total=	5.0
URS-9	CH	2.0		17.3	120	NA	NA		CH		5	CH	15.3	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-9	CL	5.0		17.3	120	16	MC		CL		5	CL	12.3	600	600	0.8	3.0	0.80	0	1.70	75	22	5	1.03	22	0.71	1.00	0.264	0.99	0.460	0.418	0.6	Yes	0.98	No	No	No		-	-						No	0
URS-9	CL	10.0		17.3	120	22	MC		CL		5	CL	7.3	1200	1200	0.8	4.6	0.85	0	1.29	75	24	5	1.03	25	0.72	1.00	0.261	0.99	0.456	0.415	0.6	Yes	0.98	No	No	No		-	-						No	0
URS-9	CL	15.0		17.3	120	18	MC		CL		5	CL	2.3	1800	1632	0.8	6.1	0.95	0	1.11	75	19	5	1.03	20	0.70	1.00	0.161	0.97	0.496	0.451	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	20.0		17.3	120	12	MC		CL		5	CL	-2.7	2400	1920	0.8	7.6	0.95	0	1.02	75	12	5	1.04	12	0.66	1.00	0.088	0.95	0.549	0.499	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	25.0		17.3	120	13	MC		CL		5	CL	-7.7	3000	2208	0.8	9.1	0.95	0	0.95	75	12	5	1.04	12	0.66	0.99	0.085	0.92	0.577	0.532	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	30.0		17.3	120	17	MC		CL		5	CL	-12.7	3600	2496	0.8	10.7	1.00	0	0.90	75	15	5	1.04	16	0.68	0.95	0.108	0.87	0.584	0.560	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	35.0		17.3	120	8	MC		CL		5	CL	-17.7	4200	2784	0.8	12.2	1.00	0	0.85	75	7	5	1.06	7	0.64	0.90	0.055	0.82	0.576	0.578	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	SP-SM	40.0		17.3	120	35	SPT	10.6	SP-SM		5	SP-SM	-22.7	4800	3072	1.0	13.7	1.00	11	0.81	75	35	11	1.06	37	0.79	0.92	0.512	0.77	0.557	0.549	0.9	Yes	0.27	Yes	Yes	Yes		0.9	0.3		3755	0.64	0.0		No	0
URS-9	SP-SM	45.0		17.3	120	38	SPT	10.6	SP-SM		5	SP-SM	-27.7	5400	3360	1.0	15.2	1.00	11	0.77	75	37	11	1.06	39	0.79	0.91	0.555	0.72	0.536	0.536	1.0		0.11	Yes	Yes	No		-	-						No	0
URS-9	CH	50.0		17.3	120	15	MC		CH		5	CH	-32.7	6000	3648	0.8	16.8	1.00	0	0.74	75	11	5	1.04	12	0.66	0.83	0.071	0.68	0.517	0.567	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	60.0		17.3	120	40	MC		CL		5	CL	-42.7	7200	4224	0.8	19.8	1.00	0	0.69	75	28	5	1.03	28	0.74	0.84	0.238	0.63	0.496	0.539	0.5	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	70.0		17.3	120	27	MC		CL		5	CL	-52.7	8400	4800	0.8	22.9	1.00	0	0.65	75	17	5	1.03	18	0.69	0.78	0.106	0.61	0.498	0.583	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	80.0		17.3	120	40	MC		CL		5	CL	-62.7	9600	5376	0.8	25.9	1.00	0	0.61	75	24	5	1.03	25	0.73	0.77	0.176	0.61	0.508	0.596	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	90.0		17.3	120	28	SPT		CL		5	CL	-72.7	10800	5952	1.0	29.0	1.00	0	0.58	75	20	5	1.03	21	0.70	0.74	0.125	0.61	0.516	0.637	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	100.0		17.3	120	38	MC		CL		5	CL	-82.7	12000	6528	0.8	32.0	1.00	0	0.55	75	21	5	1.03	22	0.71	0.72	0.129	0.61	0.523	0.660	0.2	Yes	1.00	No	Yes	No		-	-						No	0

I-880 at 23rd and 29th Ave.
Liquefaction Evaluation
Seed et al. (2003) Procedure

Earthquake Magnitude M = 7.30 (MCE)
Peak Ground Acceleration: 0.71 (g)
Vs,40 = 695 (fps) (S-CPT measurements)
MSF (Seed et, al., 2003) = 1.10

Boring ID	USCS class from boring log	Depth to Sample (ft)	Layer Thickness (ft)	GS Elev	γ_m (pcf)	Blows foot, N	Sampler code	% finer than No200	USCS class lab	PI	GWT Elev. Ft	Assigned Class.	Sample Elev. (ft)	σ_v, psf	σ_v', psf	Sampler Correction	Rod Length, m	CR	FC, %	C_N	ER	$N_{1,60}$	Capped FC	C_{Fines}	$(N_1)_{60cs}$	f	Kσ	CRR	Rd	CSR	CSR*	FS_L	FS_L < 1	P_L	Liquefaction Susceptibility	Below GWT	Assessment	FS_L	P_L	Lookup Num	Vol. Strain (%)	Settlement (inches)	PI	Final Enginering Judgment	Liquefied Layer Thickness (ft)
																																				Estimated Settlement of Entire Boring Depth (inches) =							0.0		Total=	0.0
URS-11	CL	1.0		13.4	120	NA	NA		CL		5	CL	12.4	120	120	Check	1.8	0.75	0	1.70	75	#####	5	#####	#####	#####	1.00	#VALUE!	1.00	0.462	0.420	#####	#####	#####	No	No	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-11	CH	5.0		13.4	120	21	MC		CH		5	CH	8.4	600	600	0.8	3.0	0.80	0	1.70	75	29	5	1.03	29	0.75	1.00	0.444	0.99	0.460	0.418	1.0	Yes	0.29	No	No	No	-	-					No	0
URS-11	CL	10.0		13.4	120	14	MC		CL		5	CL	3.4	1200	1100	0.8	4.6	0.85	0	1.35	75	16	5	1.04	17	0.68	1.00	0.144	0.99	0.497	0.452	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	SC	15.0		13.4	120	36	SPT	16.9	SC		5	SC	-1.6	1800	1388	1.0	6.1	0.95	17	1.20	75	51	17	1.08	56	0.80	1.00	0.600	0.97	0.583	0.530	1.0		0.00	Yes	Yes	No	-	-					No	0
URS-11	CL	20.0		13.4	120	15	MC		CL		5	CL	-6.6	2400	1676	0.8	7.6	0.95	0	1.09	75	16	5	1.04	16	0.68	1.00	0.123	0.95	0.629	0.572	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	25.0		13.4	120	3	SPT		CH		5	CH	-11.6	3000	1964	1.0	9.1	0.95	0	1.01	75	4	5	1.09	4	0.62	1.00	0.047	0.92	0.648	0.589	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	27.0		13.4	120		Shelby		CH		5	CH	-13.6	3240	2079	1.0	9.8	0.95	0	0.98	75	0	5	0.00	0	0.60	1.00	0.035	0.90	0.650	0.591	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	30.0		13.4	120	13	MC		CH		5	CH	-16.6	3600	2252	0.8	10.7	1.00	0	0.94	75	12	5	1.04	13	0.66	0.98	0.088	0.87	0.647	0.601	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	35.0		13.4	120	10	MC		CH		5	CH	-21.6	4200	2540	0.8	12.2	1.00	0	0.89	75	9	5	1.05	9	0.65	0.94	0.066	0.82	0.631	0.612	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	40.0		13.4	120	12	MC		CL		5	CL	-26.6	4800	2828	0.8	13.7	1.00	0	0.84	75	10	5	1.04	11	0.65	0.90	0.070	0.77	0.605	0.609	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	45.0		13.4	120	15	SPT		CL		5	CL	-31.6	5400	3116	1.0	15.2	1.00	0	0.80	75	15	5	1.04	16	0.68	0.88	0.100	0.72	0.578	0.595	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	50.0		13.4	120	17	MC		CL		5	CL	-36.6	6000	3404	0.8	16.8	1.00	0	0.77	75	13	5	1.04	14	0.67	0.85	0.083	0.68	0.554	0.590	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	60.0		13.4	120	21	SPT		CL		5	CL	-46.6	7200	3980	1.0	19.8	1.00	0	0.71	75	19	5	1.03	19	0.70	0.83	0.122	0.63	0.526	0.579	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	70.0		13.4	120	20	MC		CL		5	CL	-56.6	8400	4556	0.8	22.9	1.00	0	0.66	75	13	5	1.04	14	0.67	0.78	0.078	0.61	0.524	0.615	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	80.0		13.4	120	38	MC		CL		5	CL	-66.6	9600	5132	0.8	25.9	1.00	0	0.62	75	24	5	1.03	24	0.72	0.78	0.169	0.61	0.532	0.619	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	90.0		13.4	120	41	MC		CL		5	CL	-76.6	10800	5708	0.8	29.0	1.00	0	0.59	75	24	5	1.03	25	0.73	0.76	0.171	0.61	0.538	0.643	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	100.0		13.4	120	36	SPT		CL		5	CL	-86.6	12000	6284	1.0	32.0	1.00	0	0.56	75	25	5	1.03	26	0.73	0.75	0.181	0.61	0.543	0.662	0.3	Yes	1.00	No	Yes	No	-	-					No	0
																																			Estimated Settlement of Entire Boring Depth (inches) =							0.0		Total=	0.0

Note:
1. Highlight cell is assumed value

Final Enginering Judgment is based on:
1.N160cs: if N160cs>35, no liquification problem
2.Induced settlement: if induced settlement is limited and the liquefied layer is deep, no liquefaction problem

29th OC - Abutment Loading

Total Load Per Pile Group

Location	Max Service Loading		Max Strength Loading		Max Seismic Loading	
	Axial (k)	Lateral (k)	Axial (k)	Lateral (k)	Axial (k)	Lateral (k)
Abutment 1	1947	314	N/A	N/A	N/A	N/A
Abutment 1 RW Left	506	99	661	149	453	111
Abutment 1 RW Right	685	134	895	203	613	147
Abutment 8	2032	260	N/A	N/A	N/A	N/A
Abutment 8 RW Left	703	138	928	207	639	147
Abutment 8 RW Right	573	102	746	156	518	112

29th AVE. Abut 1

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	14.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-45.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

												Cohesive Soil					Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	15	5.5	0.0	0	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.79	0.79	125.00	687.50	0.00	687.50	0.00	0.00	0.00	13
14.696	2.116	14	6.5	1.0	12	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	812.50	0.00	812.50	0.00	0.00	0.00	12
14.696	2.116	13	7.5	2.0	24	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.75	0.75	125.00	937.50	0.00	937.50	0.71	6.39	6.39	11
14.696	2.116	12	8.5	3.0	36	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.74	0.74	125.00	1062.50	0.00	1062.50	0.78	6.22	12.61	10
14.696	2.116	11	9.5	4.0	48	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.72	0.72	125.00	1187.50	0.00	1187.50	0.86	6.05	18.66	9
14.696	2.116	10	10.5	5.0	60	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.71	0.71	125.00	1312.50	31.20	1281.30	0.91	5.87	24.54	8
14.696	2.116	9	11.5	6.0	72	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1437.50	93.60	1343.90	0.93	5.70	30.24	7
14.696	2.116	8	12.5	7.0	84	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.68	0.68	125.00	1562.50	156.00	1406.50	0.96	5.53	35.77	6
14.696	2.116	7	13.5	8.0	96	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.67	0.67	125.00	1687.50	218.40	1469.10	0.98	5.36	41.12	5
14.696	2.116	6	14.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.66	0.66	125.00	1812.50	280.80	1531.70	1.01	5.18	46.31	4
14.696	2.116	5	15.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	1937.50	343.20	1594.30	1.03	5.18	51.49	3
14.696	2.116	4	16.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	405.60	1656.90	1.05	5.18	56.67	2
14.696	2.116	3	17.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	468.00	1719.50	1.07	5.18	61.86	1
14.696	2.116	2	18.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	530.40	1782.10	1.09	5.18	67.04	-1
14.696	2.116	1	19.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	592.80	1844.70	1.11	5.18	72.23	-2
14.696	2.116	-1	20.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	655.20	1907.30	1.13	5.18	77.41	-3
14.696	2.116	-2	21.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	717.60	1969.90	1.15	5.18	82.59	-4
14.696	2.116	-3	22.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	780.00	2032.50	1.16	5.18	87.78	-5
14.696	2.116	-4	23.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	842.40	2095.10	1.18	5.18	92.96	-6
14.696	2.116	-5	24.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	904.80	2157.70	1.19	5.18	98.14	-7
14.696	2.116	-6	25.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	967.20	2220.30	1.21	5.18	103.33	-8
14.696	2.116	-7	26.5	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3312.50	1029.60	2282.90	1.28	5.18	108.51	-9
14.696	2.116	-8	27.5	22.0	264	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	11	0.58	0.58	125.00	3437.50	1092.00	2345.50	1.36	5.25	113.76	-10
14.696	2.116	-9	28.5	23.0	276	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	11.5	0.60	0.60	125.00	3562.50	1154.40	2408.10	1.44	5.35	119.11	-11
14.696	2.116	-10	29.5	24.0	288	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	12	0.61	0.61	125.00	3687.50	1216.80	2470.70	1.51	5.44	124.55	-12
14.696	2.116	-11	30.5	25.0	300	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	12.5	0.63	0.63	125.00	3812.50	1279.20	2533.30	1.59	5.54	130.10	-13
14.696	2.116	-12	31.5	26.0	312	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	13	0.64	0.64	125.00	3937.50	1341.60	2595.90	1.67	5.64	135.74	-14
14.696	2.116	-13	32.5	27.0	324	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	13.5	0.66	0.66	125.00	4062.50	1404.00	2658.50	1.74	5.74	141.47	-15
14.696	2.116	-14	33.5	28.0	336	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	14	0.67	0.67	125.00	4187.50	1466.40	2721.10	1.82	5.83	147.31	-16
14.696	2.116	-15	34.5	29.0	348	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	14.5	0.68	0.68	125.00	4312.50	1528.80	2783.70	1.90	5.93	153.24	-17
14.696	2.116	-16	35.5	30.0	360	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	15	0.69	0.69	125.00	4437.50	1591.20	2846.30	1.98	6.03	159.27	-18
14.696	2.116	-17	36.5	31.0	372	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	15.5	0.68	0.68	125.00	4562.50	1653.60	2908.90	1.99	6.13	165.39	-19
14.696	2.116	-18	37.5	32.0	384	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	16	0.67	0.67	125.00	4687.50	1716.00	2971.50	2.00	6.22	171.62	-20
14.696	2.116	-19	38.5	33.0	396	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	16.5	0.66	0.66	125.00	4812.50	1778.40	3034.10	2.00	6.32	177.94	-21
14.696	2.116	-20	39.5	34.0	408	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	17	0.65	0.65	125.00	4937.50	1840.80	3096.70	2.01	6.42	184.36	-22
14.696	2.116	-21	40.5	35.0	420	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	17.5	0.64	0.64	125.00	5062.50	1903.20	3159.30	2.02	6.52	190.87	-23
14.696	2.116	-22	41.5	36.0	432	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18	0.63	0.63	125.00	5187.50	1965.60	3221.90	2.03	6.61	197.49	-24
14.696	2.116	-23	42.5	37.0	444	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	18.5	0.62	0.62	125.00	5312.50	2028.00	3284.50	2.03	6.71	204.20	-25
14.696	2.116	-24	43.5	38.0	456	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	19	0.61	0.61	125.00	5437.50	2090.40	3347.10	2.03	6.81	211.00	-26
14.696	2.116	-25	44.5	39.0	468	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	19.5	0.60	0.60	125.00	5562.50	2152.80	3409.70	2.04	6.91	217.91	-27
14.696	2.116	-26	45.5	40.0	480	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	20	0.59	0.59	125.00	5687.50	2215.20	3472.30	2.04	7.00	224.91	-28
14.696	2.116	-27	46.5	41.0	492	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	20.5	0.58	0.58	125.00	5812.50	2277.60	3534.90	2.04	7.10	232.01	-29
14.696	2.116	-28	47.5	42.0	504	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	21	0.57	0.57	125.00	5937.50	2340.00	3597.50	2.04	7.20	239.21	-30
14.696	2.116	-29	48.5	43.0	516	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	21.5	0.56	0.56	125.00	6062.50	2402.40	3660.10	2.04	7.29	246.50	-31
14.696	2.116	-30	49.5	44.0	528	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	22	0.55	0.55	125.00	6187.50	2464.80	3722.70	2.04	7.39	253.90	-32
14.696	2.116	-31	50.5	45.0	540	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	22.5	0.54	0.54	125.00	6312.50	2527.20	3785.30	2.04	7.49	261.39	-33
14.696	2.116	-32	51.5	46.0	552	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	23	0.53	0.53	125.00	6437.50	2589.60	3847.90	2.04	7.59	268.97	-34
14.696	2.116	-33	52.5	47.0	564	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	23.5	0.52	0.52	125.00	6562.50	2652.00	3910.50	2.03	7.68	276.66	-35
14.696	2.116	-34	53.5	48.0	576	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	24	0.51	0.51	125.00	6687.50	2714.40	3973.10	2.03	7.78	284.44	-36
14.696	2.116	-35	54.5	49.0	588	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	24.5	0.50	0.50	125.00	6812.50	2776.80	4035.70	2.02	7.88	292.32	-37
14.696	2.116	-36	55.5	50.0	600	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	25	0.49	0.49	125.00	6937.50	2839.20	4098.30	2.02	7.98	300.29	-38
14.696	2.116	-37	56.5	51.0	612	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	25.5	0.48	0.48	125.00	7062.50	2901.60	4160.90	2.01	8.07	308.37	-39
14.696	2.116	-38	57.5	52.0	624	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	26	0.47	0.47	125.00	7187.50	2964.00	4223.50	2.00	8.17	316.54	-40
14.696	2.116	-39	58.5	53.0	636	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	26.5	0.47	0.47	125.00	7312.50	3026.40	4286.10	1.99	8.27	324.80	-41
14.696	2.116	-40	59.5	54.0	648	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	27	0.46	0.46	125.00	7437.50	3088.80	4348.70	1.99	8.37	333.17	-42
14.696	2.116	-41	60.5	55.0	660	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	27.5	0.45	0.45	125.00	7562.50	3151.20	4411.30	1.98	8.46	341.63	-43
14.696	2.116	-42	61.5	56.0	672	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	28	0.44	0.44	125.00	7687.50	3213.60	4473.90	1.97	8.56	350.19	-44
14.696	2.116	-43	62.5	57.0	684	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	28.5	0.43	0.43	125.00	7812.50	3276.00	4536.50	1.95	8.66	358.85	-45
14.696	2.116	-44	63.5	58.0	696	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	29	0.42	0.42	125.00	7937.50	3338.40	4599.10	1.94	8.75	367.61	-46
14.696	2.116	-45	64.5	59.0	708	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	29.5	0.41	0.41	125.00	8062.50	3400.80	4661.70	1.93	8.85	376.46	-47
14.696	2.116	-46	65.5	60.0	720	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	30	0.41	0.41	125.00	8187.50	3463.20	4724.30	1.91	8.95	385.41	-48
14.696	2.116	-47	66.5	61.0	732	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	30.5	0.40	0.40	125.00	8312.50	3525.60	4786.90	1.90	9.05	394.45	-49
14.696	2.116	-48	67.5	62.0	744	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	31	0.39	0.39	125.00	8437.50	3588.00	4849.50	1.89	9.14	403.60	-50
14.696	2.116	-49	68.5	63.0	756	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	31.5	0.38	0.38	125.00	8562.50	3650.40	4912.10	1.87	9.24	412.84	-51
14.696	2.116	-50	69.5	64.0	768	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	32	0.37	0.37	125.00	8687.50	3712.80	4974.70	1.85	9.34	422.18	-52
14.696	2.116	-51	70.5	65.0	780	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	32.5	0.36	0.36	125.00	8812.50	3775.20	5037.30	1.84	9.44	431.62	-53
14.696	2.116	-52	71.5	66.0	792	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	33	0.36	0.36	125.00	8937.50	3837.60	5099.90	1.82	9.53	441.15	-54
14.696	2.116	-53	72.5	67.0	804	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	33.5	0.35	0.35	125.00	9062.50	3900.00	5162.50	1.80	9.63	450.78	-55
14.696	2.116	-54	73.5	68.0	816	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	34	0.34	0.34	125.00	9187.50	3962.40	5225.10	1.78	9.73	460.51	-56
14.696	2.116	-55	74.5	69.0	828	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	34.5	0.33	0.33	125.00	9312.50	4024.80	5287.70	1.76	9.83	470.33	-57
14.696	2.116	-56	75.5	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.32	0.32	125.00	9437.50	4087.20	5350.30	1.74	9.92	480.26	-58
14.696	2.116	-57	76.5	71.0	852	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	35.5	0.32	0.32	125.00	9562.50	4149.60	5412.90	1.72	10.02	490.28	-59
14.696	2.116	-58	77.5	72.0	864	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	36	0.31	0.31	125.00	9687.50	4212.00	5475.50	1.69	10.12	500.39	-60
14.696	2.116	-59	78.5	73.0	876	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	36.5	0.30	0.30	125.00	9812.50	4274.40	5538.10	1.67	10.22	510.61	-61
14.696	2.116	-60	79.5	74.0	888	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	37	0.29	0.29	125.00	9937.50	4336.80	5600.70	1.65	10.31	520.92	-62
14.696	2.116	-61	80.5	75.0	900	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	37.5	0.29	0.29	125.00	10062.50	4399.20	5663.30	1.62	10.41	531.33	-63
14.696	2.116	-62	81.5	76.0	912	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	38	0.28	0.28	125.00	10187.50	4461.60	5725.90	1.60	10.51	541.84	-64
14.696	2.116	-63	82.5	77.0	924	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	38.5	0.27	0.27	125.00	10312.50	4524.00	5788.50	1.57	10.60	552.44	-65
14.696	2.116	-64	83.5	78.0	936	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	39	0.26	0.26	125.00	10437.50	4586.40	5851.10	1.54	10.70	563.15	-66
14.696	2.116	-65	84.5	79.0	948	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	39.5	0.26	0.26	125.00	10562.50	4648.80	5913.70	1.52	10.80	573.94	-67
14.696	2.116	-66	85.5	80.0	960	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	40	0.25	0.25	125.00	10687.50	4711.20	5976.30	1.49	10.90	584.84	-68
14.696	2.116	-67	86.5	81.0	972	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	40.5	0.24	0.25	125.00	10812.50	4773.60	6038.90	1.51	10.99	595.83	-69
14.696	2.116	-68	87.5	82.0	984	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	41	0.23	0.25	125.00	10937.50	4836.00	6101.50	1.53	11.06	606.89	-70
14.696	2.116	-69	88.5	83.0	996	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	41.5	0.23	0.25	125.00	11062.50	4898.40	6164.10	1.54	11.13	618.01	-71
14.696	2.116	-70	89.5	84.0	1008	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	42	0.22	0.25	125.00	11187.50	4960.80	6226.70	1.56	11.20	629.21	-72
14.696	2.116	-71	90.5	85.0	1020	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	42.5	0.21	0.25	125.00	11312.50	5023.20	6289.30	1.57	11.27	640.48	-73
14.696	2.116	-72	91.5	86.0	1032	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	43	0.21	0.25	125.00	11437.50	5085.60	6351.90	1.59	11.33	651.81	-74
14.696	2.116	-73	92.5	87.0	1044	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	43.5	0.20	0.25	125.00	11562.50	5148.00	6414.50	1.60	11.40	663.21	-75
14.696	2.116	-74	93.5	88.0	1056	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	44	0.19	0.25	125.00	11687.50	5210.40	6477.10	1.62	11.47	674.69	-76
14.696	2.116	-75	94.5	89.0	1068	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	44.5	0.19	0.25	125.00	11812.50	5272.80	6539.70	1.63	11.54	686.22	-77
14.696	2.116	-76	95.5	90.0	1080	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	45	0.18	0.25	125.00	11937.50	5335.20	6602.30	1.65	11.60	697.83	-78
14.696	2.116	-77	96.5	91.0	1092	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	45.5	0.17	0.25	125.00	12062.50	5397.60	6664.90	1.67	11.67	709.50	-79
14.696	2.116	-78	97.5	92.0	1104	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	46	0.16	0.25	125.00	12187.50	5460.00	6727.50	1.68	11.74	721.23	-80
14.696	2.116	-79	98.5	93.0	1116	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	46.5	0.16	0.25	125.00	12312.50	5522.40	6790.10	1.70	11.80	733.04	-81
14.696	2.116	-80	99.5	94.0	1128	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	47	0.15	0.25	125.00	12437.50	5584.80	6852.70	1.71	11.87	744.90	-82
14.696	2.116	-81	100.5	95.0	1140	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	47.5	0.14	0.25	125.00	12562.50	5647.20	6915.30	1.73	11.93	756.83	-83
14.696	2.116	-82	101.5	96.0	1152	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	48	0.14	0.25	125.00	12687.50	5709.60	6977.90	1.74	11.99	768.83	-84
14.696	2.116	-83	102.5	97.0	1164	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	48.5	0.13	0.25	125.00	12812.50	5772.00	7040.50	1.76	12.06	780.88	-85
14.696	2.116	-84	103.5	98.0	1176	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	49	0.12	0.25	125.00	12937.50	5834.40	7103.10	1.78	12.12	793.01	-86
14.696	2.116	-85	104.5	99.0	1188	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	49.5	0.12	0.25	125.00	13062.50	5896.80	7165.70	1.79	12.18	805.19	-87
14.696	2.116	-86	105.5	100.0	1200	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	50	0.11	0.25	125.00	13187.50	5959.20	7228.30	1.81	12.25	817.43	-88
14.696	2.116	-87	106.5	101.0	1212	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	50.5	0.10	0.25	125.00	13312.50	6021.60	7290.90	1.82	12.31	829.74	-89
14.696	2.116	-88	107.5	102.0	1224	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	51	0.10	0.25	125.00	13437.50	6084.00	7353.50	1.84	12.37	842.11	-90
14.696	2.116	-89	108.5	103.0	1236	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	51.5	0.09	0.25	125.00	13562.50	6146.40	7416.10	1.85	12.43	854.54	-91
14.696	2.116	-90	109.5	104.0	1248	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	52	0.08	0.25	125.00	13687.50	6208.80	7478.70	1.87	12.49	867.02	-92
14.696	2.116	-91	110.5	105.0	1260	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	52.5	0.08	0.25	125.00	13812.50	6271.20	7541.30	1.89	12.55	879.57	-93
14.696	2.116	-92	111.5	106.0	1272	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	53	0.07	0.25	125.00	13937.50	6333.60	7603.90	1.90	12.61	892.18	-94
14.696	2.116	-93	112.5	107.0	1284	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	53.5	0.07	0.25	125.00	14062.50	6396.00	7666.50	1.92	12.67	904.85	-95
14.696	2.116	-94	113.5	108.0	1296	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	54	0.06	0.25	125.00	14187.50	6458.40	7729.10	1.93	12.72	917.57	-96
14.696	2.116	-95	114.5	109.0	1308	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	54.5	0.05	0.25	125.00	14312.50	6520.80	7791.70	1.95	12.78	930.35	-97
14.696	2.116	-96	115.5	110.0	1320	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	55	0.05	0.25	125.00	14437.50	6583.20	7854.30	1.96	12.84	943.19	-98
14.696	2.116	-97	116.5	111.0	1332	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	55.5	0.04	0.25	125.00	14562.50	6645.60	7916.90	1.98	12.90	956.09	-99
14.696	2.116	-98	117.5	112.0	1344	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	56	0.03	0.25	125.00	14687.50	6708.00	7979.50	1.99	12.95	969.04	-100
14.696	2.116	-99	118.5	113.0	1356	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	56.5	0.03	0.25	125.00	14812.50	6770.40	8042.10	2.01	13.01	982.05	-101
14.696	2.116	-100	119.5	114.0	1368	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	57	0.02	0.25	125.00	14937.50	6832.80	8104.70	2.03	13.06	995.11	-102
14.696	2.116	-101	120.5	115.0	1380	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	57.5	0.02	0.25	125.00	15062.50	6895.20	8167.30	2.04	13.12	1008.23	-103
14.696	2.116	-102	121.5	116.0	1392	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	58	0.01	0.25	125.00	15187.50	6957.60	8229.90	2.06	13.17	1021.40	-104
14.696	2.116	-103	122.5	117.0	1404	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	58.5	0.00	0.25	125.00	15312.50	7020.00	8292.50	2.07	13.23	1034.63	-105
14.696	2.116	-104	123.5	118.0	1416	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	59	0.00	0.25	125.00	15437.50	7082.40	8355.10	2.09	13.28	1047.91	-106
14.696	2.116	-105	124.5	119.0	1428	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	59.5	-0.01	0.25	125.00	15562.50	7144.80	8417.70	2.10	13.33	1061.24	-107
14.696	2.116	-106	125.5	120.0	1440	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	60	-0.02	0.25	125.00	15687.50	7207.20	8480.30	2.12	13.39	1074.62	-108
14.696	2.116	-107	126.5	121.0	1452	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	60.5	-0.02	0.25	125.00	15812.50	7269.60	8542.90	2.14	13.44	1088.06	-109
14.696	2.116	-108	127.5	122.0	1464	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	61	-0.03	0.25	125.00	15937.50	7332.00	8605.50	2.15	13.49	1101.55	-110
14.696	2.116	-109	128.5	123.0	1476	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	61.5	-0.03	0.25	125.00	16062.50	7394.40	8668.10	2.17	13.54	1115.09	-111
14.696	2.116	-110	129.5	124.0	1488	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	62	-0.04	0.25	125.00	16187.50	7456.80	8730.70	2.18	13.59	1128.68	-112
14.696	2.116	-111	130.5	125.0	1500	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	62.5	-0.05	0.25	125.00	16312.50	7519.20	8793.30	2.20	13.64	1142.32	-113
14.696	2.116	-112	131.5	126.0	1512	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	63	-0.05	0.25	125.00	16437.50	7581.60	8855.90	2.21	13.69	1156.01	-114
14.696	2.116	-113	132.5	127.0	1524	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	63.5	-0.06	0.25	125.00	16562.50	7644.00	8918.50	2.23	13.74	1169.75	-115
14.696	2.116	-114	133.5	128.0	1536	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	64	-0.06	0.25	125.00	16687.50	7706.40	8981.10	2.25	13.79	1183.54	-116
14.696	2.116	-115	134.5	129.0	1548	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	64.5	-0.07	0.25	125.00	16812.50	7768.80	9043.70	2.26	13.84	1197.38	-117
14.696	2.116	-116	135.5	130.0	1560	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	65	-0.07	0.25	125.00	16937.50	7831.20	9106.30	2.28	13.88	1211.26	-118
14.696	2.116	-117	136.5	131.0	1572	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	65.5	-0.08	0.25	125.00	17062.50	7893.60	9168.90	2.29	13.93	1225.20	-119
14.696	2.116	-118	137.5	132.0	1584	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	66	-0.09	0.25	125.00	17187.50	7956.00	9231.50	2.31	13.98	1239.18	-120
14.696	2.116	-119	138.5	133.0	1596	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	66.5	-0.09	0.25	125.00	17312.50	8018.40	9294.10	2.32	14.03	1253.20	-121
14.696	2.116	-120	139.5	134.0	1608	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	67	-0.10	0.25	125.00	17437.50	8080.80	9356.70	2.34	14.07	1267.27	-122
14.696	2.116	-121	140.5	135.0	1620	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	67.5	-0.10	0.25	125.00	17562.50	8143.20	9419.30	2.35	14.12	1281.39	-123
14.696	2.116	-122	141.5	136.0	1632	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	68	-0.11	0.25	125.00	17687.50	8205.60	9481.90	2.37	14.16	1295.55	-124
14.696	2.116	-123	142.5	137.0	1644	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	68.5	-0.11	0.25	125.00	17812.50	8268.00	9544.50	2.39	14.21	1309.76	-125
14.696	2.116	-124	143.5	138.0	1656	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	69	-0.12	0.25	125.00	17937.50	8330.40	9607.10	2.40	14.25	1324.01	-126
14.696	2.116	-125	144.5	139.0	1668	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	69.5	-0.13	0.25	125.00	18062.50	8392.80	9669.70	2.42	14.29	1338.30	-127
14.696	2.116	-126	145.5	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.13	0.25	125.00	18187.50	8455.20	9732.30	2.43	#N/A	#N/A	-128
14.696	2.116	-127	146.5	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.14	0.25	125.00	18312.50	8517.60	9794.90	2.45	#N/A	#N/A	-129

29th AVE. Abut 1 RW Left

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	14.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-45.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	15	5.5	0.0	0	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.79	0.79	125.00	687.50	0.00	687.50	0.00	0.00	0.00	13
14.696	2.116	14	6.5	1.0	12	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	812.50	0.00	812.50	0.00	0.00	0.00	12
14.696	2.116	13	7.5	2.0	24	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.75	0.75	125.00	937.50	0.00	937.50	0.71	6.39	6.39	11
14.696	2.116	12	8.5	3.0	36	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.74	0.74	125.00	1062.50	0.00	1062.50	0.78	6.22	12.61	10
14.696	2.116	11	9.5	4.0	48	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.72	0.72	125.00	1187.50	0.00	1187.50	0.86	6.05	18.66	9
14.696	2.116	10	10.5	5.0	60	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.71	0.71	125.00	1312.50	31.20	1281.30	0.91	5.87	24.54	8
14.696	2.116	9	11.5	6.0	72	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1437.50	93.60	1343.90	0.93	5.70	30.24	7
14.696	2.116	8	12.5	7.0	84	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.68	0.68	125.00	1562.50	156.00	1406.50	0.96	5.53	35.77	6
14.696	2.116	7	13.5	8.0	96	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.67	0.67	125.00	1687.50	218.40	1469.10	0.98	5.36	41.12	5
14.696	2.116	6	14.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.66	0.66	125.00	1812.50	280.80	1531.70	1.01	5.18	46.31	4
14.696	2.116	5	15.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	1937.50	343.20	1594.30	1.03	5.18	51.49	3
14.696	2.116	4	16.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	405.60	1656.90	1.05	5.18	56.67	2
14.696	2.116	3	17.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	468.00	1719.50	1.07	5.18	61.86	1
14.696	2.116	2	18.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	530.40	1782.10	1.09	5.18	67.04	-1
14.696	2.116	1	19.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	592.80	1844.70	1.11	5.18	72.23	-2
14.696	2.116	-1	20.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	655.20	1907.30	1.13	5.18	77.41	-3
14.696	2.116	-2	21.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	717.60	1969.90	1.15	5.18	82.59	-4
14.696	2.116	-3	22.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	780.00	2032.50	1.16	5.18	87.78	-5
14.696	2.116	-4	23.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	842.40	2095.10	1.18	5.18	92.96	-6
14.696	2.116	-5	24.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	904.80	2157.70	1.19	5.18	98.14	-7
14.696	2.116	-6	25.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	967.20	2220.30	1.21	5.18	103.33	-8
14.696	2.116	-7	26.5	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3312.50	1029.60	2282.90	1.28	5.18	108.51	-9
14.696	2.116	-8	27.5	22.0	264	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	11	0.58	0.58	125.00	3437.50	1092.00	2345.50	1.36	5.25	113.76	-10
14.696	2.116	-9	28.5	23.0	276	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	11.5	0.60	0.60	125.00	3562.50	1154.40	2408.10	1.44	5.35	119.11	-11
14.696	2.116	-10	29.5	24.0	288	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	12	0.61	0.61	125.00	3687.50	1216.80	2470.70	1.51	5.44	124.55	-12
14.696	2.116	-11	30.5	25.0	300	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	12.5	0.63	0.63	125.00	3812.50	1279.20	2533.30	1.59	5.54	130.10	-13
14.696	2.116	-12	31.5	26.0	312	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	13	0.64	0.64	125.00	3937.50	1341.60	2595.90	1.67	5.64	135.74	-14
14.696	2.116	-13	32.5	27.0	324	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	13.5	0.66	0.66	125.00	4062.50	1404.00	2658.50	1.74	5.74	141.47	-15
14.696	2.116	-14	33.5	28.0	336	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	14	0.67	0.67	125.00	4187.50	1466.40	2721.10	1.82	5.83	147.31	-16
14.696	2.116	-15	34.5	29.0	348	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	14.5	0.68	0.68	125.00	4312.50	1528.80	2783.70	1.90	5.93	153.24	-17
14.696	2.116	-16	35.5	30.0	360	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	15	0.69	0.69	125.00	4437.50	1591.20	2846.30	1.98	6.03	159.27	-18
14.696	2.116	-17	36.5	31.0	372	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	15.5	0.68	0.68	125.00	4562.50	1653.60	2908.90	1.99	6.13	165.39	-19
14.696	2.116	-18	37.5	32.0	384	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	16	0.67	0.67	125.00	4687.50	1716.00	2971.50	2.00	6.22	171.62	-20
14.696	2.116	-19	38.5	33.0	396	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	16.5	0.66	0.66	125.00	4812.50	1778.40	3034.10	2.00	6.32	177.94	-21
14.696	2.116	-20	39.5	34.0	408	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	17	0.65	0.65	125.00	4937.50	1840.80	3096.70	2.01	6.42	184.36	-22
14.696	2.116	-21	40.5	35.0	420	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	17.5	0.64	0.64	125.00	5062.50	1903.20	3159.30	2.02	6.52	190.87	-23
14.696	2.116	-22	41.5	36.0	432	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18	0.63	0.63	125.00	5187.50	1965.60	3221.90	2.03	6.61	197.49	-24
14.696	2.116	-23	42.5	37.0	444	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	18.5	0.62	0.62	125.00	5312.50	2028.00	3284.50	2.03	6.71	204.20	-25
14.696	2.116	-24	43.5	38.0	456	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	19	0.61	0.61	125.00	5437.50	2090.40	3347.10	2.03	6.81	211.00	-26
14.696	2.116	-25	44.5	39.0	468	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	19.5	0.60	0.60	125.00	5562.50	2152.80	3409.70	2.04	6.91	217.91	-27
14.696	2.116	-26	45.5	40.0	480	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	20	0.59	0.59	125.00	5687.50	2215.20	3472.30	2.04	7.00	224.91	-28
14.696	2.116	-27	46.5	41.0	492	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	20.5	0.58	0.58	125.00	5812.50	2277.60	3534.90	2.04	7.10	232.01	-29
14.696	2.116	-28	47.5	42.0	504	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	21	0.57	0.57	125.00	5937.50	2340.00	3597.50	2.04	7.20	239.21	-30
14.696	2.116	-29	48.5	43.0	516	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	21.5	0.56	0.56	125.00	6062.50	2402.40	3660.10	2.04	7.29	246.50	-31
14.696	2.116	-30	49.5	44.0	528	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	22	0.55	0.55	125.00	6187.50	2464.80	3722.70	2.04	7.39	253.90	-32
14.696	2.116	-31	50.5	45.0	540	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	22.5	0.54	0.54	125.00	6312.50	2527.20	3785.30	2.04	7.49	261.39	-33
14.696	2.116	-32	51.5	46.0	552	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	23	0.53	0.53	125.00	6437.50	2589.60	3847.90	2.04	7.59	268.97	-34
14.696	2.116	-33	52.5	47.0	564	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	23.5	0.52	0.52	125.00	6562.50	2652.00	3910.50	2.03	7.68	276.66	-35
14.696	2.116	-34	53.5	48.0	576	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	24	0.51	0.51	125.00	6687.50	2714.40	3973.10	2.03	7.78	284.44	-36
14.696	2.116	-35	54.5	49.0	588	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	24.5	0.50	0.50	125.00	6812.50	2776.80	4035.70	2.02	7.88	292.32	-37
14.696	2.116	-36	55.5	50.0	600	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	25	0.49	0.49	125.00	6937.50	2839.20	4098.30	2.02	7.98	300.29	-38
14.696	2.116	-37	56.5	51.0	612	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	25.5	0.48	0.48	125.00	7062.50	2901.60	4160.90	2.01	8.07	308.37	-39
14.696	2.116	-38	57.5	52.0	624	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	26	0.47	0.47	125.00	7187.50	2964.00	4223.50	2.00	8.17	316.54	-40
14.696	2.116	-39	58.5	53.0	636	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	26.5	0.47	0.47	125.00	7312.50	3026.40	4286.10	1.99	8.27	324.80	-41
14.696	2.116	-40	59.5	54.0	648	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	27	0.46	0.46	125.00	7437.50	3088.80	4348.70	1.99	8.37	333.17	-42
14.696	2.116	-41	60.5	55.0	660	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	27.5	0.45	0.45	125.00	7562.50	3151.20	4411.30	1.98	8.46	341.63	-43
14.696	2.116	-42	61.5	56.0	672	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	28	0.44	0.44	125.00	7687.50	3213.60	4473.90	1.97	8.56	350.19	-44
14.696	2.116	-43	62.5	57.0	684	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	28.5	0.43	0.43	125.00	7812.50	3276.00	4536.50	1.95	8.66	358.85	-45
14.696	2.116	-44	63.5	58.0	696	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	29	0.42	0.42	125.00	7937.50	3338.40	4599.10	1.94	8.75	367.61	-46
14.696	2.116	-45	64.5	59.0	708	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	29.5	0.41	0.41	125.00	8062.50	3400.80	4661.70	1.93	8.85	376.46	-47
14.696	2.116	-46	65.5	60.0	720	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	30	0.41	0.41	125.00	8187.50	3463.20	4724.30	1.91	8.95	385.41	-48
14.696	2.116	-47	66.5	61.0	732	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	30.5	0.40	0.40	125.00	8312.50	3525.60	4786.90	1.90	9.05	394.45	-49
14.696	2.116	-48	67.5	62.0	744	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	31	0.39	0.39	125.00	8437.50	3588.00	4849.50	1.89	9.14	403.60	-50
14.696	2.116	-49	68.5	63.0	756	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	31.5	0.38	0.38	125.00	8562.50	3650.40	4912.10	1.87	9.24	412.84	-51
14.696	2.116	-50	69.5	64.0	768	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	32	0.37	0.37	125.00	8687.50	3712.80	4974.70	1.85	9.34	422.18	-52
14.696	2.116	-51	70.5	65.0	780	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	32.5	0.36	0.36	125.00	8812.50	3775.20	5037.30	1.84	9.44	431.62	-53
14.696	2.116	-52	71.5	66.0	792	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	33	0.36	0.36	125.00	8937.50	3837.60	5099.90	1.82	9.53	441.15	-54
14.696	2.116	-53	72.5	67.0	804	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	33.5	0.35	0.35	125.00	9062.50	3900.00	5162.50	1.80	9.63	450.78	-55
14.696	2.116	-54	73.5	68.0	816	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	34	0.34	0.34	125.00	9187.50	3962.40	5225.10	1.78	9.73	460.51	-56
14.696	2.116	-55	74.5	69.0	828	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	34.5	0.33	0.33	125.00	9312.50	4024.80	5287.70	1.76	9.83	470.33	-57
14.696	2.116	-56	75.5	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.32	0.32	125.00	9437.50	4087.20	5350.30	1.74	9.92	480.26	-58
14.696	2.116	-57	76.5	71.0	852	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	35.5	0.32	0.32	125.00	9562.50	4149.60	5412.90	1.72	10.02	490.28	-59
14.696	2.116	-58	77.5	72.0	864	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	36	0.31	0.31	125.00	9687.50	4212.00	5475.50	1.69	10.12	500.39	-60
14.696	2.116	-59	78.5	73.0	876	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	36.5	0.30	0.30	125.00	9812.50	4274.40	5538.10	1.67	10.22	510.61	-61
14.696	2.116	-60	79.5	74.0	888	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	37	0.29	0.29	125.00	9937.50	4336.80	5600.70	1.65	10.31	520.92	-62
14.696	2.116	-61	80.5	75.0	900	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	37.5	0.29	0.29	125.00	10062.50	4399.20	5663.30	1.62	10.41	531.33	-63
14.696	2.116	-62	81.5	76.0	912	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	38	0.28	0.28	125.00	10187.50	4461.60	5725.90	1.60	10.51	541.84	-64
14.696	2.116	-63	82.5	77.0	924	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	38.5	0.27	0.27	125.00	10312.50	4524.00	5788.50	1.57	10.60	552.44	-65
14.696	2.116	-64	83.5	78.0	936	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	39	0.26	0.26	125.00	10437.50	4586.40	5851.10	1.54	10.70	563.15	-66
14.696	2.116	-65	84.5	79.0	948	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	39.5	0.26	0.26	125.00	10562.50	4648.80	5913.70	1.52	10.80	573.94	-67
14.696	2.116	-66	85.5	80.0	960	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	40	0.25	0.25	125.00	10687.50	4711.20	5976.30	1.49	10.90	584.84	-68
14.696	2.116	-67	86.5	81.0	972	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	40.5	0.24	0.25	125.00	10812.50	4773.60	6038.90	1.51	10.99	595.83	-69
14.696	2.116	-68	87.5	82.0	984	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	41	0.23	0.25	125.00	10937.50	4836.00	6101.50	1.53	11.06	606.89	-70
14.696	2.116	-69	88.5	83.0	996	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	41.5	0.23	0.25	125.00	11062.50	4898.40	6164.10	1.54	11.13	618.01	-71
14.696	2.116	-70	89.5	84.0	1008	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	42	0.22	0.25	125.00	11187.50	4960.80	6226.70	1.56	11.20	629.21	-72
14.696	2.116	-71	90.5	85.0	1020	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	42.5	0.21	0.25	125.00	11312.50	5023.20	6289.30	1.57	11.27	640.48	-73
14.696	2.116	-72	91.5	86.0	1032	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	43	0.21	0.25	125.00	11437.50	5085.60	6351.90	1.59	11.33	651.81	-74
14.696	2.116	-73	92.5	87.0	1044	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	43.5	0.20	0.25	125.00	11562.50	5148.00	6414.50	1.60	11.40	663.21	-75
14.696	2.116	-74	93.5	88.0	1056	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	44	0.19	0.25	125.00	11687.50	5210.40	6477.10	1.62	11.47	674.69	-76
14.696	2.116	-75	94.5	89.0	1068	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	44.5	0.19	0.25	125.00	11812.50	5272.80	6539.70	1.63	11.54	686.22	-77
14.696	2.116	-76	95.5	90.0	1080	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	45	0.18	0.25	125.00	11937.50	5335.20	6602.30	1.65	11.60	697.83	-78
14.696	2.116	-77	96.5	91.0	1092	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	45.5	0.17	0.25	125.00	12062.50	5397.60	6664.90	1.67	11.67	709.50	-79
14.696	2.116	-78	97.5	92.0	1104	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	46	0.16	0.25	125.00	12187.50	5460.00	6727.50	1.68	11.74	721.23	-80
14.696	2.116	-79	98.5	93.0	1116	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	46.5	0.16	0.25	125.00	12312.50	5522.40	6790.10	1.70	11.80	733.04	-81
14.696	2.116	-80	99.5	94.0	1128	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	47	0.15	0.25	125.00	12437.50	5584.80	6852.70	1.71	11.87	744.90	-82
14.696	2.116	-81	100.5	95.0	1140	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	47.5	0.14	0.25	125.00	12562.50	5647.20	6915.30	1.73	11.93	756.83	-83
14.696	2.116	-82	101.5	96.0	1152	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	48	0.14	0.25	125.00	12687.50	5709.60	6977.90	1.74	11.99	768.83	-84
14.696	2.116	-83	102.5	97.0	1164	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	48.5	0.13	0.25	125.00	12812.50	5772.00	7040.50	1.76	12.06	780.88	-85
14.696	2.116	-84	103.5	98.0	1176	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	49	0.12	0.25	125.00	12937.50	5834.40	7103.10	1.78	12.12	793.01	-86
14.696	2.116	-85	104.5	99.0	1188	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	49.5	0.12	0.25	125.00	13062.50	5896.80	7165.70	1.79	12.18	805.19	-87
14.696	2.116	-86	105.5	100.0	1200	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	50	0.11	0.25	125.00	13187.50	5959.20	7228.30	1.81	12.25	817.43	-88
14.696	2.116	-87	106.5	101.0	1212	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	50.5	0.10	0.25	125.00	13312.50	6021.60	7290.90	1.82	12.31	829.74	-89
14.696	2.116	-88	107.5	102.0	1224	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	51	0.10	0.25	125.00	13437.50	6084.00	7353.50	1.84	12.37	842.11	-90
14.696	2.116	-89	108.5	103.0	1236	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	51.5	0.09	0.25	125.00	13562.50	6146.40	7416.10	1.85	12.43	854.54	-91
14.696	2.116	-90	109.5	104.0	1248	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	52	0.08	0.25	125.00	13687.50	6208.80	7478.70	1.87	12.49	867.02	-92
14.696	2.116	-91	110.5	105.0	1260	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	52.5	0.08	0.25	125.00	13812.50	6271.20	7541.30	1.89	12.55	879.57	-93
14.696	2.116	-92	111.5	106.0	1272	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	53	0.07	0.25	125.00	13937.50	6333.60	7603.90	1.90	12.61	892.18	-94
14.696	2.116	-93	112.5	107.0	1284	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	53.5	0.07	0.25	125.00	14062.50	6396.00	7666.50	1.92	12.67	904.85	-95
14.696	2.116	-94	113.5	108.0	1296	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	54	0.06	0.25	125.00	14187.50	6458.40	7729.10	1.93	12.72	917.57	-96
14.696	2.116	-95	114.5	109.0	1308	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	54.5	0.05	0.25	125.00	14312.50	6520.80	7791.70	1.95	12.78	930.35	-97
14.696	2.116	-96	115.5	110.0	1320	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	55	0.05	0.25	125.00	14437.50	6583.20	7854.30	1.96	12.84	943.19	-98
14.696	2.116	-97	116.5	111.0	1332	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	55.5	0.04	0.25	125.00	14562.50	6645.60	7916.90	1.98	12.90	956.09	-99
14.696	2.116	-98	117.5	112.0	1344	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	56	0.03	0.25	125.00	14687.50	6708.00	7979.50	1.99	12.95	969.04	-100
14.696	2.116	-99	118.5	113.0	1356	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	56.5	0.03	0.25	125.00	14812.50	6770.40	8042.10	2.01	13.01	982.05	-101
14.696	2.116	-100	119.5	114.0	1368	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	57	0.02	0.25	125.00	14937.50	6832.80	8104.70	2.03	13.06	995.11	-102
14.696	2.116	-101	120.5	115.0	1380	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	57.5	0.02	0.25	125.00	15062.50	6895.20	8167.30	2.04	13.12	1008.23	-103
14.696	2.116	-102	121.5	116.0	1392	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	58	0.01	0.25	125.00	15187.50	6957.60	8229.90	2.06	13.17	1021.40	-104
14.696	2.116	-103	122.5	117.0	1404	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	58.5	0.00	0.25	125.00	15312.50	7020.00	8292.50	2.07	13.23	1034.63	-105
14.696	2.116	-104	123.5	118.0	1416	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	59	0.00	0.25	125.00	15437.50	7082.40	8355.10	2.09	13.28	1047.91	-106
14.696	2.116	-105	124.5	119.0	1428	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	59.5	-0.01	0.25	125.00	15562.50	7144.80	8417.70	2.10	13.33	1061.24	-107
14.696	2.116	-106	125.5	120.0	1440	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	60	-0.02	0.25	125.00	15687.50	7207.20	8480.30	2.12	13.39	1074.62	-108
14.696	2.116	-107	126.5	121.0	1452	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	60.5	-0.02	0.25	125.00	15812.50	7269.60	8542.90	2.14	13.44	1088.06	-109
14.696	2.116	-108	127.5	122.0	1464	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	61	-0.03	0.25	125.00	15937.50	7332.00	8605.50	2.15	13.49	1101.55	-110
14.696	2.116	-109	128.5	123.0	1476	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	61.5	-0.03	0.25	125.00	16062.50	7394.40	8668.10	2.17	13.54	1115.09	-111
14.696	2.116	-110	129.5	124.0	1488	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	62	-0.04	0.25	125.00	16187.50	7456.80	8730.70	2.18	13.59	1128.68	-112
14.696	2.116	-111	130.5	125.0	1500	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	62.5	-0.05	0.25	125.00	16312.50	7519.20	8793.30	2.20	13.64	1142.32	-113
14.696	2.116	-112	131.5	126.0	1512	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	63	-0.05	0.25	125.00	16437.50	7581.60	8855.90	2.21	13.69	1156.01	-114
14.696	2.116	-113	132.5	127.0	1524	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	63.5	-0.06	0.25	125.00	16562.50	7644.00	8918.50	2.23	13.74	1169.75	-115
14.696	2.116	-114	133.5	128.0	1536	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	64	-0.06	0.25	125.00	16687.50	7706.40	8981.10	2.25	13.79	1183.54	-116
14.696	2.116	-115	134.5	129.0	1548	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	64.5	-0.07	0.25	125.00	16812.50	7768.80	9043.70	2.26	13.84	1197.38	-117
14.696	2.116	-116	135.5	130.0	1560	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	65	-0.07	0.25	125.00	16937.50	7831.20	9106.30	2.28	13.88	1211.26	-118
14.696	2.116	-117	136.5	131.0	1572	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	65.5	-0.08	0.25	125.00	17062.50	7893.60	9168.90	2.29	13.93	1225.20	-119
14.696	2.116	-118	137.5	132.0	1584	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	66	-0.09	0.25	125.00	17187.50	7956.00	9231.50	2.31	13.98	1239.18	-120
14.696	2.116	-119	138.5	133.0	1596	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	66.5	-0.09	0.25	125.00	17312.50	8018.40	9294.10	2.32	14.03	1253.20	-121
14.696	2.116	-120	139.5	134.0	1608	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	67	-0.10	0.25	125.00	17437.50	8080.80	9356.70	2.34	14.07	1267.27	-122
14.696	2.116	-121	140.5	135.0	1620	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	67.5	-0.10	0.25	125.00	17562.50	8143.20	9419.30	2.35	14.12	1281.39	-123
14.696	2.116	-122	141.5	136.0	1632	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	68	-0.11	0.25	125.00	17687.50	8205.60	9481.90	2.37	14.16	1295.55	-124
14.696	2.116	-123	142.5	137.0	1644	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	68.5	-0.11	0.25	125.00	17812.50	8268.00	9544.50	2.39	14.21	1309.76	-125
14.696	2.116	-124	143.5	138.0	1656	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	69	-0.12	0.25	125.00	17937.50	8330.40	9607.10	2.40	14.25	1324.01	-126
14.696	2.116	-125	144.5	139.0	1668	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	69.5	-0.13	0.25	125.00	18062.50	8392.80	9669.70	2.42	14.29	1338.30	-127
14.696	2.116	-126	145.5	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.13	0.25	125.00	18187.50	8455.20	9732.30	2.43	#N/A	#N/A	-128
14.696	2.116	-127	146.5	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.14	0.25	125.00	18312.50	8517.60	9794.90	2.45	#N/A	#N/A	-129

29th AVE. Abut 1 RW Right

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	14.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-45.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil					Cohesionless Soil									
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	15	5.5	0.0	0	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.79	0.79	125.00	687.50	0.00	687.50	0.00	0.00	0.00	13
14.696	2.116	14	6.5	1.0	12	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	812.50	0.00	812.50	0.00	0.00	0.00	12
14.696	2.116	13	7.5	2.0	24	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.75	0.75	125.00	937.50	0.00	937.50	0.71	6.39	6.39	11
14.696	2.116	12	8.5	3.0	36	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.74	0.74	125.00	1062.50	0.00	1062.50	0.78	6.22	12.61	10
14.696	2.116	11	9.5	4.0	48	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.72	0.72	125.00	1187.50	0.00	1187.50	0.86	6.05	18.66	9
14.696	2.116	10	10.5	5.0	60	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.71	0.71	125.00	1312.50	31.20	1281.30	0.91	5.87	24.54	8
14.696	2.116	9	11.5	6.0	72	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1437.50	93.60	1343.90	0.93	5.70	30.24	7
14.696	2.116	8	12.5	7.0	84	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.68	0.68	125.00	1562.50	156.00	1406.50	0.96	5.53	35.77	6
14.696	2.116	7	13.5	8.0	96	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.67	0.67	125.00	1687.50	218.40	1469.10	0.98	5.36	41.12	5
14.696	2.116	6	14.5	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.66	0.66	125.00	1812.50	280.80	1531.70	1.01	5.18	46.31	4
14.696	2.116	5	15.5	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	1937.50	343.20	1594.30	1.03	5.18	51.49	3
14.696	2.116	4	16.5	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2062.50	405.60	1656.90	1.05	5.18	56.67	2
14.696	2.116	3	17.5	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2187.50	468.00	1719.50	1.07	5.18	61.86	1
14.696	2.116	2	18.5	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2312.50	530.40	1782.10	1.09	5.18	67.04	-1
14.696	2.116	1	19.5	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2437.50	592.80	1844.70	1.11	5.18	72.23	-2
14.696	2.116	-1	20.5	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2562.50	655.20	1907.30	1.13	5.18	77.41	-3
14.696	2.116	-2	21.5	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2687.50	717.60	1969.90	1.15	5.18	82.59	-4
14.696	2.116	-3	22.5	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2812.50	780.00	2032.50	1.16	5.18	87.78	-5
14.696	2.116	-4	23.5	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2937.50	842.40	2095.10	1.18	5.18	92.96	-6
14.696	2.116	-5	24.5	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3062.50	904.80	2157.70	1.19	5.18	98.14	-7
14.696	2.116	-6	25.5	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3187.50	967.20	2220.30	1.21	5.18	103.33	-8
14.696	2.116	-7	26.5	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3312.50	1029.60	2282.90	1.28	5.18	108.51	-9
14.696	2.116	-8	27.5	22.0	264	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	11	0.58	0.58	125.00	3437.50	1092.00	2345.50	1.36	5.25	113.76	-10
14.696	2.116	-9	28.5	23.0	276	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	11.5	0.60	0.60	125.00	3562.50	1154.40	2408.10	1.44	5.35	119.11	-11
14.696	2.116	-10	29.5	24.0	288	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	12	0.61	0.61	125.00	3687.50	1216.80	2470.70	1.51	5.44	124.55	-12
14.696	2.116	-11	30.5	25.0	300	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	12.5	0.63	0.63	125.00	3812.50	1279.20	2533.30	1.59	5.54	130.10	-13
14.696	2.116	-12	31.5	26.0	312	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	13	0.64	0.64	125.00	3937.50	1341.60	2595.90	1.67	5.64	135.74	-14
14.696	2.116	-13	32.5	27.0	324	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	13.5	0.66	0.66	125.00	4062.50	1404.00	2658.50	1.74	5.74	141.47	-15
14.696	2.116	-14	33.5	28.0	336	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	14	0.67	0.67	125.00	4187.50	1466.40	2721.10	1.82	5.83	147.31	-16
14.696	2.116	-15	34.5	29.0	348	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	14.5	0.68	0.68	125.00	4312.50	1528.80	2783.70	1.90	5.93	153.24	-17
14.696	2.116	-16	35.5	30.0	360	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	15	0.69	0.69	125.00	4437.50	1591.20	2846.30	1.98	6.03	159.27	-18
14.696	2.116	-17	36.5	31.0	372	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	15.5	0.68	0.68	125.00	4562.50	1653.60	2908.90	1.99	6.13	165.39	-19
14.696	2.116	-18	37.5	32.0	384	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	16	0.67	0.67	125.00	4687.50	1716.00	2971.50	2.00	6.22	171.62	-20
14.696	2.116	-19	38.5	33.0	396	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	16.5	0.66	0.66	125.00	4812.50	1778.40	3034.10	2.00	6.32	177.94	-21
14.696	2.116	-20	39.5	34.0	408	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	17	0.65	0.65	125.00	4937.50	1840.80	3096.70	2.01	6.42	184.36	-22
14.696	2.116	-21	40.5	35.0	420	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	17.5	0.64	0.64	125.00	5062.50	1903.20	3159.30	2.02	6.52	190.87	-23
14.696	2.116	-22	41.5	36.0	432	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18	0.63	0.63	125.00	5187.50	1965.60	3221.90	2.03	6.61	197.49	-24
14.696	2.116	-23	42.5	37.0	444	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	18.5	0.62	0.62	125.00	5312.50	2028.00	3284.50	2.03	6.71	204.20	-25
14.696	2.116	-24	43.5	38.0	456	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	19	0.61	0.61	125.00	5437.50	2090.40	3347.10	2.03	6.81	211.00	-26
14.696	2.116	-25	44.5	39.0	468	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	19.5	0.60	0.60	125.00	5562.50	2152.80	3409.70	2.04	6.91	217.91	-27
14.696	2.116	-26	45.5	40.0	480	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	20	0.59	0.59	125.00	5687.50	2215.20	3472.30	2.04	7.00	224.91	-28
14.696	2.116	-27	46.5	41.0	492	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	20.5	0.58	0.58	125.00	5812.50	2277.60	3534.90	2.04	7.10	232.01	-29
14.696	2.116	-28	47.5	42.0	504	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	21	0.57	0.57	125.00	5937.50	2340.00	3597.50	2.04	7.20	239.21	-30
14.696	2.116	-29	48.5	43.0	516	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	21.5	0.56	0.56	125.00	6062.50	2402.40	3660.10	2.04	7.29	246.50	-31
14.696	2.116	-30	49.5	44.0	528	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	22	0.55	0.55	125.00	6187.50	2464.80	3722.70	2.04	7.39	253.90	-32
14.696	2.116	-31	50.5	45.0	540	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	22.5	0.54	0.54	125.00	6312.50	2527.20	3785.30	2.04	7.49	261.39	-33
14.696	2.116	-32	51.5	46.0	552	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	23	0.53	0.53	125.00	6437.50	2589.60	3847.90	2.04	7.59	268.97	-34
14.696	2.116	-33	52.5	47.0	564	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	23.5	0.52	0.52	125.00	6562.50	2652.00	3910.50	2.03	7.68	276.66	-35
14.696	2.116	-34	53.5	48.0	576	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	24	0.51	0.51	125.00	6687.50	2714.40	3973.10	2.03	7.78	284.44	-36
14.696	2.116	-35	54.5	49.0	588	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	24.5	0.50	0.50	125.00	6812.50	2776.80	4035.70	2.02	7.88	292.32	-37
14.696	2.116	-36	55.5	50.0	600	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	25	0.49	0.49	125.00	6937.50	2839.20	4098.30	2.02	7.98	300.29	-38
14.696	2.116	-37	56.5	51.0	612	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	25.5	0.48	0.48	125.00	7062.50	2901.60	4160.90	2.01	8.07	308.37	-39
14.696	2.116	-38	57.5	52.0	624	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	26	0.47	0.47	125.00	7187.50	2964.00	4223.50	2.00	8.17	316.54	-40
14.696	2.116	-39	58.5	53.0	636	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	26.5	0.47	0.47	125.00	7312.50	3026.40	4286.10	1.99	8.27	324.80	-41
14.696	2.116	-40	59.5	54.0	648	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	27	0.46	0.46	125.00	7437.50	3088.80	4348.70	1.99	8.37	333.17	-42
14.696	2.116	-41	60.5	55.0	660	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	27.5	0.45	0.45	125.00	7562.50	3151.20	4411.30	1.98	8.46	341.63	-43
14.696	2.116	-42	61.5	56.0	672	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	28	0.44	0.44	125.00	7687.50	3213.60	4473.90	1.97	8.56	350.19	-44
14.696	2.116	-43	62.5	57.0	684	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	28.5	0.43	0.43	125.00	7812.50	3276.00	4536.50	1.95	8.66	358.85	-45
14.696	2.116	-44	63.5	58.0	696	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	29	0.42	0.42	125.00	7937.50	3338.40	4599.10	1.94	8.75	367.61	-46
14.696	2.116	-45	64.5	59.0	708	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	29.5	0.41	0.41	125.00	8062.50	3400.80	4661.70	1.93	8.85	376.46	-47
14.696	2.116	-46	65.5	60.0	720	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	30	0.41	0.41	125.00	8187.50	3463.20	4724.30	1.91	8.95	385.41	-48
14.696	2.116	-47	66.5	61.0	732	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	30.5	0.40	0.40	125.00	8312.50	3525.60	4786.90	1.90	9.05	394.45	-49
14.696	2.116	-48	67.5	62.0	744	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	31	0.39	0.39	125.00	8437.50	3588.00	4849.50	1.89	9.14	403.60	-50
14.696	2.116	-49	68.5	63.0	756	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	31.5	0.38	0.38	125.00	8562.50	3650.40	4912.10	1.87	9.24	412.84	-51
14.696	2.116	-50	69.5	64.0	768	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	32	0.37	0.37	125.00	8687.50	3712.80	4974.70	1.85	9.34	422.18	-52
14.696	2.116	-51	70.5	65.0	780	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	32.5	0.36	0.36	125.00	8812.50	3775.20	5037.30	1.84	9.44	431.62	-53
14.696	2.116	-52	71.5	66.0	792	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	33	0.36	0.36	125.00	8937.50	3837.60	5099.90	1.82	9.53	441.15	-54
14.696	2.116	-53	72.5	67.0	804	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	33.5	0.35	0.35	125.00	9062.50	3900.00	5162.50	1.80	9.63	450.78	-55
14.696	2.116	-54	73.5	68.0	816	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	34	0.34	0.34	125.00	9187.50	3962.40	5225.10	1.78	9.73	460.51	-56
14.696	2.116	-55	74.5	69.0	828	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	34.5	0.33	0.33	125.00	9312.50	4024.80	5287.70	1.76	9.83	470.33	-57
14.696	2.116	-56	75.5	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.32	0.32	125.00	9437.50	4087.20	5350.30	1.74	9.92	480.26	-58
14.696	2.116	-57	76.5	71.0	852	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	35.5	0.32	0.32	125.00	9562.50	4149.60	5412.90	1.72	10.02	490.28	-59
14.696	2.116	-58	77.5	72.0	864	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	36	0.31	0.31	125.00	9687.50	4212.00	5475.50	1.69	10.12	500.39	-60
14.696	2.116	-59	78.5	73.0	876	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	36.5	0.30	0.30	125.00	9812.50	4274.40	5538.10	1.67	10.22	510.61	-61
14.696	2.116	-60	79.5	74.0	888	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	37	0.29	0.29	125.00	9937.50	4336.80	5600.70	1.65	10.31	520.92	-62
14.696	2.116	-61	80.5	75.0	900	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	37.5	0.29	0.29	125.00	10062.50	4399.20	5663.30	1.62	10.41	531.33	-63
14.696	2.116	-62	81.5	76.0	912	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	38	0.28	0.28	125.00	10187.50	4461.60	5725.90	1.60	10.51	541.84	-64
14.696	2.116	-63	82.5	77.0	924	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	38.5	0.27	0.27	125.00	10312.50	4524.00	5788.50	1.57	10.60	552.44	-65
14.696	2.116	-64	83.5	78.0	936	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	39	0.26	0.26	125.00	10437.50	4586.40	5851.10	1.54	10.70	563.15	-66
14.696	2.116	-65	84.5	79.0	948	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	39.5	0.26	0.26	125.00	10562.50	4648.80	5913.70	1.52	10.80	573.94	-67
14.696	2.116	-66	85.5	80.0	960	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	40	0.25	0.25	125.00	10687.50	4711.20	5976.30	1.49	10.90	584.84	-68
14.696	2.116	-67	86.5	81.0	972	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	40.5	0.24	0.25	125.00	10812.50	4773.60	6038.90	1.51	10.99	595.83	-69
14.696	2.116	-68	87.5	82.0	984	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	41	0.23	0.25	125.00	10937.50	4836.00	6101.50	1.53	11.06	606.89	-70
14.696	2.116	-69	88.5	83.0	996	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	41.5	0.23	0.25	125.00	11062.50	4898.40	6164.10	1.54	11.13	618.01	-71
14.696	2.116	-70	89.5	84.0	1008	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	42	0.22	0.25	125.00	11187.50	4960.80	6226.70	1.56	11.20	629.21	-72
14.696	2.116	-71	90.5	85.0	1020	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	42.5	0.21	0.25	125.00	11312.50	5023.20	6289.30	1.57	11.27	640.48	-73
14.696	2.116	-72	91.5	86.0	1032	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	43	0.21	0.25	125.00	11437.50	5085.60	6351.90	1.59	11.33	651.81	-74
14.696	2.116	-73	92.5	87.0	1044	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	43.5	0.20	0.25	125.00	11562.50	5148.00	6414.50	1.60	11.40	663.21	-75
14.696	2.116	-74	93.5	88.0	1056	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	44	0.19	0.25	125.00	11687.50	5210.40	6477.10	1.62	11.47	674.69	-76
14.696	2.116	-75	94.5	89.0	1068	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	44.5	0.19	0.25	125.00	11812.50	5272.80	6539.70	1.63	11.54	686.22	-77
14.696	2.116	-76	95.5	90.0	1080	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	45	0.18	0.25	125.00	11937.50	5335.20	6602.30	1.65	11.60	697.83	-78
14.696	2.116	-77	96.5	91.0	1092	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	45.5	0.17	0.25	125.00	12062.50	5397.60	6664.90	1.67	11.67	709.50	-79
14.696	2.116	-78	97.5	92.0	1104	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	46	0.16	0.25	125.00	12187.50	5460.00	6727.50	1.68	11.74	721.23	-80
14.696	2.116	-79	98.5	93.0	1116	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	46.5	0.16	0.25	125.00	12312.50	5522.40	6790.10	1.70	11.80	733.04	-81
14.696	2.116	-80	99.5	94.0	1128	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	47	0.15	0.25	125.00	12437.50	5584.80	6852.70	1.71	11.87	744.90	-82
14.696	2.116	-81	100.5	95.0	1140	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	47.5	0.14	0.25	125.00	12562.50	5647.20	6915.30	1.73	11.93	756.83	-83
14.696	2.116	-82	101.5	96.0	1152	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	48	0.14	0.25	125.00	12687.50	5709.60	6977.90	1.74	11.99	768.83	-84
14.696	2.116	-83	102.5	97.0	1164	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	48.5	0.13	0.25	125.00	12812.50	5772.00	7040.50	1.76	12.06	780.88	-85
14.696	2.116	-84	103.5	98.0	1176	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	49	0.12	0.25	125.00	12937.50	5834.40	7103.10	1.78	12.12	793.01	-86
14.696	2.116	-85	104.5	99.0	1188	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	49.5	0.12	0.25	125.00	13062.50	5896.80	7165.70	1.79	12.18	805.19	-87
14.696	2.116	-86	105.5	100.0	1200	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	50	0.11	0.25	125.00	13187.50	5959.20	7228.30	1.81	12.25	817.43	-88
14.696	2.116	-87	106.5	101.0	1212	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	50.5	0.10	0.25	125.00	13312.50	6021.60	7290.90	1.82	12.31	829.74	-89
14.696	2.116	-88	107.5	102.0	1224	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	51	0.10	0.25	125.00	13437.50	6084.00	7353.50	1.84	12.37	842.11	-90
14.696	2.116	-89	108.5	103.0	1236	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	51.5	0.09	0.25	125.00	13562.50	6146.40	7416.10	1.85	12.43	854.54	-91
14.696	2.116	-90	109.5	104.0	1248	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	52	0.08	0.25	125.00	13687.50	6208.80	7478.70	1.87	12.49	867.02	-92
14.696	2.116	-91	110.5	105.0	1260	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	52.5	0.08	0.25	125.00	13812.50	6271.20	7541.30	1.89	12.55	879.57	-93
14.696	2.116	-92	111.5	106.0	1272	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	53	0.07	0.25	125.00	13937.50	6333.60	7603.90	1.90	12.61	892.18	-94
14.696	2.116	-93	112.5	107.0	1284	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	53.5	0.07	0.25	125.00	14062.50	6396.00	7666.50	1.92	12.67	904.85	-95
14.696	2.116	-94	113.5	108.0	1296	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	54	0.06	0.25	125.00	14187.50	6458.40	7729.10	1.93	12.72	917.57	-96
14.696	2.116	-95	114.5	109.0	1308	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	54.5	0.05	0.25	125.00	14312.50	6520.80	7791.70	1.95	12.78	930.35	-97
14.696	2.116	-96	115.5	110.0	1320	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	55	0.05	0.25	125.00	14437.50	6583.20	7854.30	1.96	12.84	943.19	-98
14.696	2.116	-97	116.5	111.0	1332	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	55.5	0.04	0.25	125.00	14562.50	6645.60	7916.90	1.98	12.90	956.09	-99
14.696	2.116	-98	117.5	112.0	1344	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	56	0.03	0.25	125.00	14687.50	6708.00	7979.50	1.99	12.95	969.04	-100
14.696	2.116	-99	118.5	113.0	1356	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	56.5	0.03	0.25	125.00	14812.50	6770.40	8042.10	2.01	13.01	982.05	-101
14.696	2.116	-100	119.5	114.0	1368	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	57	0.02	0.25	125.00	14937.50	6832.80	8104.70	2.03	13.06	995.11	-102
14.696	2.116	-101	120.5	115.0	1380	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	57.5	0.02	0.25	125.00	15062.50	6895.20	8167.30	2.04	13.12	1008.23	-103
14.696	2.116	-102	121.5	116.0	1392	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	58	0.01	0.25	125.00	15187.50	6957.60	8229.90	2.06	13.17	1021.40	-104
14.696	2.116	-103	122.5	117.0	1404	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	58.5	0.00	0.25	125.00	15312.50	7020.00	8292.50	2.07	13.23	1034.63	-105
14.696	2.116	-104	123.5	118.0	1416	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	59	0.00	0.25	125.00	15437.50	7082.40	8355.10	2.09	13.28	1047.91	-106
14.696	2.116	-105	124.5	119.0	1428	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	59.5	-0.01	0.25	125.00	15562.50	7144.80	8417.70	2.10	13.33	1061.24	-107
14.696	2.116	-106	125.5	120.0	1440	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	60	-0.02	0.25	125.00	15687.50	7207.20	8480.30	2.12	13.39	1074.62	-108
14.696	2.116	-107	126.5	121.0	1452	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	60.5	-0.02	0.25	125.00	15812.50	7269.60	8542.90	2.14	13.44	1088.06	-109
14.696	2.116	-108	127.5	122.0	1464	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	61	-0.03	0.25	125.00	15937.50	7332.00	8605.50	2.15	13.49	1101.55	-110
14.696	2.116	-109	128.5	123.0	1476	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	61.5	-0.03	0.25	125.00	16062.50	7394.40	8668.10	2.17	13.54	1115.09	-111
14.696	2.116	-110	129.5	124.0	1488	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	62	-0.04	0.25	125.00	16187.50	7456.80	8730.70	2.18	13.59	1128.68	-112
14.696	2.116	-111	130.5	125.0	1500	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	62.5	-0.05	0.25	125.00	16312.50	7519.20	8793.30	2.20	13.64	1142.32	-113
14.696	2.116	-112	131.5	126.0	1512	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	63	-0.05	0.25	125.00	16437.50	7581.60	8855.90	2.21	13.69	1156.01	-114
14.696	2.116	-113	132.5	127.0	1524	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	63.5	-0.06	0.25	125.00	16562.50	7644.00	8918.50	2.23	13.74	1169.75	-115
14.696	2.116	-114	133.5	128.0	1536	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	64	-0.06	0.25	125.00	16687.50	7706.40	8981.10	2.25	13.79	1183.54	-116
14.696	2.116	-115	134.5	129.0	1548	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	64.5	-0.07	0.25	125.00	16812.50	7768.80	9043.70	2.26	13.84	1197.38	-117
14.696	2.116	-116	135.5	130.0	1560	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	65	-0.07	0.25	125.00	16937.50	7831.20	9106.30	2.28	13.88	1211.26	-118
14.696	2.116	-117	136.5	131.0	1572	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	65.5	-0.08	0.25	125.00	17062.50	7893.60	9168.90	2.29	13.93	1225.20	-119
14.696	2.116	-118	137.5	132.0	1584	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	66	-0.09	0.25	125.00	17187.50	7956.00	9231.50	2.31	13.98	1239.18	-120
14.696	2.116	-119	138.5	133.0	1596	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	66.5	-0.09	0.25	125.00	17312.50	8018.40	9294.10	2.32	14.03	1253.20	-121
14.696	2.116	-120	139.5	134.0	1608	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	67	-0.10	0.25	125.00	17437.50	8080.80	9356.70	2.34	14.07	1267.27	-122
14.696	2.116	-121	140.5	135.0	1620	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	67.5	-0.10	0.25	125.00	17562.50	8143.20	9419.30	2.35	14.12	1281.39	-123
14.696	2.116	-122	141.5	136.0	1632	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	68	-0.11	0.25	125.00	17687.50	8205.60	9481.90	2.37	14.16	1295.55	-124
14.696	2.116	-123	142.5	137.0	1644	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	68.5	-0.11	0.25	125.00	17812.50	8268.00	9544.50	2.39	14.21	1309.76	-125
14.696	2.116	-124	143.5	138.0	1656	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	69	-0.12	0.25	125.00	17937.50	8330.40	9607.10	2.40	14.25	1324.01	-126
14.696	2.116	-125	144.5	139.0	1668	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	69.5	-0.13	0.25	125.00	18062.50	8392.80	9669.70	2.42	14.29	1338.30	-127
14.696	2.116	-126	145.5	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.13	0.25	125.00	18187.50	8455.20	9732.30	2.43	#N/A	#N/A	-128
14.696	2.116	-127	146.5	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.14	0.25	125.00	18312.50	8517.60	9794.90	2.45	#N/A	#N/A	-129

29th AVE. Bent 2

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	22.00	
Bottom of footing elevation / Pile top elevation (feet)	10.25	
GWT elevation (feet)	10.00	
Maximum tip elev for L/d < 30	-64.75	

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	2.5	feet
	30	inches

Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
										Cohesive Soil							Cohesionless Soil							
14.696	2.116	10	11.75	0.0	0	1.75	12.15	0.827	0	0.55	0.00	0.000	0.00	10	0.69	0.69	125.00	1468.75	0.00	1468.75	0.00	0.00	0.00	8
14.696	2.116	9	12.75	1.0	12	1.70	11.81	0.803	0	0.55	0.00	0.000	0.00	10	0.68	0.68	125.00	1593.75	46.80	1546.95	0.00	0.00	0.00	7
14.696	2.116	8	13.75	2.0	24	1.65	11.46	0.780	0	0.55	0.00	0.000	0.00	10	0.67	0.67	125.00	1718.75	109.20	1609.55	0.00	0.00	0.00	6
14.696	2.116	7	14.75	3.0	36	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.65	0.65	125.00	1843.75	171.60	1672.15	1.09	6.91	6.91	5
14.696	2.116	6	15.75	4.0	48	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	1968.75	234.00	1734.75	1.11	6.70	13.61	4
14.696	2.116	5	16.75	5.0	60	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2093.75	296.40	1797.35	1.13	6.48	20.09	3
14.696	2.116	4	17.75	6.0	72	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2218.75	358.80	1859.95	1.15	6.48	26.57	2
14.696	2.116	3	18.75	7.0	84	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2343.75	421.20	1922.55	1.17	6.48	33.05	1
14.696	2.116	2	19.75	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2468.75	483.60	1985.15	1.19	6.48	39.53	0
14.696	2.116	1	20.75	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2593.75	546.00	2047.75	1.21	6.48	46.00	-1
14.696	2.116	0	21.75	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2718.75	608.40	2110.35	1.22	6.48	52.48	-2
14.696	2.116	-1	22.75	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2843.75	670.80	2172.95	1.24	6.48	58.96	-3
14.696	2.116	-2	23.75	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2968.75	733.20	2235.55	1.25	6.48	65.44	-4
14.696	2.116	-3	24.75	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3093.75	795.60	2298.15	1.27	6.48	71.92	-5
14.696	2.116	-4	25.75	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3218.75	858.00	2360.75	1.28	6.48	78.40	-6
14.696	2.116	-5	26.75	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3343.75	920.40	2423.35	1.29	6.48	84.88	-7
14.696	2.116	-6	27.75	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3468.75	982.80	2485.95	1.31	6.48	91.36	-8
14.696	2.116	-7	28.75	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3593.75	1045.20	2548.55	1.32	6.48	97.84	-9
14.696	2.116	-8	29.75	18.0	216	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	10	0.51	0.51	125.00	3718.75	1107.60	2611.15	1.33	6.56	104.40	-10
14.696	2.116	-9	30.75	19.0	228	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	10	0.50	0.50	125.00	3843.75	1170.00	2673.75	1.34	6.68	111.09	-11
14.696	2.116	-10	31.75	20.0	240	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	10	0.49	0.49	125.00	3968.75	1232.40	2736.35	1.35	6.81	117.89	-12
14.696	2.116	-11	32.75	21.0	252	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	10.5	0.51	0.51	125.00	4093.75	1294.80	2798.95	1.42	6.93	124.82	-13
14.696	2.116	-12	33.75	22.0	264	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	11	0.52	0.52	125.00	4218.75	1357.20	2861.55	1.50	7.05	131.87	-14
14.696	2.116	-13	34.75	23.0	276	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	11.5	0.54	0.54	125.00	4343.75	1419.60	2924.15	1.58	7.17	139.04	-15
14.696	2.116	-14	35.75	24.0	288	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	12	0.55	0.55	125.00	4468.75	1482.00	2986.75	1.65	7.29	146.34	-16
14.696	2.116	-15	36.75	25.0	300	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	12.5	0.57	0.57	125.00	4593.75	1544.40	3049.35	1.73	7.41	153.75	-17
14.696	2.116	-16	37.75	26.0	312	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	13	0.58	0.58	125.00	4718.75	1606.80	3111.95	1.80	7.54	161.29	-18
14.696	2.116	-17	38.75	27.0	324	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	13.5	0.59	0.59	125.00	4843.75	1669.20	3174.55	1.88	7.66	168.95	-19
14.696	2.116	-18	39.75	28.0	336	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	14	0.60	0.60	125.00	4968.75	1731.60	3237.15	1.96	7.78	176.73	-20
14.696	2.116	-19	40.75	29.0	348	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	14.5	0.62	0.62	125.00	5093.75	1794.00	3299.75	2.03	7.90	184.63	-21
14.696	2.116	-20	41.75	30.0	360	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	15	0.63	0.63	125.00	5218.75	1856.40	3362.35	2.10	8.02	192.65	-22
14.696	2.116	-21	42.75	31.0	372	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	15.5	0.62	0.62	125.00	5343.75	1918.80	3424.95	2.11	8.14	200.79	-23
14.696	2.116	-22	43.75	32.0	384	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	16	0.61	0.61	125.00	5468.75	1981.20	3487.55	2.11	8.27	209.06	-24
14.696	2.116	-23	44.75	33.0	396	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	16.5	0.60	0.60	125.00	5593.75	2043.60	3550.15	2.11	8.39	217.45	-25
14.696	2.116	-24	45.75	34.0	408	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	17	0.59	0.59	125.00	5718.75	2106.00	3612.75	2.11	8.51	225.96	-26
14.696	2.116	-25	46.75	35.0	420	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	17.5	0.58	0.58	125.00	5843.75	2168.40	3675.35	2.11	8.63	234.59	-27
14.696	2.116	-26	47.75	36.0	432	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	18	0.57	0.57	125.00	5968.75	2230.80	3737.95	2.11	8.75	243.34	-28
14.696	2.116	-27	48.75	37.0	444	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	18.5	0.56	0.56	125.00	6093.75	2293.20	3800.55	2.11	8.87	252.22	-29
14.696	2.116	-28	49.75	38.0	456	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	19	0.55	0.55	125.00	6218.75	2355.60	3863.15	2.11	9.00	261.22	-30
14.696	2.116	-29	50.75	39.0	468	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	19.5	0.54	0.54	125.00	6343.75	2418.00	3925.75	2.11	9.12	270.33	-31
14.696	2.116	-30	51.75	40.0	480	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	20	0.53	0.53	125.00	6468.75	2480.40	3988.35	2.10	9.24	279.57	-32
14.696	2.116	-31	52.75	41.0	492	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	20.5	0.52	0.52	125.00	6593.75	2542.80	4050.95	2.10	9.36	288.93	-33
14.696	2.116	-32	53.75	42.0	504	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	21	0.51	0.51	125.00	6718.75	2605.20	4113.55	2.09	9.48	298.42	-34
14.696	2.116	-33	54.75	43.0	516	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	21.5	0.50	0.50	125.00	6843.75	2667.60	4176.15	2.08	9.61	308.02	-35
14.696	2.116	-34	55.75	44.0	528	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	22	0.49	0.49	125.00	6968.75	2730.00	4238.75	2.08	9.73	317.75	-36
14.696	2.116	-35	56.75	45.0	540	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	22.5	0.48	0.48	125.00	7093.75	2792.40	4301.35	2.07	9.85	327.60	-37
14.696	2.116	-36	57.75	46.0	552	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	23	0.47	0.47	125.00	7218.75	2854.80	4363.95	2.06	9.97	337.57	-38
14.696	2.116	-37	58.75	47.0	564	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	23.5	0.46	0.46	125.00	7343.75	2917.20	4426.55	2.05	10.09	347.66	-39
14.696	2.116	-38	59.75	48.0	576	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	24	0.45	0.45	125.00	7468.75	2979.60	4489.15	2.04	10.21	357.87	-40
14.696	2.116	-39	60.75	49.0	588	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	24.5	0.45	0.45	125.00	7593.75	3042.00	4551.75	2.03	10.34	368.21	-41
14.696	2.116	-40	61.75	50.0	600	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	25	0.44	0.44	125.00	7718.75	3104.40	4614.35	2.02	10.46	378.67	-42
14.696	2.116	-41	62.75	51.0	612	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	25.5	0.43	0.43	125.00	7843.75	3166.80	4676.95	2.00	10.58	389.24	-43
14.696	2.116	-42	63.75	52.0	624	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	26	0.42	0.42	125.00	7968.75	3229.20	4739.55	1.99	10.70	399.94	-44
14.696	2.116	-43	64.75	53.0	636	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	26.5	0.41	0.41	125.00	8093.75	3291.60	4802.15	1.98	10.82	410.77	-45
14.696	2.116	-44	65.75	54.0	648	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	27	0.40	0.40	125.00	8218.75	3354.00	4864.75	1.96	10.94	421.71	-46
14.696	2.116	-45	66.75	55.0	660	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	27.5	0.39	0.39	125.00	8343.75	3416.40	4927.35	1.95	11.07	432.77	-47
14.696	2.116	-46	67.75	56.0	672	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	28	0.39	0.39	125.00	8468.75	3478.80	4989.95	1.93	11.19	443.96	-48
14.696	2.116	-47	68.75	57.0	684	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	28.5	0.38	0.38	125.00	8593.75	3541.20	5052.55	1.91	11.31	455.27	-49
14.696	2.116	-48	69.75	58.0	696	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	29	0.37	0.37	125.00	8718.75	3603.60	5115.15	1.89	11.43	466.70	-50
14.696	2.116	-49	70.75	59.0	708	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	29.5	0.36	0.36	125.00	8843.75	3666.00	5177.75	1.88	11.55	478.25	-51
14.696	2.116	-50	71.75	60.0	720	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	30	0.35	0.35	125.00	8968.75	3728.40	5240.35	1.86	11.67	489.93	-52
14.696	2.116	-51	72.75	61.0	732	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	30.5	0.35	0.35	125.00	9093.75	3790.80	5302.95	1.84	11.80	501.72	-53
14.696	2.116	-52	73.75	62.0	744	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	31	0.34	0.34	125.00	9218.75	3853.20	5365.55	1.82	11.92	513.64	-54
14.696	2.116	-53	74.75	63.0	756	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	31.5	0.33	0.33	125.00	9343.75	3915.60	5428.15	1.79	12.04	525.68	-55
14.696	2.116	-54	75.75	64.0	768	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	32	0.32	0.32	125.00	9468.75	3978.00	5490.75	1.77	12.16	537.84	-56
14.696	2.116	-55	76.75	65.0	780	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	32.5	0.32	0.32	125.00	9593.75	4040.40	5553.35	1.75	12.28	550.12	-57
14.696	2.116	-56	77.75	66.0	792	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	33	0.31	0.31	125.00	9718.75	4102.80	5615.95	1.73	12.40	562.52	-58
14.696	2.116	-57	78.75	67.0	804	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	33.5	0.30	0.30	125.00	9843.75	4165.20	5678.55	1.70	12.53	575.05	-59
14.696	2.116	-58	79.75	68.0	816	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	34	0.29	0.29	125.00	9968.75	4227.60	5741.15	1.68	12.65	587.70	-60
14.696	2.116	-59	80.75	69.0	828	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	34.5	0.28	0.28	125.00	10093.75	4290.00	5803.75	1.65	12.77	600.46	-61
14.696	2.116	-60	81.75	70.0	840	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	35	0.28	0.28	125.00	10218.75	4352.40	5866.35	1.63	12.89	613.36	-62
14.696	2.116	-61	82.75	71.0	852	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	35.5	0.27	0.27	125.00	10343.75	4414.80	5928.95	1.60	13.01	626.37	-63
14.696	2.116	-62	83.75	72.0	864	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	36	0.26	0.26	125.00	10468.75	4477.20	5991.55	1.57	13.13	639.50	-64
14.696	2.116	-63	84.75	73.0	876	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	36.5	0.25	0.25	125.00	10593.75	4539.60	6054.15	1.54	13.26	652.76	-65
14.696	2.116	-64	85.75	74.0	888	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	37	0.25	0.25	125.00	10718.75	4602.00	6116.75	1.53	13.38	666.13	-66
14.696	2.116	-65	86.75	75.0	900	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	37.5	0.24	0.25	125.00	10843.75	4664.40	6179.35	1.54	13.50	679.63	-67
14.696	2.116	-66	87.75	76.0	912	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	38	0.23	0.25	125.00	10968.75	4726.80	6241.95	1.56	13.62	693.25	-68
14.696	2.116	-67	88.75	77.0	924	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	38.5	0.23	0.25	125.00	11093.75	4789.20	6304.55	1.58	13.73	706.99	-69
14.696	2.116	-68	89.75	78.0	936	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	39	0.22	0.25	125.00	11218.75	4851.60	6367.15	1.59	13.82	720.81	-70
14.696	2.116	-69	90.75	79.0	948	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	39.5	0.21	0.25	125.00	11343.75	4914.00	6429.75	1.61	13.91	734.72	-71
14.696	2.116	-70	91.75	80.0	960	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	40	0.20	0.25	125.00	11468.75	4976.40	6492.35	1.62	14.00	748.72	-72
14.696	2.116	-71	92.75	81.0	972	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	40.5	0.20	0.25	125.00	11593.75	5038.80	6554.95	1.64	14.08	762.80	-73
14.696	2.116	-72	93.75	82.0	984	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	41	0.19	0.25	125.00	11718.75	5101.20	6617.55	1.65	14.17	776.97	-74
14.696	2.116	-73	94.75	83.0	996	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	41.5	0.18	0.25	125.00	11843.75	5163.60	6680.15	1.67	14.25	791.22	-75
14.696	2.116	-74	95.75	84.0	1008	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	42	0.18	0.25	125.00	11968.75	5226.00	6742.75	1.69	14.34	805.56	-76
14.696	2.116	-75	96.75	85.0	1020	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	42.5	0.17	0.25	125.00	12093.75	5288.40	6805.35	1.70	14.42	819.98	-77
14.696	2.116	-76	97.75	86.0	1032	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	43	0.16	0.25	125.00	12218.75	5350.80	6867.95	1.72	14.51	834.49	-78
14.696	2.116	-77	98.75	87.0	1044	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	43.5	0.16	0.25	125.00	12343.75	5413.20	6930.55	1.73	14.59	849.07	-79
14.696	2.116	-78	99.75	88.0	1056	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	44	0.15	0.25	125.00	12468.75	5475.60	6993.15	1.75	14.67	863.75	-80
14.696	2.116	-79	100.75	89.0	1068	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	44.5	0.14	0.25	125.00	12593.75	5538.00	7055.75	1.76	14.75	878.50	-81
14.696	2.116	-80	101.75	90.0	1080	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	45	0.14	0.25	125.00	12718.75	5600.40	7118.35	1.78	14.83	893.33	-82
14.696	2.116	-81	102.75	91.0	1092	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	45.5	0.13	0.25	125.00	12843.75	5662.80	7180.95	1.80	14.91	908.24	-83
14.696	2.116	-82	103.75	92.0	1104	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	46	0.12	0.25	125.00	12968.75	5725.20	7243.55	1.81	14.99	923.24	-84
14.696	2.116	-83	104.75	93.0	1116	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	46.5	0.12	0.25	125.00	13093.75	5787.60	7306.15	1.83	15.07	938.31	-85
14.696	2.116	-84	105.75	94.0	1128	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	47	0.11	0.25	125.00	13218.75	5850.00	7368.75	1.84	15.15	953.46	-86
14.696	2.116	-85	106.75	95.0	1140	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	47.5	0.10	0.25	125.00	13343.75	5912.40	7431.35	1.86	15.23	968.69	-87
14.696	2.116	-86	107.75	96.0	1152	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	48	0.10	0.25	125.00	13468.75	5974.80	7493.95	1.87	15.31	983.99	-88
14.696	2.116	-87	108.75	97.0	1164	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	48.5	0.09	0.25	125.00	13593.75	6037.20	7556.55	1.89	15.38	999.38	-89
14.696	2.116	-88	109.75	98.0	1176	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	49	0.08	0.25	125.00	13718.75	6099.60	7619.15	1.90	15.46	1014.84	-90
14.696	2.116	-89	110.75	99.0	1188	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	49.5	0.08	0.25	125.00	13843.75	6162.00	7681.75	1.92	15.54	1030.37	-91
14.696	2.116	-90	111.75	100.0	1200	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	50	0.07	0.25	125.00	13968.75	6224.40	7744.35	1.94	15.61	1045.98	-92
14.696	2.116	-91	112.75	101.0	1212	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	50.5	0.06	0.25	125.00	14093.75	6286.80	7806.95	1.95	15.68	1061.67	-93
14.696	2.116	-92	113.75	102.0	1224	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	51	0.06	0.25	125.00	14218.75	6349.20	7869.55	1.97	15.76	1077.43	-94
14.696	2.116	-93	114.75	103.0	1236	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	51.5	0.05	0.25	125.00	14343.75	6411.60	7932.15	1.98	15.83	1093.26	-95
14.696	2.116	-94	115.75	104.0	1248	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	52	0.04	0.25	125.00	14468.75	6474.00	7994.75	2.00	15.90	1109.16	-96
14.696	2.116	-95	116.75	105.0	1260	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	52.5	0.04	0.25	125.00	14593.75	6536.40	8057.35	2.01	15.98	1125.14	-97
14.696	2.116	-96	117.75	106.0	1272	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	53	0.03	0.25	125.00	14718.75	6598.80	8119.95	2.03	16.05	1141.19	-98
14.696	2.116	-97	118.75	107.0	1284	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	53.5	0.03	0.25	125.00	14843.75	6661.20	8182.55	2.05	16.12	1157.31	-99
14.696	2.116	-98	119.75	108.0	1296	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	54	0.02	0.25	125.00	14968.75	6723.60	8245.15	2.06	16.19	1173.50	-100
14.696	2.116	-99	120.75	109.0	1308	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	54.5	0.01	0.25	125.00	15093.75	6786.00	8307.75	2.08	16.26	1189.76	-101
14.696	2.116	-100	121.75	110.0	1320	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	55	0.01	0.25	125.00	15218.75	6848.40	8370.35	2.09	16.33	1206.09	-102
14.696	2.116	-101	122.75	111.0	1332	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	55.5	0.00	0.25	125.00	15343.75	6910.80	8432.95	2.11	16.40	1222.49	-103
14.696	2.116	-102	123.75	112.0	1344	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	56	0.00	0.25	125.00	15468.75	6973.20	8495.55	2.12	16.47	1238.95	-104
14.696	2.116	-103	124.75	113.0	1356	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	56.5	-0.01	0.25	125.00	15593.75	7035.60	8558.15	2.14	16.53	1255.48	-105
14.696	2.116	-104	125.75	114.0	1368	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	57	-0.02	0.25	125.00	15718.75	7098.00	8620.75	2.16	16.60	1272.08	-106
14.696	2.116	-105	126.75	115.0	1380	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	57.5	-0.02	0.25	125.00	15843.75	7160.40	8683.35	2.17	16.67	1288.75	-107
14.696	2.116	-106	127.75	116.0	1392	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	58	-0.03	0.25	125.00	15968.75	7222.80	8745.95	2.19	16.73	1305.48	-108
14.696	2.116	-107	128.75	117.0	1404	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	58.5	-0.03	0.25	125.00	16093.75	7285.20	8808.55	2.20	16.80	1322.28	-109
14.696	2.116	-108	129.75	118.0	1416	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	59	-0.04	0.25	125.00	16218.75	7347.60	8871.15	2.22	16.86	1339.14	-110
14.696	2.116	-109	130.75	119.0	1428	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	59.5	-0.05	0.25	125.00	16343.75	7410.00	8933.75	2.23	16.93	1356.07	-111
14.696	2.116	-110	131.75	120.0	1440	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	60	-0.05	0.25	125.00	16468.75	7472.40	8996.35	2.25	16.99	1373.06	-112
14.696	2.116	-111	132.75	121.0	1452	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	60.5	-0.06	0.25	125.00	16593.75	7534.80	9058.95	2.26	17.05	1390.11	-113
14.696	2.116	-112	133.75	122.0	1464	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	61	-0.06	0.25	125.00	16718.75	7597.20	9121.55	2.28	17.11	1407.22	-114
14.696	2.116	-113	134.75	123.0	1476	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	61.5	-0.07	0.25	125.00	16843.75	7659.60	9184.15	2.30	17.18	1424.40	-115
14.696	2.116	-114	135.75	124.0	1488	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	62	-0.08	0.25	125.00	16968.75	7722.00	9246.75	2.31	17.24	1441.63	-116
14.696	2.116	-115	136.75	125.0	1500	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	62.5	-0.08	0.25	125.00	17093.75	7784.40	9309.35	2.33	17.30	1458.93	-117
14.696	2.116	-116	137.75	126.0	1512	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	63	-0.09	0.25	125.00	17218.75	7846.80	9371.95	2.34	17.36	1476.28	-118
14.696	2.116	-117	138.75	127.0	1524	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	63.5	-0.09	0.25	125.00	17343.75	7909.20	9434.55	2.36	17.42	1493.70	-119
14.696	2.116	-118	139.75	128.0	1536	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	64	-0.10	0.25	125.00	17468.75	7971.60	9497.15	2.37	17.47	1511.17	-120
14.696	2.116	-119	140.75	129.0	1548	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	64.5	-0.10	0.25	125.00	17593.75	8034.00	9559.75	2.39	17.53	1528.71	-121
14.696	2.116	-120	141.75	130.0	1560	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	65	-0.11	0.25	125.00	17718.75	8096.40	9622.35	2.41	17.59	1546.29	-122
14.696	2.116	-121	142.75	131.0	1572	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	65.5	-0.12	0.25	125.00	17843.75	8158.80	9684.95	2.42	17.65	1563.94	-123
14.696	2.116	-122	143.75	132.0	1584	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	66	-0.12	0.25	125.00	17968.75	8221.20	9747.55	2.44	17.70	1581.64	-124
14.696	2.116	-123	144.75	133.0	1596	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	66.5	-0.13	0.25	125.00	18093.75	8283.60	9810.15	2.45	17.76	1599.40	-125
14.696	2.116	-124	145.75	134.0	1608	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	67	-0.13	0.25	125.00	18218.75	8346.00	9872.75	2.47	17.81	1617.22	-126
14.696	2.116	-125	146.75	135.0	1620	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	67.5	-0.14	0.25	125.00	18343.75	8408.40	9935.35	2.48	17.87	1635.08	-127
14.696	2.116	-126	147.75	136.0	1632	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	68	-0.14	0.25	125.00	18468.75	8470.80	9997.95	2.50	#N/A	#N/A	-128
14.696	2.116	-127	148.75	137.0	1644	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	68.5	-0.15	0.25	125.00	18593.75	8533.20	10060.55	2.52	#N/A	#N/A	-129
14.696	2.116	-128	149.75	138.0	1656	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	69	-0.16	0.25	125.00	18718.75	8595.60	10123.15	2.53	#N/A	#N/A	-130
14.696	2.116	-129	150.75	139.0	1668	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	69.5	-0.16	0.25	125.00	18843.75	8658.00	10185.75	2.55	#N/A	#N/A	-131
14.696	2.116	-130	151.75	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.17	0.25	125.00	18968.75	8720.40	10248.35	2.56	#N/A	#N/A	-132
14.696	2.116	-131	152.75	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.17	0.25	125.00	19093.75	8782.80	10310.95	2.58	#N/A	#N/A	-133

29th AVE. Bent 3

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	23.00	
Bottom of footing elevation / Pile top elevation (feet)	16.25	
GWT elevation (feet)	10.00	
Maximum tip elev for L/d < 30	-58.75	

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.5 feet
30 inches

										Cohesive Soil						Cohesionless Soil								
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	16	6.75	0.0	0	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	843.75	0.00	843.75	0.00	0.00	0.00	14
14.696	2.116	15	7.75	1.0	12	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.75	0.75	125.00	968.75	0.00	968.75	0.00	0.00	0.00	13
14.696	2.116	14	8.75	2.0	24	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.73	0.73	125.00	1093.75	0.00	1093.75	0.00	0.00	0.00	12
14.696	2.116	13	9.75	3.0	36	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.72	0.72	125.00	1218.75	0.00	1218.75	0.88	8.21	8.21	11
14.696	2.116	12	10.75	4.0	48	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.70	0.70	125.00	1343.75	0.00	1343.75	0.95	7.99	16.20	10
14.696	2.116	11	11.75	5.0	60	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.69	0.69	125.00	1468.75	0.00	1468.75	1.01	7.78	23.97	9
14.696	2.116	10	12.75	6.0	72	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1593.75	0.00	1593.75	1.08	7.56	31.53	8
14.696	2.116	9	13.75	7.0	84	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1718.75	46.80	1671.95	1.11	7.34	38.88	7
14.696	2.116	8	14.75	8.0	96	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.65	0.65	125.00	1843.75	109.20	1734.55	1.13	7.13	46.00	6
14.696	2.116	7	15.75	9.0	108	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.64	0.64	125.00	1968.75	171.60	1797.15	1.15	6.91	52.92	5
14.696	2.116	6	16.75	10.0	120	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.63	0.63	125.00	2093.75	234.00	1859.75	1.17	6.70	59.61	4
14.696	2.116	5	17.75	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2218.75	296.40	1922.35	1.19	6.48	66.09	3
14.696	2.116	4	18.75	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2343.75	358.80	1984.95	1.21	6.48	72.57	2
14.696	2.116	3	19.75	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2468.75	421.20	2047.55	1.23	6.48	79.05	1
14.696	2.116	2	20.75	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2593.75	483.60	2110.15	1.24	6.48	85.53	0
14.696	2.116	1	21.75	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2718.75	546.00	2172.75	1.26	6.48	92.01	-1
14.696	2.116	0	22.75	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2843.75	608.40	2235.35	1.27	6.48	98.49	-2
14.696	2.116	-1	23.75	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2968.75	670.80	2297.95	1.29	6.48	104.97	-3
14.696	2.116	-2	24.75	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3093.75	733.20	2360.55	1.30	6.48	111.45	-4
14.696	2.116	-3	25.75	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3218.75	795.60	2423.15	1.31	6.48	117.93	-5
14.696	2.116	-4	26.75	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3343.75	858.00	2485.75	1.33	6.48	124.41	-6
14.696	2.116	-5	27.75	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.55	0.55	125.00	3468.75	920.40	2548.35	1.40	6.48	130.89	-7
14.696	2.116	-6	28.75	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.57	0.57	125.00	3593.75	982.80	2610.95	1.48	6.48	137.37	-8
14.696	2.116	-7	29.75	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.58	0.58	125.00	3718.75	1045.20	2673.55	1.56	6.48	143.85	-9
14.696	2.116	-8	30.75	24.0	288	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12	0.60	0.60	125.00	3843.75	1107.60	2736.15	1.64	6.56	150.41	-10
14.696	2.116	-9	31.75	25.0	300	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	12.5	0.61	0.61	125.00	3968.75	1170.00	2798.75	1.72	6.68	157.09	-11
14.696	2.116	-10	32.75	26.0	312	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	13	0.63	0.63	125.00	4093.75	1232.40	2861.35	1.80	6.81	163.90	-12
14.696	2.116	-11	33.75	27.0	324	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	13.5	0.64	0.64	125.00	4218.75	1294.80	2923.95	1.88	6.93	170.83	-13
14.696	2.116	-12	34.75	28.0	336	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	14	0.66	0.66	125.00	4343.75	1357.20	2986.55	1.96	7.05	177.88	-14
14.696	2.116	-13	35.75	29.0	348	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	14.5	0.67	0.67	125.00	4468.75	1419.60	3049.15	2.04	7.17	185.05	-15
14.696	2.116	-14	36.75	30.0	360	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	15	0.68	0.68	125.00	4593.75	1482.00	3111.75	2.12	7.29	192.34	-16
14.696	2.116	-15	37.75	31.0	372	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	15.5	0.67	0.67	125.00	4718.75	1544.40	3174.35	2.12	7.41	199.76	-17
14.696	2.116	-16	38.75	32.0	384	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	16	0.66	0.66	125.00	4843.75	1606.80	3236.95	2.13	7.54	207.29	-18
14.696	2.116	-17	39.75	33.0	396	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	16.5	0.65	0.65	125.00	4968.75	1669.20	3299.55	2.14	7.66	214.95	-19
14.696	2.116	-18	40.75	34.0	408	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	17	0.64	0.64	125.00	5093.75	1731.60	3362.15	2.14	7.78	222.73	-20
14.696	2.116	-19	41.75	35.0	420	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	17.5	0.63	0.63	125.00	5218.75	1794.00	3424.75	2.14	7.90	230.63	-21
14.696	2.116	-20	42.75	36.0	432	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	18	0.62	0.62	125.00	5343.75	1856.40	3487.35	2.15	8.02	238.65	-22
14.696	2.116	-21	43.75	37.0	444	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	18.5	0.61	0.61	125.00	5468.75	1918.80	3549.95	2.15	8.14	246.80	-23
14.696	2.116	-22	44.75	38.0	456	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	19	0.60	0.60	125.00	5593.75	1981.20	3612.55	2.15	8.27	255.07	-24
14.696	2.116	-23	45.75	39.0	468	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	19.5	0.59	0.59	125.00	5718.75	2043.60	3675.15	2.15	8.39	263.45	-25
14.696	2.116	-24	46.75	40.0	480	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	20	0.58	0.58	125.00	5843.75	2106.00	3737.75	2.15	8.51	271.96	-26
14.696	2.116	-25	47.75	41.0	492	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	20.5	0.57	0.57	125.00	5968.75	2168.40	3800.35	2.15	8.63	280.60	-27
14.696	2.116	-26	48.75	42.0	504	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	21	0.56	0.56	125.00	6093.75	2230.80	3862.95	2.15	8.75	289.35	-28
14.696	2.116	-27	49.75	43.0	516	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	21.5	0.55	0.55	125.00	6218.75	2293.20	3925.55	2.14	8.87	298.22	-29
14.696	2.116	-28	50.75	44.0	528	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	22	0.54	0.54	125.00	6343.75	2355.60	3988.15	2.14	9.00	307.22	-30
14.696	2.116	-29	51.75	45.0	540	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	22.5	0.53	0.53	125.00	6468.75	2418.00	4050.75	2.13	9.12	316.34	-31
14.696	2.116	-30	52.75	46.0	552	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	23	0.52	0.52	125.00	6593.75	2480.40	4113.35	2.13	9.24	325.58	-32
14.696	2.116	-31	53.75	47.0	564	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	23.5	0.51	0.51	125.00	6718.75	2542.80	4175.95	2.12	9.36	334.94	-33
14.696	2.116	-32	54.75	48.0	576	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	24	0.50	0.50	125.00	6843.75	2605.20	4238.55	2.12	9.48	344.42	-34
14.696	2.116	-33	55.75	49.0	588	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	24.5	0.49	0.49	125.00	6968.75	2667.60	4301.15	2.11	9.61	354.03	-35
14.696	2.116	-34	56.75	50.0	600	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	25	0.48	0.48	125.00	7093.75	2730.00	4363.75	2.10	9.73	363.75	-36
14.696	2.116	-35	57.75	51.0	612	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	25.5	0.47	0.47	125.00	7218.75	2792.40	4426.35	2.09	9.85	373.60	-37
14.696	2.116	-36	58.75	52.0	624	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	26	0.46	0.46	125.00	7343.75	2854.80	4488.95	2.08	9.97	383.57	-38
14.696	2.116	-37	59.75	53.0	636	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	26.5	0.45	0.45	125.00	7468.75	2917.20	4551.55	2.07	10.09	393.66	-39
14.696	2.116	-38	60.75	54.0	648	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	27	0.45	0.45	125.00	7593.75	2979.60	4614.15	2.06	10.21	403.88	-40
14.696	2.116	-39	61.75	55.0	660	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27.5	0.44	0.44	125.00	7718.75	3042.00	4676.75	2.04	10.34	414.21	-41
14.696	2.116	-40	62.75	56.0	672	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	28	0.43	0.43	125.00	7843.75	3104.40	4739.35	2.03	10.46	424.67	-42
14.696	2.116	-41	63.75	57.0	684	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	28.5	0.42	0.42	125.00	7968.75	3166.80	4801.95	2.02	10.58	435.25	-43
14.696	2.116	-42	64.75	58.0	696	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	29	0.41	0.41	125.00	8093.75	3229.20	4864.55	2.00	10.70	445.95	-44
14.696	2.116	-43	65.75	59.0	708	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	29.5	0.40	0.40	125.00	8218.75	3291.60	4927.15	1.99	10.82	456.77	-45
14.696	2.116	-44	66.75	60.0	720	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	30	0.39	0.39	125.00	8343.75	3354.00	4989.75	1.97	10.94	467.71	-46
14.696	2.116	-45	67.75	61.0	732	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	30.5	0.39	0.39	125.00	8468.75	3416.40	5052.35	1.95	11.07	478.78	-47
14.696	2.116	-46	68.75	62.0	744	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	31	0.38	0.38	125.00	8593.75	3478.80	5114.95	1.94	11.19	489.97	-48
14.696	2.116	-47	69.75	63.0	756	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	31.5	0.37	0.37	125.00	8718.75	3541.20	5177.55	1.92	11.31	501.27	-49
14.696	2.116	-48	70.75	64.0	768	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	32	0.36	0.36	125.00	8843.75	3603.60	5240.15	1.90	11.43	512.71	-50
14.696	2.116	-49	71.75	65.0	780	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	32.5	0.35	0.35	125.00	8968.75	3666.00	5302.75	1.88	11.55	524.26	-51
14.696	2.116	-50	72.75	66.0	792	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	33	0.35	0.35	125.00	9093.75	3728.40	5365.35	1.86	11.67	535.93	-52
14.696	2.116	-51	73.75	67.0	804	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	33.5	0.34	0.34	125.00	9218.75	3790.80	5427.95	1.84	11.80	547.73	-53
14.696	2.116	-52	74.75	68.0	816	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	34	0.33	0.33	125.00	9343.75	3853.20	5490.55	1.81	11.92	559.64	-54
14.696	2.116	-53	75.75	69.0	828	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	34.5	0.32	0.32	125.00	9468.75	3915.60	5553.15	1.79	12.04	571.68	-55
14.696	2.116	-54	76.75	70.0	840	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	35	0.32	0.32	125.00	9593.75	3978.00	5615.75	1.77	12.16	583.84	-56
14.696	2.116	-55	77.75	71.0	852	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	35.5	0.31	0.31	125.00	9718.75	4040.40	5678.35	1.75	12.28	596.12	-57
14.696	2.116	-56	78.75	72.0	864	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	36	0.30	0.30	125.00	9843.75	4102.80	5740.95	1.72	12.40	608.53	-58
14.696	2.116	-57	79.75	73.0	876	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	36.5	0.29	0.29	125.00	9968.75	4165.20	5803.55	1.70	12.53	621.05	-59
14.696	2.116	-58	80.75	74.0	888	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	37	0.28	0.28	125.00	10093.75	4227.60	5866.15	1.67	12.65	633.70	-60
14.696	2.116	-59	81.75	75.0	900	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	37.5	0.28	0.28	125.00	10218.75	4290.00	5928.75	1.64	12.77	646.47	-61
14.696	2.116	-60	82.75	76.0	912	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	38	0.27	0.27	125.00	10343.75	4352.40	5991.35	1.62	12.89	659.36	-62
14.696	2.116	-61	83.75	77.0	924	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	38.5	0.26	0.26	125.00	10468.75	4414.80	6053.95	1.59	13.01	672.37	-63
14.696	2.116	-62	84.75	78.0	936	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	39	0.25	0.25	125.00	10593.75	4477.20	6116.55	1.56	13.13	685.51	-64
14.696	2.116	-63	85.75	79.0	948	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	39.5	0.25	0.25	125.00	10718.75	4539.60	6179.15	1.54	13.26	698.76	-65
14.696	2.116	-64	86.75	80.0	960	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	40	0.24	0.25	125.00	10843.75	4602.00	6241.75	1.56	13.38	712.14	-66
14.696	2.116	-65	87.75	81.0	972	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	40.5	0.23	0.25	125.00	10968.75	4664.40	6304.35	1.58	13.50	725.64	-67
14.696	2.116	-66	88.75	82.0	984	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	41	0.23	0.25	125.00	11093.75	4726.80	6366.95	1.59	13.62	739.26	-68
14.696	2.116	-67	89.75	83.0	996	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	41.5	0.22	0.25	125.00	11218.75	4789.20	6429.55	1.61	13.73	752.99	-69
14.696	2.116	-68	90.75	84.0	1008	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	42	0.21	0.25	125.00	11343.75	4851.60	6492.15	1.62	13.82	766.81	-70
14.696	2.116	-69	91.75	85.0	1020	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	42.5	0.20	0.25	125.00	11468.75	4914.00	6554.75	1.64	13.91	780.72	-71
14.696	2.116	-70	92.75	86.0	1032	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	43	0.20	0.25	125.00	11593.75	4976.40	6617.35	1.65	14.00	794.72	-72
14.696	2.116	-71	93.75	87.0	1044	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	43.5	0.19	0.25	125.00	11718.75	5038.80	6679.95	1.67	14.08	808.80	-73
14.696	2.116	-72	94.75	88.0	1056	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	44	0.18	0.25	125.00	11843.75	5101.20	6742.55	1.69	14.17	822.97	-74
14.696	2.116	-73	95.75	89.0	1068	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	44.5	0.18	0.25	125.00	11968.75	5163.60	6805.15	1.70	14.25	837.23	-75
14.696	2.116	-74	96.75	90.0	1080	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	45	0.17	0.25	125.00	12093.75	5226.00	6867.75	1.72	14.34	851.56	-76
14.696	2.116	-75	97.75	91.0	1092	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	45.5	0.16	0.25	125.00	12218.75	5288.40	6930.35	1.73	14.42	865.99	-77
14.696	2.116	-76	98.75	92.0	1104	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	46	0.16	0.25	125.00	12343.75	5350.80	6992.95	1.75	14.51	880.49	-78
14.696	2.116	-77	99.75	93.0	1116	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	46.5	0.15	0.25	125.00	12468.75	5413.20	7055.55	1.76	14.59	895.08	-79
14.696	2.116	-78	100.75	94.0	1128	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	47	0.14	0.25	125.00	12593.75	5475.60	7118.15	1.78	14.67	909.75	-80
14.696	2.116	-79	101.75	95.0	1140	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	47.5	0.14	0.25	125.00	12718.75	5538.00	7180.75	1.80	14.75	924.50	-81
14.696	2.116	-80	102.75	96.0	1152	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	48	0.13	0.25	125.00	12843.75	5600.40	7243.35	1.81	14.83	939.33	-82
14.696	2.116	-81	103.75	97.0	1164	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	48.5	0.12	0.25	125.00	12968.75	5662.80	7305.95	1.83	14.91	954.25	-83
14.696	2.116	-82	104.75	98.0	1176	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	49	0.12	0.25	125.00	13093.75	5725.20	7368.55	1.84	14.99	969.24	-84
14.696	2.116	-83	105.75	99.0	1188	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	49.5	0.11	0.25	125.00	13218.75	5787.60	7431.15	1.86	15.07	984.31	-85
14.696	2.116	-84	106.75	100.0	1200	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	50	0.10	0.25	125.00	13343.75	5850.00	7493.75	1.87	15.15	999.46	-86
14.696	2.116	-85	107.75	101.0	1212	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	50.5	0.10	0.25	125.00	13468.75	5912.40	7556.35	1.89	15.23	1014.69	-87
14.696	2.116	-86	108.75	102.0	1224	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	51	0.09	0.25	125.00	13593.75	5974.80	7618.95	1.90	15.31	1030.00	-88
14.696	2.116	-87	109.75	103.0	1236	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	51.5	0.08	0.25	125.00	13718.75	6037.20	7681.55	1.92	15.38	1045.38	-89
14.696	2.116	-88	110.75	104.0	1248	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	52	0.08	0.25	125.00	13843.75	6099.60	7744.15	1.94	15.46	1060.84	-90
14.696	2.116	-89	111.75	105.0	1260	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	52.5	0.07	0.25	125.00	13968.75	6162.00	7806.75	1.95	15.54	1076.38	-91
14.696	2.116	-90	112.75	106.0	1272	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	53	0.06	0.25	125.00	14093.75	6224.40	7869.35	1.97	15.61	1091.99	-92
14.696	2.116	-91	113.75	107.0	1284	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	53.5	0.06	0.25	125.00	14218.75	6286.80	7931.95	1.98	15.68	1107.67	-93
14.696	2.116	-92	114.75	108.0	1296	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	54	0.05	0.25	125.00	14343.75	6349.20	7994.55	2.00	15.76	1123.43	-94
14.696	2.116	-93	115.75	109.0	1308	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	54.5	0.04	0.25	125.00	14468.75	6411.60	8057.15	2.01	15.83	1139.26	-95
14.696	2.116	-94	116.75	110.0	1320	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	55	0.04	0.25	125.00	14593.75	6474.00	8119.75	2.03	15.90	1155.17	-96
14.696	2.116	-95	117.75	111.0	1332	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	55.5	0.03	0.25	125.00	14718.75	6536.40	8182.35	2.05	15.98	1171.15	-97
14.696	2.116	-96	118.75	112.0	1344	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	56	0.03	0.25	125.00	14843.75	6598.80	8244.95	2.06	16.05	1187.19	-98
14.696	2.116	-97	119.75	113.0	1356	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	56.5	0.02	0.25	125.00	14968.75	6661.20	8307.55	2.08	16.12	1203.31	-99
14.696	2.116	-98	120.75	114.0	1368	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	57	0.01	0.25	125.00	15093.75	6723.60	8370.15	2.09	16.19	1219.50	-100
14.696	2.116	-99	121.75	115.0	1380	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	57.5	0.01	0.25	125.00	15218.75	6786.00	8432.75	2.11	16.26	1235.76	-101
14.696	2.116	-100	122.75	116.0	1392	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	58	0.00	0.25	125.00	15343.75	6848.40	8495.35	2.12	16.33	1252.09	-102
14.696	2.116	-101	123.75	117.0	1404	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	58.5	0.00	0.25	125.00	15468.75	6910.80	8557.95	2.14	16.40	1268.49	-103
14.696	2.116	-102	124.75	118.0	1416	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	59	-0.01	0.25	125.00	15593.75	6973.20	8620.55	2.16	16.47	1284.96	-104
14.696	2.116	-103	125.75	119.0	1428	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	59.5	-0.02	0.25	125.00	15718.75	7035.60	8683.15	2.17	16.53	1301.49	-105
14.696	2.116	-104	126.75	120.0	1440	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	60	-0.02	0.25	125.00	15843.75	7098.00	8745.75	2.19	16.60	1318.09	-106
14.696	2.116	-105	127.75	121.0	1452	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	60.5	-0.03	0.25	125.00	15968.75	7160.40	8808.35	2.20	16.67	1334.76	-107
14.696	2.116	-106	128.75	122.0	1464	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	61	-0.03	0.25	125.00	16093.75	7222.80	8870.95	2.22	16.73	1351.49	-108
14.696	2.116	-107	129.75	123.0	1476	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	61.5	-0.04	0.25	125.00	16218.75	7285.20	8933.55	2.23	16.80	1368.28	-109
14.696	2.116	-108	130.75	124.0	1488	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	62	-0.05	0.25	125.00	16343.75	7347.60	8996.15	2.25	16.86	1385.15	-110
14.696	2.116	-109	131.75	125.0	1500	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	62.5	-0.05	0.25	125.00	16468.75	7410.00	9058.75	2.26	16.93	1402.07	-111
14.696	2.116	-110	132.75	126.0	1512	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	63	-0.06	0.25	125.00	16593.75	7472.40	9121.35	2.28	16.99	1419.06	-112
14.696	2.116	-111	133.75	127.0	1524	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	63.5	-0.06	0.25	125.00	16718.75	7534.80	9183.95	2.30	17.05	1436.11	-113
14.696	2.116	-112	134.75	128.0	1536	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	64	-0.07	0.25	125.00	16843.75	7597.20	9246.55	2.31	17.11	1453.22	-114
14.696	2.116	-113	135.75	129.0	1548	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	64.5	-0.08	0.25	125.00	16968.75	7659.60	9309.15	2.33	17.18	1470.40	-115
14.696	2.116	-114	136.75	130.0	1560	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	65	-0.08	0.25	125.00	17093.75	7722.00	9371.75	2.34	17.24	1487.64	-116
14.696	2.116	-115	137.75	131.0	1572	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	65.5	-0.09	0.25	125.00	17218.75	7784.40	9434.35	2.36	17.30	1504.93	-117
14.696	2.116	-116	138.75	132.0	1584	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	66	-0.09	0.25	125.00	17343.75	7846.80	9496.95	2.37	17.36	1522.29	-118
14.696	2.116	-117	139.75	133.0	1596	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	66.5	-0.10	0.25	125.00	17468.75	7909.20	9559.55	2.39	17.42	1539.70	-119
14.696	2.116	-118	140.75	134.0	1608	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	67	-0.10	0.25	125.00	17593.75	7971.60	9622.15	2.41	17.47	1557.18	-120
14.696	2.116	-119	141.75	135.0	1620	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	67.5	-0.11	0.25	125.00	17718.75	8034.00	9684.75	2.42	17.53	1574.71	-121
14.696	2.116	-120	142.75	136.0	1632	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	68	-0.12	0.25	125.00	17843.75	8096.40	9747.35	2.44	17.59	1592.30	-122
14.696	2.116	-121	143.75	137.0	1644	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	68.5	-0.12	0.25	125.00	17968.75	8158.80	9809.95	2.45	17.65	1609.95	-123
14.696	2.116	-122	144.75	138.0	1656	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	69	-0.13	0.25	125.00	18093.75	8221.20	9872.55	2.47	17.70	1627.65	-124
14.696	2.116	-123	145.75	139.0	1668	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	69.5	-0.13	0.25	125.00	18218.75	8283.60	9935.15	2.48	17.76	1645.41	-125
14.696	2.116	-124	146.75	140.0	1680	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	70	-0.14	0.25	125.00	18343.75	8346.00	9997.75	2.50	17.81	1663.22	-126
130.696	18.820	-125	147.75	141.0	1692	4.82	33.44	0.256	0	0.55	0.55	2.648	18.39	70.5	-0.14	0.25	125.00	18468.75	8408.40	10060.35	2.52	20.80	1684.02	-127

29th AVE. Bent 4

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	21.00
Bottom of footing elevation / Pile top elevation (feet)	14.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-45.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil						Cohesionless Soil								
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{max} (ksf)	f_{max} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{max} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	14	6.75	0.0	0	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	843.75	0.00	843.75	0.00	0.00	0.00	12
14.696	2.116	13	7.75	1.0	12	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.75	0.75	125.00	968.75	0.00	968.75	0.00	0.00	0.00	11
14.696	2.116	12	8.75	2.0	24	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.73	0.73	125.00	1093.75	0.00	1093.75	0.80	6.39	6.39	10
14.696	2.116	11	9.75	3.0	36	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.72	0.72	125.00	1218.75	0.00	1218.75	0.88	6.22	12.61	9
14.696	2.116	10	10.75	4.0	48	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.70	0.70	125.00	1343.75	0.00	1343.75	0.95	6.05	18.66	8
14.696	2.116	9	11.75	5.0	60	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.69	0.69	125.00	1468.75	46.80	1421.95	0.98	5.87	24.54	7
14.696	2.116	8	12.75	6.0	72	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.68	0.68	125.00	1593.75	109.20	1484.55	1.01	5.70	30.24	6
14.696	2.116	7	13.75	7.0	84	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.67	0.67	125.00	1718.75	171.60	1547.15	1.03	5.53	35.77	5
14.696	2.116	6	14.75	8.0	96	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.65	0.65	125.00	1843.75	234.00	1609.75	1.05	5.36	41.12	4
14.696	2.116	5	15.75	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	1968.75	296.40	1672.35	1.07	5.18	46.31	3
14.696	2.116	4	16.75	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2093.75	358.80	1734.95	1.09	5.18	51.49	2
14.696	2.116	3	17.75	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2218.75	421.20	1797.55	1.11	5.18	56.67	1
14.696	2.116	2	18.75	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2343.75	483.60	1860.15	1.13	5.18	61.86	0
14.696	2.116	1	19.75	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2468.75	546.00	1922.75	1.15	5.18	67.04	-1
14.696	2.116	0	20.75	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2593.75	608.40	1985.35	1.17	5.18	72.23	-2
14.696	2.116	-1	21.75	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2718.75	670.80	2047.95	1.19	5.18	77.41	-3
14.696	2.116	-2	22.75	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2843.75	733.20	2110.55	1.20	5.18	82.59	-4
14.696	2.116	-3	23.75	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2968.75	795.60	2173.15	1.22	5.18	87.78	-5
14.696	2.116	-4	24.75	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3093.75	858.00	2235.75	1.23	5.18	92.96	-6
14.696	2.116	-5	25.75	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3218.75	920.40	2298.35	1.25	5.18	98.14	-7
14.696	2.116	-6	26.75	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3343.75	982.80	2360.95	1.26	5.18	103.33	-8
14.696	2.116	-7	27.75	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.55	0.55	125.00	3468.75	1045.20	2423.55	1.34	5.18	108.51	-9
14.696	2.116	-8	28.75	22.0	264	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	11	0.57	0.57	125.00	3593.75	1107.60	2486.15	1.41	5.25	113.76	-10
14.696	2.116	-9	29.75	23.0	276	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	11.5	0.58	0.58	125.00	3718.75	1170.00	2548.75	1.49	5.35	119.11	-11
14.696	2.116	-10	30.75	24.0	288	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	12	0.60	0.60	125.00	3843.75	1232.40	2611.35	1.57	5.44	124.55	-12
14.696	2.116	-11	31.75	25.0	300	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	12.5	0.61	0.61	125.00	3968.75	1294.80	2673.95	1.64	5.54	130.10	-13
14.696	2.116	-12	32.75	26.0	312	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	13	0.63	0.63	125.00	4093.75	1357.20	2736.55	1.72	5.64	135.74	-14
14.696	2.116	-13	33.75	27.0	324	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	13.5	0.64	0.64	125.00	4218.75	1419.60	2799.15	1.80	5.74	141.47	-15
14.696	2.116	-14	34.75	28.0	336	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	14	0.66	0.66	125.00	4343.75	1482.00	2861.75	1.88	5.83	147.31	-16
14.696	2.116	-15	35.75	29.0	348	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	14.5	0.67	0.67	125.00	4468.75	1544.40	2924.35	1.95	5.93	153.24	-17
14.696	2.116	-16	36.75	30.0	360	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	15	0.68	0.68	125.00	4593.75	1606.80	2986.95	2.03	6.03	159.27	-18
14.696	2.116	-17	37.75	31.0	372	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	15.5	0.67	0.67	125.00	4718.75	1669.20	3049.55	2.04	6.13	165.39	-19
14.696	2.116	-18	38.75	32.0	384	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	16	0.66	0.66	125.00	4843.75	1731.60	3112.15	2.05	6.22	171.62	-20
14.696	2.116	-19	39.75	33.0	396	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	16.5	0.65	0.65	125.00	4968.75	1794.00	3174.75	2.05	6.32	177.94	-21
14.696	2.116	-20	40.75	34.0	408	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	17	0.64	0.64	125.00	5093.75	1856.40	3237.35	2.06	6.42	184.36	-22
14.696	2.116	-21	41.75	35.0	420	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	17.5	0.63	0.63	125.00	5218.75	1918.80	3299.95	2.07	6.52	190.87	-23
14.696	2.116	-22	42.75	36.0	432	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18	0.62	0.62	125.00	5343.75	1981.20	3362.55	2.07	6.61	197.49	-24
14.696	2.116	-23	43.75	37.0	444	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	18.5	0.61	0.61	125.00	5468.75	2043.60	3425.15	2.07	6.71	204.20	-25
14.696	2.116	-24	44.75	38.0	456	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	19	0.60	0.60	125.00	5593.75	2106.00	3487.75	2.08	6.81	211.00	-26
14.696	2.116	-25	45.75	39.0	468	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	19.5	0.59	0.59	125.00	5718.75	2168.40	3550.35	2.08	6.91	217.91	-27
14.696	2.116	-26	46.75	40.0	480	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	20	0.58	0.58	125.00	5843.75	2230.80	3612.95	2.08	7.00	224.91	-28
14.696	2.116	-27	47.75	41.0	492	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	20.5	0.57	0.57	125.00	5968.75	2293.20	3675.55	2.08	7.10	232.01	-29
14.696	2.116	-28	48.75	42.0	504	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	21	0.56	0.56	125.00	6093.75	2355.60	3738.15	2.08	7.20	239.21	-30
14.696	2.116	-29	49.75	43.0	516	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	21.5	0.55	0.55	125.00	6218.75	2418.00	3800.75	2.08	7.29	246.50	-31
14.696	2.116	-30	50.75	44.0	528	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	22	0.54	0.54	125.00	6343.75	2480.40	3863.35	2.07	7.39	253.90	-32
14.696	2.116	-31	51.75	45.0	540	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	22.5	0.53	0.53	125.00	6468.75	2542.80	3925.95	2.07	7.49	261.39	-33
14.696	2.116	-32	52.75	46.0	552	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	23	0.52	0.52	125.00	6593.75	2605.20	3988.55	2.06	7.59	268.97	-34
14.696	2.116	-33	53.75	47.0	564	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	23.5	0.51	0.51	125.00	6718.75	2667.60	4051.15	2.06	7.68	276.66	-35
14.696	2.116	-34	54.75	48.0	576	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	24	0.50	0.50	125.00	6843.75	2730.00	4113.75	2.05	7.78	284.44	-36
14.696	2.116	-35	55.75	49.0	588	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	24.5	0.49	0.49	125.00	6968.75	2792.40	4176.35	2.05	7.88	292.32	-37
14.696	2.116	-36	56.75	50.0	600	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	25	0.48	0.48	125.00	7093.75	2854.80	4238.95	2.04	7.98	300.29	-38
14.696	2.116	-37	57.75	51.0	612	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	25.5	0.47	0.47	125.00	7218.75	2917.20	4301.55	2.03	8.07	308.37	-39
14.696	2.116	-38	58.75	52.0	624	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	26	0.46	0.46	125.00	7343.75	2979.60	4364.15	2.02	8.17	316.54	-40
14.696	2.116	-39	59.75	53.0	636	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	26.5	0.45	0.45	125.00	7468.75	3042.00	4426.75	2.01	8.27	324.80	-41
14.696	2.116	-40	60.75	54.0	648	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	27	0.45	0.45	125.00	7593.75	3104.40	4489.35	2.00	8.37	333.17	-42
14.696	2.116	-41	61.75	55.0	660	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	27.5	0.44	0.44	125.00	7718.75	3166.80	4551.95	1.99	8.46	341.63	-43
14.696	2.116	-42	62.75	56.0	672	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	28	0.43	0.43	125.00	7843.75	3229.20	4614.55	1.98	8.56	350.19	-44
14.696	2.116	-43	63.75	57.0	684	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	28.5	0.42	0.42	125.00	7968.75	3291.60	4677.15	1.96	8.66	358.85	-45
14.696	2.116	-44	64.75	58.0	696	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	29	0.41	0.41	125.00	8093.75	3354.00	4739.75	1.95	8.75	367.61	-46
14.696	2.116	-45	65.75	59.0	708	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	29.5	0.40	0.40	125.00	8218.75	3416.40	4802.35	1.94	8.85	376.46	-47
14.696	2.116	-46	66.75	60.0	720	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	30	0.39	0.39	125.00	8343.75	3478.80	4864.95	1.92	8.95	385.41	-48
14.696	2.116	-47	67.75	61.0	732	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	30.5	0.39	0.39	125.00	8468.75	3541.20	4927.55	1.91	9.05	394.45	-49
14.696	2.116	-48	68.75	62.0	744	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	31	0.38	0.38	125.00	8593.75	3603.60	4990.15	1.89	9.14	403.60	-50
14.696	2.116	-49	69.75	63.0	756	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	31.5	0.37	0.37	125.00	8718.75	3666.00	5052.75	1.87	9.24	412.84	-51
14.696	2.116	-50	70.75	64.0	768	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	32	0.36	0.36	125.00	8843.75	3728.40	5115.35	1.85	9.34	422.18	-52
14.696	2.116	-51	71.75	65.0	780	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	32.5	0.35	0.35	125.00	8968.75	3790.80	5177.95	1.83	9.44	431.62	-53
14.696	2.116	-52	72.75	66.0	792	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	33	0.35	0.35	125.00	9093.75	3853.20	5240.55	1.81	9.53	441.15	-54
14.696	2.116	-53	73.75	67.0	804	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	33.5	0.34	0.34	125.00	9218.75	3915.60	5303.15	1.79	9.63	450.78	-55
14.696	2.116	-54	74.75	68.0	816	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	34	0.33	0.33	125.00	9343.75	3978.00	5365.75	1.77	9.73	460.51	-56
14.696	2.116	-55	75.75	69.0	828	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	34.5	0.32	0.32	125.00	9468.75	4040.40	5428.35	1.75	9.83	470.33	-57
14.696	2.116	-56	76.75	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.32	0.32	125.00	9593.75	4102.80	5490.95	1.73	9.92	480.26	-58
14.696	2.116	-57	77.75	71.0	852	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	35.5	0.31	0.31	125.00	9718.75	4165.20	5553.55	1.71	10.02	490.28	-59
14.696	2.116	-58	78.75	72.0	864	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	36	0.30	0.30	125.00	9843.75	4227.60	5616.15	1.68	10.12	500.39	-60
14.696	2.116	-59	79.75	73.0	876	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	36.5	0.29	0.29	125.00	9968.75	4290.00	5678.75	1.66	10.22	510.61	-61
14.696	2.116	-60	80.75	74.0	888	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	37	0.28	0.28	125.00	10093.75	4352.40	5741.35	1.63	10.31	520.92	-62
14.696	2.116	-61	81.75	75.0	900	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	37.5	0.28	0.28	125.00	10218.75	4414.80	5803.95	1.61	10.41	531.33	-63
14.696	2.116	-62	82.75	76.0	912	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	38	0.27	0.27	125.00	10343.75	4477.20	5866.55	1.58	10.51	541.84	-64
14.696	2.116	-63	83.75	77.0	924	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	38.5	0.26	0.26	125.00	10468.75	4539.60	5929.15	1.55	10.60	552.44	-65
14.696	2.116	-64	84.75	78.0	936	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	39	0.25	0.25	125.00	10593.75	4602.00	5991.75	1.53	10.70	563.15	-66
14.696	2.116	-65	85.75	79.0	948	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	39.5	0.25	0.25	125.00	10718.75	4664.40	6054.35	1.51	10.80	573.94	-67
14.696	2.116	-66	86.75	80.0	960	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	40	0.24	0.25	125.00	10843.75	4726.80	6116.95	1.53	10.90	584.84	-68
14.696	2.116	-67	87.75	81.0	972	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	40.5	0.23	0.25	125.00	10968.75	4789.20	6179.55	1.54	10.99	595.83	-69
14.696	2.116	-68	88.75	82.0	984	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	41	0.23	0.25	125.00	11093.75	4851.60	6242.15	1.56	11.06	606.89	-70
14.696	2.116	-69	89.75	83.0	996	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	41.5	0.22	0.25	125.00	11218.75	4914.00	6304.75	1.58	11.13	618.01	-71
14.696	2.116	-70	90.75	84.0	1008	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	42	0.21	0.25	125.00	11343.75	4976.40	6367.35	1.59	11.20	629.21	-72
14.696	2.116	-71	91.75	85.0	1020	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	42.5	0.20	0.25	125.00	11468.75	5038.80	6429.95	1.61	11.27	640.48	-73
14.696	2.116	-72	92.75	86.0	1032	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	43	0.20	0.25	125.00	11593.75	5101.20	6492.55	1.62	11.33	651.81	-74
14.696	2.116	-73	93.75	87.0	1044	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	43.5	0.19	0.25	125.00	11718.75	5163.60	6555.15	1.64	11.40	663.21	-75
14.696	2.116	-74	94.75	88.0	1056	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	44	0.18	0.25	125.00	11843.75	5226.00	6617.75	1.65	11.47	674.69	-76
14.696	2.116	-75	95.75	89.0	1068	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	44.5	0.18	0.25	125.00	11968.75	5288.40	6680.35	1.67	11.54	686.22	-77
14.696	2.116	-76	96.75	90.0	1080	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	45	0.17	0.25	125.00	12093.75	5350.80	6742.95	1.69	11.60	697.83	-78
14.696	2.116	-77	97.75	91.0	1092	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	45.5	0.16	0.25	125.00	12218.75	5413.20	6805.55	1.70	11.67	709.50	-79
14.696	2.116	-78	98.75	92.0	1104	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	46	0.16	0.25	125.00	12343.75	5475.60	6868.15	1.72	11.74	721.23	-80
14.696	2.116	-79	99.75	93.0	1116	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	46.5	0.15	0.25	125.00	12468.75	5538.00	6930.75	1.73	11.80	733.04	-81
14.696	2.116	-80	100.75	94.0	1128	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	47	0.14	0.25	125.00	12593.75	5600.40	6993.35	1.75	11.87	744.90	-82
14.696	2.116	-81	101.75	95.0	1140	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	47.5	0.14	0.25	125.00	12718.75	5662.80	7055.95	1.76	11.93	756.83	-83
14.696	2.116	-82	102.75	96.0	1152	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	48	0.13	0.25	125.00	12843.75	5725.20	7118.55	1.78	11.99	768.83	-84
14.696	2.116	-83	103.75	97.0	1164	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	48.5	0.12	0.25	125.00	12968.75	5787.60	7181.15	1.80	12.06	780.88	-85
14.696	2.116	-84	104.75	98.0	1176	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	49	0.12	0.25	125.00	13093.75	5850.00	7243.75	1.81	12.12	793.01	-86
14.696	2.116	-85	105.75	99.0	1188	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	49.5	0.11	0.25	125.00	13218.75	5912.40	7306.35	1.83	12.18	805.19	-87
14.696	2.116	-86	106.75	100.0	1200	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	50	0.10	0.25	125.00	13343.75	5974.80	7368.95	1.84	12.25	817.43	-88
14.696	2.116	-87	107.75	101.0	1212	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	50.5	0.10	0.25	125.00	13468.75	6037.20	7431.55	1.86	12.31	829.74	-89
14.696	2.116	-88	108.75	102.0	1224	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	51	0.09	0.25	125.00	13593.75	6099.60	7494.15	1.87	12.37	842.11	-90
14.696	2.116	-89	109.75	103.0	1236	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	51.5	0.08	0.25	125.00	13718.75	6162.00	7556.75	1.89	12.43	854.54	-91
14.696	2.116	-90	110.75	104.0	1248	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	52	0.08	0.25	125.00	13843.75	6224.40	7619.35	1.90	12.49	867.02	-92
14.696	2.116	-91	111.75	105.0	1260	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	52.5	0.07	0.25	125.00	13968.75	6286.80	7681.95	1.92	12.55	879.57	-93
14.696	2.116	-92	112.75	106.0	1272	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	53	0.06	0.25	125.00	14093.75	6349.20	7744.55	1.94	12.61	892.18	-94
14.696	2.116	-93	113.75	107.0	1284	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	53.5	0.06	0.25	125.00	14218.75	6411.60	7807.15	1.95	12.67	904.85	-95
14.696	2.116	-94	114.75	108.0	1296	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	54	0.05	0.25	125.00	14343.75	6474.00	7869.75	1.97	12.72	917.57	-96
14.696	2.116	-95	115.75	109.0	1308	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	54.5	0.04	0.25	125.00	14468.75	6536.40	7932.35	1.98	12.78	930.35	-97
14.696	2.116	-96	116.75	110.0	1320	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	55	0.04	0.25	125.00	14593.75	6598.80	7994.95	2.00	12.84	943.19	-98
14.696	2.116	-97	117.75	111.0	1332	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	55.5	0.03	0.25	125.00	14718.75	6661.20	8057.55	2.01	12.90	956.09	-99
14.696	2.116	-98	118.75	112.0	1344	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	56	0.03	0.25	125.00	14843.75	6723.60	8120.15	2.03	12.95	969.04	-100
14.696	2.116	-99	119.75	113.0	1356	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	56.5	0.02	0.25	125.00	14968.75	6786.00	8182.75	2.05	13.01	982.05	-101
14.696	2.116	-100	120.75	114.0	1368	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	57	0.01	0.25	125.00	15093.75	6848.40	8245.35	2.06	13.06	995.11	-102
14.696	2.116	-101	121.75	115.0	1380	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	57.5	0.01	0.25	125.00	15218.75	6910.80	8307.95	2.08	13.12	1008.23	-103
14.696	2.116	-102	122.75	116.0	1392	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	58	0.00	0.25	125.00	15343.75	6973.20	8370.55	2.09	13.17	1021.40	-104
14.696	2.116	-103	123.75	117.0	1404	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	58.5	0.00	0.25	125.00	15468.75	7035.60	8433.15	2.11	13.23	1034.63	-105
14.696	2.116	-104	124.75	118.0	1416	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	59	-0.01	0.25	125.00	15593.75	7098.00	8495.75	2.12	13.28	1047.91	-106
14.696	2.116	-105	125.75	119.0	1428	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	59.5	-0.02	0.25	125.00	15718.75	7160.40	8558.35	2.14	13.33	1061.24	-107
14.696	2.116	-106	126.75	120.0	1440	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	60	-0.02	0.25	125.00	15843.75	7222.80	8620.95	2.16	13.39	1074.62	-108
14.696	2.116	-107	127.75	121.0	1452	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	60.5	-0.03	0.25	125.00	15968.75	7285.20	8683.55	2.17	13.44	1088.06	-109
14.696	2.116	-108	128.75	122.0	1464	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	61	-0.03	0.25	125.00	16093.75	7347.60	8746.15	2.19	13.49	1101.55	-110
14.696	2.116	-109	129.75	123.0	1476	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	61.5	-0.04	0.25	125.00	16218.75	7410.00	8808.75	2.20	13.54	1115.09	-111
14.696	2.116	-110	130.75	124.0	1488	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	62	-0.05	0.25	125.00	16343.75	7472.40	8871.35	2.22	13.59	1128.68	-112
14.696	2.116	-111	131.75	125.0	1500	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	62.5	-0.05	0.25	125.00	16468.75	7534.80	8933.95	2.23	13.64	1142.32	-113
14.696	2.116	-112	132.75	126.0	1512	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	63	-0.06	0.25	125.00	16593.75	7597.20	8996.55	2.25	13.69	1156.01	-114
14.696	2.116	-113	133.75	127.0	1524	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	63.5	-0.06	0.25	125.00	16718.75	7659.60	9059.15	2.26	13.74	1169.75	-115
14.696	2.116	-114	134.75	128.0	1536	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	64	-0.07	0.25	125.00	16843.75	7722.00	9121.75	2.28	13.79	1183.54	-116
14.696	2.116	-115	135.75	129.0	1548	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	64.5	-0.08	0.25	125.00	16968.75	7784.40	9184.35	2.30	13.84	1197.38	-117
14.696	2.116	-116	136.75	130.0	1560	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	65	-0.08	0.25	125.00	17093.75	7846.80	9246.95	2.31	13.88	1211.26	-118
14.696	2.116	-117	137.75	131.0	1572	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	65.5	-0.09	0.25	125.00	17218.75	7909.20	9309.55	2.33	13.93	1225.20	-119
14.696	2.116	-118	138.75	132.0	1584	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	66	-0.09	0.25	125.00	17343.75	7971.60	9372.15	2.34	13.98	1239.18	-120
14.696	2.116	-119	139.75	133.0	1596	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	66.5	-0.10	0.25	125.00	17468.75	8034.00	9434.75	2.36	14.03	1253.20	-121
14.696	2.116	-120	140.75	134.0	1608	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	67	-0.10	0.25	125.00	17593.75	8096.40	9497.35	2.37	14.07	1267.27	-122
14.696	2.116	-121	141.75	135.0	1620	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	67.5	-0.11	0.25	125.00	17718.75	8158.80	9559.95	2.39	14.12	1281.39	-123
14.696	2.116	-122	142.75	136.0	1632	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	68	-0.12	0.25	125.00	17843.75	8221.20	9622.55	2.41	14.16	1295.55	-124
14.696	2.116	-123	143.75	137.0	1644	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	68.5	-0.12	0.25	125.00	17968.75	8283.60	9685.15	2.42	14.21	1309.76	-125
14.696	2.116	-124	144.75	138.0	1656	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	69	-0.13	0.25	125.00	18093.75	8346.00	9747.75	2.44	14.25	1324.01	-126
14.696	2.116	-125	145.75	139.0	1668	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	69.5	-0.13	0.25	125.00	18218.75	8408.40	9810.35	2.45	14.29	1338.30	-127
14.696	2.116	-126	146.75	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.14	0.25	125.00	18343.75	8470.80	9872.95	2.47	#N/A	#N/A	-128
14.696	2.116	-127	147.75	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.14	0.25	125.00	18468.75	8533.20	9935.55	2.48	#N/A	#N/A	-129

29th AVE. Bent 5

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.00
Bottom of footing elevation / Pile top elevation (feet)	14.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-60.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.5 feet
30 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{max} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	14	5.75	0.0	0	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	718.75	0.00	718.75	0.00	0.00	0.00	12
14.696	2.116	13	6.75	1.0	12	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	843.75	0.00	843.75	0.00	0.00	0.00	11
14.696	2.116	12	7.75	2.0	24	1.85	12.85	0.874	0	0.55	0.00	0.000	0.00	10	0.75	0.75	125.00	968.75	0.00	968.75	0.00	0.00	0.00	10
14.696	2.116	11	8.75	3.0	36	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.73	0.73	125.00	1093.75	0.00	1093.75	0.80	7.78	7.78	9
14.696	2.116	10	9.75	4.0	48	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.72	0.72	125.00	1218.75	0.00	1218.75	0.88	7.56	15.33	8
14.696	2.116	9	10.75	5.0	60	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.70	0.70	125.00	1343.75	46.80	1296.95	0.91	7.34	22.68	7
14.696	2.116	8	11.75	6.0	72	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1468.75	109.20	1359.55	0.94	7.13	29.81	6
14.696	2.116	7	12.75	7.0	84	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.68	0.68	125.00	1593.75	171.60	1422.15	0.96	6.91	36.72	5
14.696	2.116	6	13.75	8.0	96	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.67	0.67	125.00	1718.75	234.00	1484.75	0.99	6.70	43.41	4
14.696	2.116	5	14.75	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.65	0.65	125.00	1843.75	296.40	1547.35	1.01	6.48	49.89	3
14.696	2.116	4	15.75	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	1968.75	358.80	1609.95	1.03	6.48	56.37	2
14.696	2.116	3	16.75	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2093.75	421.20	1672.55	1.06	6.48	62.85	1
14.696	2.116	2	17.75	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2218.75	483.60	1735.15	1.08	6.48	69.33	0
14.696	2.116	1	18.75	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2343.75	546.00	1797.75	1.10	6.48	75.81	-1
14.696	2.116	0	19.75	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2468.75	608.40	1860.35	1.11	6.48	82.29	-2
14.696	2.116	-1	20.75	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2593.75	670.80	1922.95	1.13	6.48	88.77	-3
14.696	2.116	-2	21.75	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2718.75	733.20	1985.55	1.15	6.48	95.25	-4
14.696	2.116	-3	22.75	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2843.75	795.60	2048.15	1.17	6.48	101.73	-5
14.696	2.116	-4	23.75	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	2968.75	858.00	2110.75	1.18	6.48	108.21	-6
14.696	2.116	-5	24.75	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3093.75	920.40	2173.35	1.20	6.48	114.69	-7
14.696	2.116	-6	25.75	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3218.75	982.80	2235.95	1.21	6.48	121.17	-8
14.696	2.116	-7	26.75	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3343.75	1045.20	2298.55	1.29	6.48	127.65	-9
14.696	2.116	-8	27.75	22.0	264	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	11	0.58	0.58	125.00	3468.75	1107.60	2361.15	1.36	6.56	134.21	-10
14.696	2.116	-9	28.75	23.0	276	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	11.5	0.59	0.59	125.00	3593.75	1170.00	2423.75	1.44	6.68	140.89	-11
14.696	2.116	-10	29.75	24.0	288	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	12	0.61	0.61	125.00	3718.75	1232.40	2486.35	1.52	6.81	147.70	-12
14.696	2.116	-11	30.75	25.0	300	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	12.5	0.62	0.62	125.00	3843.75	1294.80	2548.95	1.59	6.93	154.63	-13
14.696	2.116	-12	31.75	26.0	312	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	13	0.64	0.64	125.00	3968.75	1357.20	2611.55	1.67	7.05	161.68	-14
14.696	2.116	-13	32.75	27.0	324	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	13.5	0.65	0.65	125.00	4093.75	1419.60	2674.15	1.75	7.17	168.85	-15
14.696	2.116	-14	33.75	28.0	336	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	14	0.67	0.67	125.00	4218.75	1482.00	2736.75	1.82	7.29	176.14	-16
14.696	2.116	-15	34.75	29.0	348	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	14.5	0.68	0.68	125.00	4343.75	1544.40	2799.35	1.90	7.41	183.56	-17
14.696	2.116	-16	35.75	30.0	360	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	15	0.69	0.69	125.00	4468.75	1606.80	2861.95	1.98	7.54	191.09	-18
14.696	2.116	-17	36.75	31.0	372	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	15.5	0.68	0.68	125.00	4593.75	1669.20	2924.55	1.99	7.66	198.75	-19
14.696	2.116	-18	37.75	32.0	384	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	16	0.67	0.67	125.00	4718.75	1731.60	2987.15	2.00	7.78	206.53	-20
14.696	2.116	-19	38.75	33.0	396	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	16.5	0.66	0.66	125.00	4843.75	1794.00	3049.75	2.01	7.90	214.43	-21
14.696	2.116	-20	39.75	34.0	408	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	17	0.65	0.65	125.00	4968.75	1856.40	3112.35	2.01	8.02	222.46	-22
14.696	2.116	-21	40.75	35.0	420	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	17.5	0.64	0.64	125.00	5093.75	1918.80	3174.95	2.02	8.14	230.60	-23
14.696	2.116	-22	41.75	36.0	432	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18	0.63	0.63	125.00	5218.75	1981.20	3237.55	2.03	8.27	238.87	-24
14.696	2.116	-23	42.75	37.0	444	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	18.5	0.62	0.62	125.00	5343.75	2043.60	3300.15	2.03	8.39	247.25	-25
14.696	2.116	-24	43.75	38.0	456	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	19	0.61	0.61	125.00	5468.75	2106.00	3362.75	2.04	8.51	255.76	-26
14.696	2.116	-25	44.75	39.0	468	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	19.5	0.60	0.60	125.00	5593.75	2168.40	3425.35	2.04	8.63	264.40	-27
14.696	2.116	-26	45.75	40.0	480	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	20	0.59	0.59	125.00	5718.75	2230.80	3487.95	2.04	8.75	273.15	-28
14.696	2.116	-27	46.75	41.0	492	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	20.5	0.58	0.58	125.00	5843.75	2293.20	3550.55	2.04	8.87	282.02	-29
14.696	2.116	-28	47.75	42.0	504	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	21	0.57	0.57	125.00	5968.75	2355.60	3613.15	2.04	9.00	291.02	-30
14.696	2.116	-29	48.75	43.0	516	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	21.5	0.56	0.56	125.00	6093.75	2418.00	3675.75	2.04	9.12	300.14	-31
14.696	2.116	-30	49.75	44.0	528	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	22	0.55	0.55	125.00	6218.75	2480.40	3738.35	2.04	9.24	309.38	-32
14.696	2.116	-31	50.75	45.0	540	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	22.5	0.54	0.54	125.00	6343.75	2542.80	3800.95	2.04	9.36	318.74	-33
14.696	2.116	-32	51.75	46.0	552	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	23	0.53	0.53	125.00	6468.75	2605.20	3863.55	2.04	9.48	328.22	-34
14.696	2.116	-33	52.75	47.0	564	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	23.5	0.52	0.52	125.00	6593.75	2667.60	3926.15	2.03	9.61	337.83	-35
14.696	2.116	-34	53.75	48.0	576	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	24	0.51	0.51	125.00	6718.75	2730.00	3988.75	2.03	9.73	347.56	-36
14.696	2.116	-35	54.75	49.0	588	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	24.5	0.50	0.50	125.00	6843.75	2792.40	4051.35	2.02	9.85	357.40	-37
14.696	2.116	-36	55.75	50.0	600	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	25	0.49	0.49	125.00	6968.75	2854.80	4113.95	2.02	9.97	367.37	-38
14.696	2.116	-37	56.75	51.0	612	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	25.5	0.48	0.48	125.00	7093.75	2917.20	4176.55	2.01	10.09	377.47	-39
14.696	2.116	-38	57.75	52.0	624	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	26	0.47	0.47	125.00	7218.75	2979.60	4239.15	2.00	10.21	387.68	-40
14.696	2.116	-39	58.75	53.0	636	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	26.5	0.46	0.46	125.00	7343.75	3042.00	4301.75	1.99	10.34	398.01	-41
14.696	2.116	-40	59.75	54.0	648	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	27	0.45	0.45	125.00	7468.75	3104.40	4364.35	1.98	10.46	408.47	-42
14.696	2.116	-41	60.75	55.0	660	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	27.5	0.45	0.45	125.00	7593.75	3166.80	4426.95	1.97	10.58	419.05	-43
14.696	2.116	-42	61.75	56.0	672	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	28	0.44	0.44	125.00	7718.75	3229.20	4489.55	1.96	10.70	429.75	-44
14.696	2.116	-43	62.75	57.0	684	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	28.5	0.43	0.43	125.00	7843.75	3291.60	4552.15	1.95	10.82	440.57	-45
14.696	2.116	-44	63.75	58.0	696	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	29	0.42	0.42	125.00	7968.75	3354.00	4614.75	1.94	10.94	451.52	-46
14.696	2.116	-45	64.75	59.0	708	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	29.5	0.41	0.41	125.00	8093.75	3416.40	4677.35	1.93	11.07	462.58	-47
14.696	2.116	-46	65.75	60.0	720	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	30	0.40	0.40	125.00	8218.75	3478.80	4739.95	1.91	11.19	473.77	-48
14.696	2.116	-47	66.75	61.0	732	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	30.5	0.39	0.39	125.00	8343.75	3541.20	4802.55	1.90	11.31	485.08	-49
14.696	2.116	-48	67.75	62.0	744	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	31	0.39	0.39	125.00	8468.75	3603.60	4865.15	1.88	11.43	496.51	-50
14.696	2.116	-49	68.75	63.0	756	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	31.5	0.38	0.38	125.00	8593.75	3666.00	4927.75	1.87	11.55	508.06	-51
14.696	2.116	-50	69.75	64.0	768	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	32	0.37	0.37	125.00	8718.75	3728.40	4990.35	1.85	11.67	519.73	-52
14.696	2.116	-51	70.75	65.0	780	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	32.5	0.36	0.36	125.00	8843.75	3790.80	5052.95	1.83	11.80	531.53	-53
14.696	2.116	-52	71.75	66.0	792	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	33	0.35	0.35	125.00	8968.75	3853.20	5115.55	1.81	11.92	543.44	-54
14.696	2.116	-53	72.75	67.0	804	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	33.5	0.35	0.35	125.00	9093.75	3915.60	5178.15	1.79	12.04	555.48	-55
14.696	2.116	-54	73.75	68.0	816	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	34	0.34	0.34	125.00	9218.75	3978.00	5240.75	1.77	12.16	567.64	-56
14.696	2.116	-55	74.75	69.0	828	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	34.5	0.33	0.33	125.00	9343.75	4040.40	5303.35	1.75	12.28	579.93	-57
14.696	2.116	-56	75.75	70.0	840	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35	0.32	0.32	125.00	9468.75	4102.80	5365.95	1.73	12.40	592.33	-58
14.696	2.116	-57	76.75	71.0	852	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	35.5	0.32	0.32	125.00	9593.75	4165.20	5428.55	1.71	12.53	604.85	-59
14.696	2.116	-58	77.75	72.0	864	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	36	0.31	0.31	125.00	9718.75	4227.60	5491.15	1.69	12.65	617.50	-60
14.696	2.116	-59	78.75	73.0	876	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	36.5	0.30	0.30	125.00	9843.75	4290.00	5553.75	1.66	12.77	630.27	-61
14.696	2.116	-60	79.75	74.0	888	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	37	0.29	0.29	125.00	9968.75	4352.40	5616.35	1.64	12.89	643.16	-62
14.696	2.116	-61	80.75	75.0	900	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	37.5	0.28	0.28	125.00	10093.75	4414.80	5678.95	1.62	13.01	656.17	-63
14.696	2.116	-62	81.75	76.0	912	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	38	0.28	0.28	125.00	10218.75	4477.20	5741.55	1.59	13.13	669.31	-64
14.696	2.116	-63	82.75	77.0	924	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	38.5	0.27	0.27	125.00	10343.75	4539.60	5804.15	1.56	13.26	682.56	-65
14.696	2.116	-64	83.75	78.0	936	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	39	0.26	0.26	125.00	10468.75	4602.00	5866.75	1.54	13.38	695.94	-66
14.696	2.116	-65	84.75	79.0	948	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	39.5	0.25	0.25	125.00	10593.75	4664.40	5929.35	1.51	13.50	709.44	-67
14.696	2.116	-66	85.75	80.0	960	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	40	0.25	0.25	125.00	10718.75	4726.80	5991.95	1.50	13.62	723.06	-68
14.696	2.116	-67	86.75	81.0	972	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	40.5	0.24	0.25	125.00	10843.75	4789.20	6054.55	1.51	13.73	736.79	-69
14.696	2.116	-68	87.75	82.0	984	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	41	0.23	0.25	125.00	10968.75	4851.60	6117.15	1.53	13.82	750.62	-70
14.696	2.116	-69	88.75	83.0	996	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	41.5	0.23	0.25	125.00	11093.75	4914.00	6179.75	1.54	13.91	764.53	-71
14.696	2.116	-70	89.75	84.0	1008	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	42	0.22	0.25	125.00	11218.75	4976.40	6242.35	1.56	14.00	778.52	-72
14.696	2.116	-71	90.75	85.0	1020	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	42.5	0.21	0.25	125.00	11343.75	5038.80	6304.95	1.58	14.08	792.60	-73
14.696	2.116	-72	91.75	86.0	1032	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	43	0.20	0.25	125.00	11468.75	5101.20	6367.55	1.59	14.17	806.77	-74
14.696	2.116	-73	92.75	87.0	1044	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	43.5	0.20	0.25	125.00	11593.75	5163.60	6430.15	1.61	14.25	821.03	-75
14.696	2.116	-74	93.75	88.0	1056	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	44	0.19	0.25	125.00	11718.75	5226.00	6492.75	1.62	14.34	835.37	-76
14.696	2.116	-75	94.75	89.0	1068	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	44.5	0.18	0.25	125.00	11843.75	5288.40	6555.35	1.64	14.42	849.79	-77
14.696	2.116	-76	95.75	90.0	1080	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	45	0.18	0.25	125.00	11968.75	5350.80	6617.95	1.65	14.51	864.29	-78
14.696	2.116	-77	96.75	91.0	1092	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	45.5	0.17	0.25	125.00	12093.75	5413.20	6680.55	1.67	14.59	878.88	-79
14.696	2.116	-78	97.75	92.0	1104	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	46	0.16	0.25	125.00	12218.75	5475.60	6743.15	1.69	14.67	893.55	-80
14.696	2.116	-79	98.75	93.0	1116	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	46.5	0.16	0.25	125.00	12343.75	5538.00	6805.75	1.70	14.75	908.30	-81
14.696	2.116	-80	99.75	94.0	1128	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	47	0.15	0.25	125.00	12468.75	5600.40	6868.35	1.72	14.83	923.14	-82
14.696	2.116	-81	100.75	95.0	1140	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	47.5	0.14	0.25	125.00	12593.75	5662.80	6930.95	1.73	14.91	938.05	-83
14.696	2.116	-82	101.75	96.0	1152	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	48	0.14	0.25	125.00	12718.75	5725.20	6993.55	1.75	14.99	953.04	-84
14.696	2.116	-83	102.75	97.0	1164	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	48.5	0.13	0.25	125.00	12843.75	5787.60	7056.15	1.76	15.07	968.11	-85
14.696	2.116	-84	103.75	98.0	1176	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	49	0.12	0.25	125.00	12968.75	5850.00	7118.75	1.78	15.15	983.27	-86
14.696	2.116	-85	104.75	99.0	1188	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	49.5	0.12	0.25	125.00	13093.75	5912.40	7181.35	1.80	15.23	998.49	-87
14.696	2.116	-86	105.75	100.0	1200	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	50	0.11	0.25	125.00	13218.75	5974.80	7243.95	1.81	15.31	1013.80	-88
14.696	2.116	-87	106.75	101.0	1212	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	50.5	0.10	0.25	125.00	13343.75	6037.20	7306.55	1.83	15.38	1029.18	-89
14.696	2.116	-88	107.75	102.0	1224	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	51	0.10	0.25	125.00	13468.75	6099.60	7369.15	1.84	15.46	1044.64	-90
14.696	2.116	-89	108.75	103.0	1236	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	51.5	0.09	0.25	125.00	13593.75	6162.00	7431.75	1.86	15.54	1060.18	-91
14.696	2.116	-90	109.75	104.0	1248	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	52	0.08	0.25	125.00	13718.75	6224.40	7494.35	1.87	15.61	1075.79	-92
14.696	2.116	-91	110.75	105.0	1260	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	52.5	0.08	0.25	125.00	13843.75	6286.80	7556.95	1.89	15.68	1091.47	-93
14.696	2.116	-92	111.75	106.0	1272	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	53	0.07	0.25	125.00	13968.75	6349.20	7619.55	1.90	15.76	1107.23	-94
14.696	2.116	-93	112.75	107.0	1284	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	53.5	0.06	0.25	125.00	14093.75	6411.60	7682.15	1.92	15.83	1123.07	-95
14.696	2.116	-94	113.75	108.0	1296	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	54	0.06	0.25	125.00	14218.75	6474.00	7744.75	1.94	15.90	1138.97	-96
14.696	2.116	-95	114.75	109.0	1308	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	54.5	0.05	0.25	125.00	14343.75	6536.40	7807.35	1.95	15.98	1154.95	-97
14.696	2.116	-96	115.75	110.0	1320	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	55	0.04	0.25	125.00	14468.75	6598.80	7869.95	1.97	16.05	1171.00	-98
14.696	2.116	-97	116.75	111.0	1332	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	55.5	0.04	0.25	125.00	14593.75	6661.20	7932.55	1.98	16.12	1187.12	-99
14.696	2.116	-98	117.75	112.0	1344	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	56	0.03	0.25	125.00	14718.75	6723.60	7995.15	2.00	16.19	1203.31	-100
14.696	2.116	-99	118.75	113.0	1356	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	56.5	0.03	0.25	125.00	14843.75	6786.00	8057.75	2.01	16.26	1219.57	-101
14.696	2.116	-100	119.75	114.0	1368	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	57	0.02	0.25	125.00	14968.75	6848.40	8120.35	2.03	16.33	1235.89	-102
14.696	2.116	-101	120.75	115.0	1380	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	57.5	0.01	0.25	125.00	15093.75	6910.80	8182.95	2.05	16.40	1252.29	-103
14.696	2.116	-102	121.75	116.0	1392	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	58	0.01	0.25	125.00	15218.75	6973.20	8245.55	2.06	16.47	1268.76	-104
14.696	2.116	-103	122.75	117.0	1404	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	58.5	0.00	0.25	125.00	15343.75	7035.60	8308.15	2.08	16.53	1285.29	-105
14.696	2.116	-104	123.75	118.0	1416	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	59	0.00	0.25	125.00	15468.75	7098.00	8370.75	2.09	16.60	1301.89	-106
14.696	2.116	-105	124.75	119.0	1428	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	59.5	-0.01	0.25	125.00	15593.75	7160.40	8433.35	2.11	16.67	1318.56	-107
14.696	2.116	-106	125.75	120.0	1440	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	60	-0.02	0.25	125.00	15718.75	7222.80	8495.95	2.12	16.73	1335.29	-108
14.696	2.116	-107	126.75	121.0	1452	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	60.5	-0.02	0.25	125.00	15843.75	7285.20	8558.55	2.14	16.80	1352.09	-109
14.696	2.116	-108	127.75	122.0	1464	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	61	-0.03	0.25	125.00	15968.75	7347.60	8621.15	2.16	16.86	1368.95	-110
14.696	2.116	-109	128.75	123.0	1476	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	61.5	-0.03	0.25	125.00	16093.75	7410.00	8683.75	2.17	16.93	1385.87	-111
14.696	2.116	-110	129.75	124.0	1488	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	62	-0.04	0.25	125.00	16218.75	7472.40	8746.35	2.19	16.99	1402.86	-112
14.696	2.116	-111	130.75	125.0	1500	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	62.5	-0.05	0.25	125.00	16343.75	7534.80	8808.95	2.20	17.05	1419.91	-113
14.696	2.116	-112	131.75	126.0	1512	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	63	-0.05	0.25	125.00	16468.75	7597.20	8871.55	2.22	17.11	1437.03	-114
14.696	2.116	-113	132.75	127.0	1524	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	63.5	-0.06	0.25	125.00	16593.75	7659.60	8934.15	2.23	17.18	1454.20	-115
14.696	2.116	-114	133.75	128.0	1536	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	64	-0.06	0.25	125.00	16718.75	7722.00	8996.75	2.25	17.24	1471.44	-116
14.696	2.116	-115	134.75	129.0	1548	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	64.5	-0.07	0.25	125.00	16843.75	7784.40	9059.35	2.26	17.30	1488.73	-117
14.696	2.116	-116	135.75	130.0	1560	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	65	-0.08	0.25	125.00	16968.75	7846.80	9121.95	2.28	17.36	1506.09	-118
14.696	2.116	-117	136.75	131.0	1572	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	65.5	-0.08	0.25	125.00	17093.75	7909.20	9184.55	2.30	17.42	1523.51	-119
14.696	2.116	-118	137.75	132.0	1584	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	66	-0.09	0.25	125.00	17218.75	7971.60	9247.15	2.31	17.47	1540.98	-120
14.696	2.116	-119	138.75	133.0	1596	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	66.5	-0.09	0.25	125.00	17343.75	8034.00	9309.75	2.33	17.53	1558.51	-121
14.696	2.116	-120	139.75	134.0	1608	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	67	-0.10	0.25	125.00	17468.75	8096.40	9372.35	2.34	17.59	1576.10	-122
14.696	2.116	-121	140.75	135.0	1620	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	67.5	-0.10	0.25	125.00	17593.75	8158.80	9434.95	2.36	17.65	1593.75	-123
14.696	2.116	-122	141.75	136.0	1632	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	68	-0.11	0.25	125.00	17718.75	8221.20	9497.55	2.37	17.70	1611.45	-124
14.696	2.116	-123	142.75	137.0	1644	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	68.5	-0.12	0.25	125.00	17843.75	8283.60	9560.15	2.39	17.76	1629.21	-125
14.696	2.116	-124	143.75	138.0	1656	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	69	-0.12	0.25	125.00	17968.75	8346.00	9622.75	2.41	17.81	1647.02	-126
14.696	2.116	-125	144.75	139.0	1668	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	69.5	-0.13	0.25	125.00	18093.75	8408.40	9685.35	2.42	17.87	1664.89	-127
14.696	2.116	-126	145.75	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.13	0.25	125.00	18218.75	8470.80	9747.95	2.44	#N/A	#N/A	-128
14.696	2.116	-127	146.75	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.14	0.25	125.00	18343.75	8533.20	9810.55	2.45	#N/A	#N/A	-129

29th AVE. Bent 6

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	22.50
Bottom of footing elevation / Pile top elevation (feet)	15.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-59.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	2.5	feet
	30	inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	15	7.25	0.0	0	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	906.25	0.00	906.25	0.00	0.00	0.00	13
14.696	2.116	14	8.25	1.0	12	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1031.25	0.00	1031.25	0.00	0.00	0.00	12
14.696	2.116	13	9.25	2.0	24	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.73	0.73	125.00	1156.25	0.00	1156.25	0.00	0.00	0.00	11
14.696	2.116	12	10.25	3.0	36	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.71	0.71	125.00	1281.25	0.00	1281.25	0.91	7.99	7.99	10
14.696	2.116	11	11.25	4.0	48	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.70	0.70	125.00	1406.25	0.00	1406.25	0.98	7.78	15.77	9
14.696	2.116	10	12.25	5.0	60	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1531.25	0.00	1531.25	1.05	7.56	23.33	8
14.696	2.116	9	13.25	6.0	72	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1656.25	46.80	1609.45	1.08	7.34	30.67	7
14.696	2.116	8	14.25	7.0	84	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.66	0.66	125.00	1781.25	109.20	1672.05	1.10	7.13	37.80	6
14.696	2.116	7	15.25	8.0	96	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.65	0.65	125.00	1906.25	171.60	1734.65	1.12	6.91	44.71	5
14.696	2.116	6	16.25	9.0	108	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	2031.25	234.00	1797.25	1.14	6.70	51.40	4
14.696	2.116	5	17.25	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2156.25	296.40	1859.85	1.16	6.48	57.88	3
14.696	2.116	4	18.25	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2281.25	358.80	1922.45	1.18	6.48	64.36	2
14.696	2.116	3	19.25	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2406.25	421.20	1985.05	1.20	6.48	70.84	1
14.696	2.116	2	20.25	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2531.25	483.60	2047.65	1.22	6.48	77.32	0
14.696	2.116	1	21.25	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2656.25	546.00	2110.25	1.23	6.48	83.80	-1
14.696	2.116	0	22.25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2781.25	608.40	2172.85	1.25	6.48	90.28	-2
14.696	2.116	-1	23.25	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2906.25	670.80	2235.45	1.26	6.48	96.76	-3
14.696	2.116	-2	24.25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3031.25	733.20	2298.05	1.28	6.48	103.24	-4
14.696	2.116	-3	25.25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3156.25	795.60	2360.65	1.29	6.48	109.72	-5
14.696	2.116	-4	26.25	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3281.25	858.00	2423.25	1.30	6.48	116.20	-6
14.696	2.116	-5	27.25	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3406.25	920.40	2485.85	1.32	6.48	122.68	-7
14.696	2.116	-6	28.25	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.55	0.55	125.00	3531.25	982.80	2548.45	1.39	6.48	129.16	-8
14.696	2.116	-7	29.25	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.56	0.56	125.00	3656.25	1045.20	2611.05	1.47	6.48	135.64	-9
14.696	2.116	-8	30.25	23.0	276	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	11.5	0.58	0.58	125.00	3781.25	1107.60	2673.65	1.55	6.56	142.20	-10
14.696	2.116	-9	31.25	24.0	288	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	12	0.60	0.60	125.00	3906.25	1170.00	2736.25	1.63	6.68	148.89	-11
14.696	2.116	-10	32.25	25.0	300	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	12.5	0.61	0.61	125.00	4031.25	1232.40	2798.85	1.71	6.81	155.69	-12
14.696	2.116	-11	33.25	26.0	312	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	13	0.62	0.62	125.00	4156.25	1294.80	2861.45	1.79	6.93	162.62	-13
14.696	2.116	-12	34.25	27.0	324	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	13.5	0.64	0.64	125.00	4281.25	1357.20	2924.05	1.86	7.05	169.67	-14
14.696	2.116	-13	35.25	28.0	336	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	14	0.65	0.65	125.00	4406.25	1419.60	2986.65	1.94	7.17	176.84	-15
14.696	2.116	-14	36.25	29.0	348	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	14.5	0.66	0.66	125.00	4531.25	1482.00	3049.25	2.02	7.29	184.13	-16
14.696	2.116	-15	37.25	30.0	360	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	15	0.67	0.67	125.00	4656.25	1544.40	3111.85	2.10	7.41	191.55	-17
14.696	2.116	-16	38.25	31.0	372	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	15.5	0.66	0.66	125.00	4781.25	1606.80	3174.45	2.11	7.54	199.08	-18
14.696	2.116	-17	39.25	32.0	384	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	16	0.65	0.65	125.00	4906.25	1669.20	3237.05	2.11	7.66	206.74	-19
14.696	2.116	-18	40.25	33.0	396	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	16.5	0.64	0.64	125.00	5031.25	1731.60	3299.65	2.12	7.78	214.52	-20
14.696	2.116	-19	41.25	34.0	408	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	17	0.63	0.63	125.00	5156.25	1794.00	3362.25	2.12	7.90	222.42	-21
14.696	2.116	-20	42.25	35.0	420	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	17.5	0.62	0.62	125.00	5281.25	1856.40	3424.85	2.13	8.02	230.45	-22
14.696	2.116	-21	43.25	36.0	432	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	18	0.61	0.61	125.00	5406.25	1918.80	3487.45	2.13	8.14	238.59	-23
14.696	2.116	-22	44.25	37.0	444	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	18.5	0.60	0.60	125.00	5531.25	1981.20	3550.05	2.13	8.27	246.86	-24
14.696	2.116	-23	45.25	38.0	456	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	19	0.59	0.59	125.00	5656.25	2043.60	3612.65	2.13	8.39	255.25	-25
14.696	2.116	-24	46.25	39.0	468	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	19.5	0.58	0.58	125.00	5781.25	2106.00	3675.25	2.13	8.51	263.76	-26
14.696	2.116	-25	47.25	40.0	480	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	20	0.57	0.57	125.00	5906.25	2168.40	3737.85	2.13	8.63	272.39	-27
14.696	2.116	-26	48.25	41.0	492	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	20.5	0.56	0.56	125.00	6031.25	2230.80	3800.45	2.13	8.75	281.14	-28
14.696	2.116	-27	49.25	42.0	504	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	21	0.55	0.55	125.00	6156.25	2293.20	3863.05	2.13	8.87	290.02	-29
14.696	2.116	-28	50.25	43.0	516	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	21.5	0.54	0.54	125.00	6281.25	2355.60	3925.65	2.12	9.00	299.01	-30
14.696	2.116	-29	51.25	44.0	528	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	22	0.53	0.53	125.00	6406.25	2418.00	3988.25	2.12	9.12	308.13	-31
14.696	2.116	-30	52.25	45.0	540	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	22.5	0.52	0.52	125.00	6531.25	2480.40	4050.85	2.12	9.24	317.37	-32
14.696	2.116	-31	53.25	46.0	552	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	23	0.51	0.51	125.00	6656.25	2542.80	4113.45	2.11	9.36	326.73	-33
14.696	2.116	-32	54.25	47.0	564	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	23.5	0.50	0.50	125.00	6781.25	2605.20	4176.05	2.10	9.48	336.22	-34
14.696	2.116	-33	55.25	48.0	576	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	24	0.49	0.49	125.00	6906.25	2667.60	4238.65	2.10	9.61	345.82	-35
14.696	2.116	-34	56.25	49.0	588	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	24.5	0.49	0.49	125.00	7031.25	2730.00	4301.25	2.09	9.73	355.55	-36
14.696	2.116	-35	57.25	50.0	600	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	25	0.48	0.48	125.00	7156.25	2792.40	4363.85	2.08	9.85	365.40	-37
14.696	2.116	-36	58.25	51.0	612	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	25.5	0.47	0.47	125.00	7281.25	2854.80	4426.45	2.07	9.97	375.37	-38
14.696	2.116	-37	59.25	52.0	624	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	26	0.46	0.46	125.00	7406.25	2917.20	4489.05	2.06	10.09	385.46	-39
14.696	2.116	-38	60.25	53.0	636	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	26.5	0.45	0.45	125.00	7531.25	2979.60	4551.65	2.05	10.21	395.67	-40
14.696	2.116	-39	61.25	54.0	648	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27	0.44	0.44	125.00	7656.25	3042.00	4614.25	2.04	10.34	406.01	-41
14.696	2.116	-40	62.25	55.0	660	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	27.5	0.43	0.43	125.00	7781.25	3104.40	4676.85	2.02	10.46	416.46	-42
14.696	2.116	-41	63.25	56.0	672	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	28	0.42	0.42	125.00	7906.25	3166.80	4739.45	2.01	10.58	427.04	-43
14.696	2.116	-42	64.25	57.0	684	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	28.5	0.42	0.42	125.00	8031.25	3229.20	4802.05	2.00	10.70	437.74	-44
14.696	2.116	-43	65.25	58.0	696	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	29	0.41	0.41	125.00	8156.25	3291.60	4864.65	1.98	10.82	448.56	-45
14.696	2.116	-44	66.25	59.0	708	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	29.5	0.40	0.40	125.00	8281.25	3354.00	4927.25	1.97	10.94	459.51	-46
14.696	2.116	-45	67.25	60.0	720	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	30	0.39	0.39	125.00	8406.25	3416.40	4989.85	1.95	11.07	470.57	-47
14.696	2.116	-46	68.25	61.0	732	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	30.5	0.38	0.38	125.00	8531.25	3478.80	5052.45	1.93	11.19	481.76	-48
14.696	2.116	-47	69.25	62.0	744	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	31	0.37	0.37	125.00	8656.25	3541.20	5115.05	1.92	11.31	493.07	-49
14.696	2.116	-48	70.25	63.0	756	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	31.5	0.37	0.37	125.00	8781.25	3603.60	5177.65	1.90	11.43	504.50	-50
14.696	2.116	-49	71.25	64.0	768	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	32	0.36	0.36	125.00	8906.25	3666.00	5240.25	1.88	11.55	516.05	-51
14.696	2.116	-50	72.25	65.0	780	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	32.5	0.35	0.35	125.00	9031.25	3728.40	5302.85	1.86	11.67	527.72	-52
14.696	2.116	-51	73.25	66.0	792	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	33	0.34	0.34	125.00	9156.25	3790.80	5365.45	1.84	11.80	539.52	-53
14.696	2.116	-52	74.25	67.0	804	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	33.5	0.33	0.33	125.00	9281.25	3853.20	5428.05	1.82	11.92	551.44	-54
14.696	2.116	-53	75.25	68.0	816	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	34	0.33	0.33	125.00	9406.25	3915.60	5490.65	1.79	12.04	563.47	-55
14.696	2.116	-54	76.25	69.0	828	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	34.5	0.32	0.32	125.00	9531.25	3978.00	5553.25	1.77	12.16	575.63	-56
14.696	2.116	-55	77.25	70.0	840	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	35	0.31	0.31	125.00	9656.25	4040.40	5615.85	1.75	12.28	587.92	-57
14.696	2.116	-56	78.25	71.0	852	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	35.5	0.30	0.30	125.00	9781.25	4102.80	5678.45	1.72	12.40	600.32	-58
14.696	2.116	-57	79.25	72.0	864	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	36	0.30	0.30	125.00	9906.25	4165.20	5741.05	1.70	12.53	612.85	-59
14.696	2.116	-58	80.25	73.0	876	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	36.5	0.29	0.29	125.00	10031.25	4227.60	5803.65	1.67	12.65	625.49	-60
14.696	2.116	-59	81.25	74.0	888	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	37	0.28	0.28	125.00	10156.25	4290.00	5866.25	1.65	12.77	638.26	-61
14.696	2.116	-60	82.25	75.0	900	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	37.5	0.27	0.27	125.00	10281.25	4352.40	5928.85	1.62	12.89	651.15	-62
14.696	2.116	-61	83.25	76.0	912	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	38	0.27	0.27	125.00	10406.25	4414.80	5991.45	1.59	13.01	664.16	-63
14.696	2.116	-62	84.25	77.0	924	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	38.5	0.26	0.26	125.00	10531.25	4477.20	6054.05	1.56	13.13	677.30	-64
14.696	2.116	-63	85.25	78.0	936	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	39	0.25	0.25	125.00	10656.25	4539.60	6116.65	1.54	13.26	690.55	-65
14.696	2.116	-64	86.25	79.0	948	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	39.5	0.24	0.25	125.00	10781.25	4602.00	6179.25	1.54	13.38	703.93	-66
14.696	2.116	-65	87.25	80.0	960	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	40	0.24	0.25	125.00	10906.25	4664.40	6241.85	1.56	13.50	717.43	-67
14.696	2.116	-66	88.25	81.0	972	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	40.5	0.23	0.25	125.00	11031.25	4726.80	6304.45	1.58	13.62	731.05	-68
14.696	2.116	-67	89.25	82.0	984	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	41	0.22	0.25	125.00	11156.25	4789.20	6367.05	1.59	13.73	744.79	-69
14.696	2.116	-68	90.25	83.0	996	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	41.5	0.22	0.25	125.00	11281.25	4851.60	6429.65	1.61	13.82	758.61	-70
14.696	2.116	-69	91.25	84.0	1008	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	42	0.21	0.25	125.00	11406.25	4914.00	6492.25	1.62	13.91	772.52	-71
14.696	2.116	-70	92.25	85.0	1020	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	42.5	0.20	0.25	125.00	11531.25	4976.40	6554.85	1.64	14.00	786.51	-72
14.696	2.116	-71	93.25	86.0	1032	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	43	0.19	0.25	125.00	11656.25	5038.80	6617.45	1.65	14.08	800.60	-73
14.696	2.116	-72	94.25	87.0	1044	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	43.5	0.19	0.25	125.00	11781.25	5101.20	6680.05	1.67	14.17	814.76	-74
14.696	2.116	-73	95.25	88.0	1056	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	44	0.18	0.25	125.00	11906.25	5163.60	6742.65	1.69	14.25	829.02	-75
14.696	2.116	-74	96.25	89.0	1068	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	44.5	0.17	0.25	125.00	12031.25	5226.00	6805.25	1.70	14.34	843.36	-76
14.696	2.116	-75	97.25	90.0	1080	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	45	0.17	0.25	125.00	12156.25	5288.40	6867.85	1.72	14.42	857.78	-77
14.696	2.116	-76	98.25	91.0	1092	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	45.5	0.16	0.25	125.00	12281.25	5350.80	6930.45	1.73	14.51	872.28	-78
14.696	2.116	-77	99.25	92.0	1104	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	46	0.15	0.25	125.00	12406.25	5413.20	6993.05	1.75	14.59	886.87	-79
14.696	2.116	-78	100.25	93.0	1116	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	46.5	0.15	0.25	125.00	12531.25	5475.60	7055.65	1.76	14.67	901.54	-80
14.696	2.116	-79	101.25	94.0	1128	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	47	0.14	0.25	125.00	12656.25	5538.00	7118.25	1.78	14.75	916.29	-81
14.696	2.116	-80	102.25	95.0	1140	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	47.5	0.13	0.25	125.00	12781.25	5600.40	7180.85	1.80	14.83	931.13	-82
14.696	2.116	-81	103.25	96.0	1152	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	48	0.13	0.25	125.00	12906.25	5662.80	7243.45	1.81	14.91	946.04	-83
14.696	2.116	-82	104.25	97.0	1164	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	48.5	0.12	0.25	125.00	13031.25	5725.20	7306.05	1.83	14.99	961.03	-84
14.696	2.116	-83	105.25	98.0	1176	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	49	0.11	0.25	125.00	13156.25	5787.60	7368.65	1.84	15.07	976.11	-85
14.696	2.116	-84	106.25	99.0	1188	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	49.5	0.11	0.25	125.00	13281.25	5850.00	7431.25	1.86	15.15	991.26	-86
14.696	2.116	-85	107.25	100.0	1200	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	50	0.10	0.25	125.00	13406.25	5912.40	7493.85	1.87	15.23	1006.49	-87
14.696	2.116	-86	108.25	101.0	1212	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	50.5	0.09	0.25	125.00	13531.25	5974.80	7556.45	1.89	15.31	1021.79	-88
14.696	2.116	-87	109.25	102.0	1224	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	51	0.09	0.25	125.00	13656.25	6037.20	7619.05	1.90	15.38	1037.18	-89
14.696	2.116	-88	110.25	103.0	1236	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	51.5	0.08	0.25	125.00	13781.25	6099.60	7681.65	1.92	15.46	1052.64	-90
14.696	2.116	-89	111.25	104.0	1248	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	52	0.07	0.25	125.00	13906.25	6162.00	7744.25	1.94	15.54	1068.17	-91
14.696	2.116	-90	112.25	105.0	1260	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	52.5	0.07	0.25	125.00	14031.25	6224.40	7806.85	1.95	15.61	1083.78	-92
14.696	2.116	-91	113.25	106.0	1272	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	53	0.06	0.25	125.00	14156.25	6286.80	7869.45	1.97	15.68	1099.47	-93
14.696	2.116	-92	114.25	107.0	1284	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	53.5	0.05	0.25	125.00	14281.25	6349.20	7932.05	1.98	15.76	1115.22	-94
14.696	2.116	-93	115.25	108.0	1296	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	54	0.05	0.25	125.00	14406.25	6411.60	7994.65	2.00	15.83	1131.06	-95
14.696	2.116	-94	116.25	109.0	1308	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	54.5	0.04	0.25	125.00	14531.25	6474.00	8057.25	2.01	15.90	1146.96	-96
14.696	2.116	-95	117.25	110.0	1320	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	55	0.04	0.25	125.00	14656.25	6536.40	8119.85	2.03	15.98	1162.94	-97
14.696	2.116	-96	118.25	111.0	1332	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	55.5	0.03	0.25	125.00	14781.25	6598.80	8182.45	2.05	16.05	1178.99	-98
14.696	2.116	-97	119.25	112.0	1344	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	56	0.02	0.25	125.00	14906.25	6661.20	8245.05	2.06	16.12	1195.11	-99
14.696	2.116	-98	120.25	113.0	1356	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	56.5	0.02	0.25	125.00	15031.25	6723.60	8307.65	2.08	16.19	1211.30	-100
14.696	2.116	-99	121.25	114.0	1368	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	57	0.01	0.25	125.00	15156.25	6786.00	8370.25	2.09	16.26	1227.56	-101
14.696	2.116	-100	122.25	115.0	1380	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	57.5	0.00	0.25	125.00	15281.25	6848.40	8432.85	2.11	16.33	1243.89	-102
14.696	2.116	-101	123.25	116.0	1392	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	58	0.00	0.25	125.00	15406.25	6910.80	8495.45	2.12	16.40	1260.28	-103
14.696	2.116	-102	124.25	117.0	1404	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	58.5	-0.01	0.25	125.00	15531.25	6973.20	8558.05	2.14	16.47	1276.75	-104
14.696	2.116	-103	125.25	118.0	1416	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	59	-0.01	0.25	125.00	15656.25	7035.60	8620.65	2.16	16.53	1293.28	-105
14.696	2.116	-104	126.25	119.0	1428	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	59.5	-0.02	0.25	125.00	15781.25	7098.00	8683.25	2.17	16.60	1309.88	-106
14.696	2.116	-105	127.25	120.0	1440	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	60	-0.03	0.25	125.00	15906.25	7160.40	8745.85	2.19	16.67	1326.55	-107
14.696	2.116	-106	128.25	121.0	1452	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	60.5	-0.03	0.25	125.00	16031.25	7222.80	8808.45	2.20	16.73	1343.28	-108
14.696	2.116	-107	129.25	122.0	1464	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	61	-0.04	0.25	125.00	16156.25	7285.20	8871.05	2.22	16.80	1360.08	-109
14.696	2.116	-108	130.25	123.0	1476	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	61.5	-0.04	0.25	125.00	16281.25	7347.60	8933.65	2.23	16.86	1376.94	-110
14.696	2.116	-109	131.25	124.0	1488	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	62	-0.05	0.25	125.00	16406.25	7410.00	8996.25	2.25	16.93	1393.86	-111
14.696	2.116	-110	132.25	125.0	1500	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	62.5	-0.06	0.25	125.00	16531.25	7472.40	9058.85	2.26	16.99	1410.85	-112
14.696	2.116	-111	133.25	126.0	1512	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	63	-0.06	0.25	125.00	16656.25	7534.80	9121.45	2.28	17.05	1427.90	-113
14.696	2.116	-112	134.25	127.0	1524	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	63.5	-0.07	0.25	125.00	16781.25	7597.20	9184.05	2.30	17.11	1445.02	-114
14.696	2.116	-113	135.25	128.0	1536	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	64	-0.07	0.25	125.00	16906.25	7659.60	9246.65	2.31	17.18	1462.19	-115
14.696	2.116	-114	136.25	129.0	1548	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	64.5	-0.08	0.25	125.00	17031.25	7722.00	9309.25	2.33	17.24	1479.43	-116
14.696	2.116	-115	137.25	130.0	1560	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	65	-0.08	0.25	125.00	17156.25	7784.40	9371.85	2.34	17.30	1496.72	-117
14.696	2.116	-116	138.25	131.0	1572	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	65.5	-0.09	0.25	125.00	17281.25	7846.80	9434.45	2.36	17.36	1514.08	-118
14.696	2.116	-117	139.25	132.0	1584	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	66	-0.10	0.25	125.00	17406.25	7909.20	9497.05	2.37	17.42	1531.50	-119
14.696	2.116	-118	140.25	133.0	1596	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	66.5	-0.10	0.25	125.00	17531.25	7971.60	9559.65	2.39	17.47	1548.97	-120
14.696	2.116	-119	141.25	134.0	1608	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	67	-0.11	0.25	125.00	17656.25	8034.00	9622.25	2.41	17.53	1566.50	-121
14.696	2.116	-120	142.25	135.0	1620	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	67.5	-0.11	0.25	125.00	17781.25	8096.40	9684.85	2.42	17.59	1584.09	-122
14.696	2.116	-121	143.25	136.0	1632	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	68	-0.12	0.25	125.00	17906.25	8158.80	9747.45	2.44	17.65	1601.74	-123
14.696	2.116	-122	144.25	137.0	1644	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	68.5	-0.12	0.25	125.00	18031.25	8221.20	9810.05	2.45	17.70	1619.44	-124
14.696	2.116	-123	145.25	138.0	1656	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	69	-0.13	0.25	125.00	18156.25	8283.60	9872.65	2.47	17.76	1637.20	-125
14.696	2.116	-124	146.25	139.0	1668	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	69.5	-0.14	0.25	125.00	18281.25	8346.00	9935.25	2.48	17.81	1655.01	-126
14.696	2.116	-125	147.25	140.0	1680	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	70	-0.14	0.25	125.00	18406.25	8408.40	9997.85	2.50	17.87	1672.88	-127
14.696	2.116	-126	148.25	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.15	0.25	125.00	18531.25	8470.80	10060.45	2.52	#N/A	#N/A	-128

29th AVE. Bent 7

Note: Required pile length: Add 1D to length (Column E)

9th AVE. Bent 7

Ground surface elevation/Top of soil elevation (feet)	24.50
Bottom of footing elevation / Pile top elevation (feet)	11.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-63.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.5 feet
30 inches

											Cohesive Soil						Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	11	13.25	0.0	0	1.80	12.50	0.851	0	0.55	0.00	0.000	0.00	10	0.67	0.67	125.00	1656.25	0.00	1656.25	0.00	0.00	0.00	9
14.696	2.116	10	14.25	1.0	12	1.75	12.15	0.827	0	0.55	0.00	0.000	0.00	10	0.66	0.66	125.00	1781.25	0.00	1781.25	0.00	0.00	0.00	8
14.696	2.116	9	15.25	2.0	24	1.70	11.81	0.803	0	0.55	0.00	0.000	0.00	10	0.65	0.65	125.00	1906.25	46.80	1859.45	0.00	0.00	0.00	7
14.696	2.116	8	16.25	3.0	36	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.64	0.64	125.00	2031.25	109.20	1922.05	1.22	7.13	7.13	6
14.696	2.116	7	17.25	4.0	48	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.63	0.63	125.00	2156.25	171.60	1984.65	1.24	6.91	14.04	5
14.696	2.116	6	18.25	5.0	60	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.61	0.61	125.00	2281.25	234.00	2047.25	1.26	6.70	20.73	4
14.696	2.116	5	19.25	6.0	72	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2406.25	296.40	2109.85	1.28	6.48	27.21	3
14.696	2.116	4	20.25	7.0	84	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2531.25	358.80	2172.45	1.29	6.48	33.69	2
14.696	2.116	3	21.25	8.0	96	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2656.25	421.20	2235.05	1.31	6.48	40.17	1
14.696	2.116	2	22.25	9.0	108	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2781.25	483.60	2297.65	1.32	6.48	46.65	0
14.696	2.116	1	23.25	10.0	120	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2906.25	546.00	2360.25	1.33	6.48	53.13	-1
14.696	2.116	0	24.25	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3031.25	608.40	2422.85	1.35	6.48	59.61	-2
14.696	2.116	-1	25.25	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3156.25	670.80	2485.45	1.36	6.48	66.09	-3
14.696	2.116	-2	26.25	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3281.25	733.20	2548.05	1.37	6.48	72.57	-4
14.696	2.116	-3	27.25	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3406.25	795.60	2610.65	1.38	6.48	79.05	-5
14.696	2.116	-4	28.25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3531.25	858.00	2673.25	1.39	6.48	85.53	-6
14.696	2.116	-5	29.25	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3656.25	920.40	2735.85	1.40	6.48	92.01	-7
14.696	2.116	-6	30.25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.50	0.50	125.00	3781.25	982.80	2798.45	1.41	6.48	98.49	-8
14.696	2.116	-7	31.25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.50	0.50	125.00	3906.25	1045.20	2861.05	1.42	6.48	104.97	-9
14.696	2.116	-8	32.25	19.0	228	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	10	0.49	0.49	125.00	4031.25	1107.60	2923.65	1.43	6.56	111.53	-10
14.696	2.116	-9	33.25	20.0	240	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	10	0.48	0.48	125.00	4156.25	1170.00	2986.25	1.43	6.68	118.22	-11
14.696	2.116	-10	34.25	21.0	252	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	10.5	0.50	0.50	125.00	4281.25	1232.40	3048.85	1.51	6.81	125.02	-12
14.696	2.116	-11	35.25	22.0	264	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	11	0.51	0.51	125.00	4406.25	1294.80	3111.45	1.59	6.93	131.95	-13
14.696	2.116	-12	36.25	23.0	276	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	11.5	0.53	0.53	125.00	4531.25	1357.20	3174.05	1.67	7.05	139.00	-14
14.696	2.116	-13	37.25	24.0	288	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	12	0.54	0.54	125.00	4656.25	1419.60	3236.65	1.75	7.17	146.17	-15
14.696	2.116	-14	38.25	25.0	300	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	12.5	0.55	0.55	125.00	4781.25	1482.00	3299.25	1.82	7.29	153.46	-16
14.696	2.116	-15	39.25	26.0	312	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	13	0.57	0.57	125.00	4906.25	1544.40	3361.85	1.90	7.41	160.88	-17
14.696	2.116	-16	40.25	27.0	324	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	13.5	0.58	0.58	125.00	5031.25	1606.80	3424.45	1.98	7.54	168.41	-18
14.696	2.116	-17	41.25	28.0	336	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	14	0.59	0.59	125.00	5156.25	1669.20	3487.05	2.05	7.66	176.07	-19
14.696	2.116	-18	42.25	29.0	348	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	14.5	0.60	0.60	125.00	5281.25	1731.60	3549.65	2.13	7.78	183.85	-20
14.696	2.116	-19	43.25	30.0	360	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	15	0.61	0.61	125.00	5406.25	1794.00	3612.25	2.21	7.90	191.75	-21
14.696	2.116	-20	44.25	31.0	372	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	15.5	0.60	0.60	125.00	5531.25	1856.40	3674.85	2.21	8.02	199.78	-22
14.696	2.116	-21	45.25	32.0	384	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	16	0.59	0.59	125.00	5656.25	1918.80	3737.45	2.21	8.14	207.92	-23
14.696	2.116	-22	46.25	33.0	396	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	16.5	0.58	0.58	125.00	5781.25	1981.20	3800.05	2.20	8.27	216.19	-24
14.696	2.116	-23	47.25	34.0	408	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	17	0.57	0.57	125.00	5906.25	2043.60	3862.65	2.20	8.39	224.58	-25
14.696	2.116	-24	48.25	35.0	420	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	17.5	0.56	0.56	125.00	6031.25	2106.00	3925.25	2.20	8.51	233.09	-26
14.696	2.116	-25	49.25	36.0	432	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	18	0.55	0.55	125.00	6156.25	2168.40	3987.85	2.20	8.63	241.72	-27
14.696	2.116	-26	50.25	37.0	444	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	18.5	0.54	0.54	125.00	6281.25	2230.80	4050.45	2.19	8.75	250.47	-28
14.696	2.116	-27	51.25	38.0	456	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	19	0.53	0.53	125.00	6406.25	2293.20	4113.05	2.19	8.87	259.35	-29
14.696	2.116	-28	52.25	39.0	468	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	19.5	0.52	0.52	125.00	6531.25	2355.60	4175.65	2.18	9.00	268.34	-30
14.696	2.116	-29	53.25	40.0	480	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	20	0.51	0.51	125.00	6656.25	2418.00	4238.25	2.17	9.12	277.46	-31
14.696	2.116	-30	54.25	41.0	492	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	20.5	0.50	0.50	125.00	6781.25	2480.40	4300.85	2.17	9.24	286.70	-32
14.696	2.116	-31	55.25	42.0	504	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	21	0.49	0.49	125.00	6906.25	2542.80	4363.45	2.16	9.36	296.06	-33
14.696	2.116	-32	56.25	43.0	516	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	21.5	0.49	0.49	125.00	7031.25	2605.20	4426.05	2.15	9.48	305.55	-34
14.696	2.116	-33	57.25	44.0	528	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	22	0.48	0.48	125.00	7156.25	2667.60	4488.65	2.14	9.61	315.15	-35
14.696	2.116	-34	58.25	45.0	540	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	22.5	0.47	0.47	125.00	7281.25	2730.00	4551.25	2.13	9.73	324.88	-36
14.696	2.116	-35	59.25	46.0	552	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	23	0.46	0.46	125.00	7406.25	2792.40	4613.85	2.12	9.85	334.73	-37
14.696	2.116	-36	60.25	47.0	564	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	23.5	0.45	0.45	125.00	7531.25	2854.80	4676.45	2.10	9.97	344.70	-38
14.696	2.116	-37	61.25	48.0	576	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	24	0.44	0.44	125.00	7656.25	2917.20	4739.05	2.09	10.09	354.79	-39
14.696	2.116	-38	62.25	49.0	588	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	24.5	0.43	0.43	125.00	7781.25	2979.60	4801.65	2.08	10.21	365.00	-40
14.696	2.116	-39	63.25	50.0	600	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	25	0.42	0.42	125.00	7906.25	3042.00	4864.25	2.06	10.34	375.34	-41
14.696	2.116	-40	64.25	51.0	612	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	25.5	0.42	0.42	125.00	8031.25	3104.40	4926.85	2.05	10.46	385.79	-42
14.696	2.116	-41	65.25	52.0	624	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	26	0.41	0.41	125.00	8156.25	3166.80	4989.45	2.03	10.58	396.37	-43
14.696	2.116	-42	66.25	53.0	636	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	26.5	0.40	0.40	125.00	8281.25	3229.20	5052.05	2.02	10.70	407.07	-44
14.696	2.116	-43	67.25	54.0	648	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	27	0.39	0.39	125.00	8406.25	3291.60	5114.65	2.00	10.82	417.89	-45
14.696	2.116	-44	68.25	55.0	660	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	27.5	0.38	0.38	125.00	8531.25	3354.00	5177.25	1.98	10.94	428.84	-46
14.696	2.116	-45	69.25	56.0	672	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	28	0.37	0.37	125.00	8656.25	3416.40	5239.85	1.96	11.07	439.90	-47
14.696	2.116	-46	70.25	57.0	684	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	28.5	0.37	0.37	125.00	8781.25	3478.80	5302.45	1.94	11.19	451.09	-48
14.696	2.116	-47	71.25	58.0	696	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	29	0.36	0.36	125.00	8906.25	3541.20	5365.05	1.92	11.31	462.40	-49
14.696	2.116	-48	72.25	59.0	708	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	29.5	0.35	0.35	125.00	9031.25	3603.60	5427.65	1.90	11.43	473.83	-50
14.696	2.116	-49	73.25	60.0	720	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	30	0.34	0.34	125.00	9156.25	3666.00	5490.25	1.88	11.55	485.38	-51
14.696	2.116	-50	74.25	61.0	732	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	30.5	0.33	0.33	125.00	9281.25	3728.40	5552.85	1.86	11.67	497.05	-52
14.696	2.116	-51	75.25	62.0	744	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	31	0.33	0.33	125.00	9406.25	3790.80	5615.45	1.83	11.80	508.85	-53
14.696	2.116	-52	76.25	63.0	756	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	31.5	0.32	0.32	125.00	9531.25	3853.20	5678.05	1.81	11.92	520.77	-54
14.696	2.116	-53	77.25	64.0	768	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	32	0.31	0.31	125.00	9656.25	3915.60	5740.65	1.79	12.04	532.80	-55
14.696	2.116	-54	78.25	65.0	780	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	32.5	0.30	0.30	125.00	9781.25	3978.00	5803.25	1.76	12.16	544.97	-56
14.696	2.116	-55	79.25	66.0	792	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	33	0.30	0.30	125.00	9906.25	4040.40	5865.85	1.74	12.28	557.25	-57
14.696	2.116	-56	80.25	67.0	804	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	33.5	0.29	0.29	125.00	10031.25	4102.80	5928.45	1.71	12.40	569.65	-58
14.696	2.116	-57	81.25	68.0	816	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	34	0.28	0.28	125.00	10156.25	4165.20	5991.05	1.68	12.53	582.18	-59
14.696	2.116	-58	82.25	69.0	828	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	34.5	0.27	0.27	125.00	10281.25	4227.60	6053.65	1.65	12.65	594.82	-60
14.696	2.116	-59	83.25	70.0	840	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	35	0.27	0.27	125.00	10406.25	4290.00	6116.25	1.63	12.77	607.59	-61
14.696	2.116	-60	84.25	71.0	852	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	35.5	0.26	0.26	125.00	10531.25	4352.40	6178.85	1.60	12.89	620.48	-62
14.696	2.116	-61	85.25	72.0	864	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	36	0.25	0.25	125.00	10656.25	4414.80	6241.45	1.57	13.01	633.50	-63
14.696	2.116	-62	86.25	73.0	876	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	36.5	0.24	0.25	125.00	10781.25	4477.20	6304.05	1.58	13.13	646.63	-64
14.696	2.116	-63	87.25	74.0	888	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	37	0.24	0.25	125.00	10906.25	4539.60	6366.65	1.59	13.26	659.88	-65
14.696	2.116	-64	88.25	75.0	900	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	37.5	0.23	0.25	125.00	11031.25	4602.00	6429.25	1.61	13.38	673.26	-66
14.696	2.116	-65	89.25	76.0	912	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	38	0.22	0.25	125.00	11156.25	4664.40	6491.85	1.62	13.50	686.76	-67
14.696	2.116	-66	90.25	77.0	924	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	38.5	0.22	0.25	125.00	11281.25	4726.80	6554.45	1.64	13.62	700.38	-68
14.696	2.116	-67	91.25	78.0	936	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	39	0.21	0.25	125.00	11406.25	4789.20	6617.05	1.65	13.73	714.12	-69
14.696	2.116	-68	92.25	79.0	948	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	39.5	0.20	0.25	125.00	11531.25	4851.60	6679.65	1.67	13.82	727.94	-70
14.696	2.116	-69	93.25	80.0	960	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	40	0.19	0.25	125.00	11656.25	4914.00	6742.25	1.69	13.91	741.85	-71
14.696	2.116	-70	94.25	81.0	972	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	40.5	0.19	0.25	125.00	11781.25	4976.40	6804.85	1.70	14.00	755.84	-72
14.696	2.116	-71	95.25	82.0	984	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	41	0.18	0.25	125.00	11906.25	5038.80	6867.45	1.72	14.08	769.93	-73
14.696	2.116	-72	96.25	83.0	996	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	41.5	0.17	0.25	125.00	12031.25	5101.20	6930.05	1.73	14.17	784.09	-74
14.696	2.116	-73	97.25	84.0	1008	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	42	0.17	0.25	125.00	12156.25	5163.60	6992.65	1.75	14.25	798.35	-75
14.696	2.116	-74	98.25	85.0	1020	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	42.5	0.16	0.25	125.00	12281.25	5226.00	7055.25	1.76	14.34	812.69	-76
14.696	2.116	-75	99.25	86.0	1032	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	43	0.15	0.25	125.00	12406.25	5288.40	7117.85	1.78	14.42	827.11	-77
14.696	2.116	-76	100.25	87.0	1044	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	43.5	0.15	0.25	125.00	12531.25	5350.80	7180.45	1.80	14.51	841.61	-78
14.696	2.116	-77	101.25	88.0	1056	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	44	0.14	0.25	125.00	12656.25	5413.20	7243.05	1.81	14.59	856.20	-79
14.696	2.116	-78	102.25	89.0	1068	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	44.5	0.13	0.25	125.00	12781.25	5475.60	7305.65	1.83	14.67	870.87	-80
14.696	2.116	-79	103.25	90.0	1080	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	45	0.13	0.25	125.00	12906.25	5538.00	7368.25	1.84	14.75	885.62	-81
14.696	2.116	-80	104.25	91.0	1092	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	45.5	0.12	0.25	125.00	13031.25	5600.40	7430.85	1.86	14.83	900.46	-82
14.696	2.116	-81	105.25	92.0	1104	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	46	0.11	0.25	125.00	13156.25	5662.80	7493.45	1.87	14.91	915.37	-83
14.696	2.116	-82	106.25	93.0	1116	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	46.5	0.11	0.25	125.00	13281.25	5725.20	7556.05	1.89	14.99	930.36	-84
14.696	2.116	-83	107.25	94.0	1128	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	47	0.10	0.25	125.00	13406.25	5787.60	7618.65	1.90	15.07	945.44	-85
14.696	2.116	-84	108.25	95.0	1140	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	47.5	0.09	0.25	125.00	13531.25	5850.00	7681.25	1.92	15.15	960.59	-86
14.696	2.116	-85	109.25	96.0	1152	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	48	0.09	0.25	125.00	13656.25	5912.40	7743.85	1.94	15.23	975.82	-87
14.696	2.116	-86	110.25	97.0	1164	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	48.5	0.08	0.25	125.00	13781.25	5974.80	7806.45	1.95	15.31	991.12	-88
14.696	2.116	-87	111.25	98.0	1176	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	49	0.07	0.25	125.00	13906.25	6037.20	7869.05	1.97	15.38	1006.51	-89
14.696	2.116	-88	112.25	99.0	1188	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	49.5	0.07	0.25	125.00	14031.25	6099.60	7931.65	1.98	15.46	1021.97	-90
14.696	2.116	-89	113.25	100.0	1200	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	50	0.06	0.25	125.00	14156.25	6162.00	7994.25	2.00	15.54	1037.50	-91
14.696	2.116	-90	114.25	101.0	1212	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	50.5	0.05	0.25	125.00	14281.25	6224.40	8056.85	2.01	15.61	1053.11	-92
14.696	2.116	-91	115.25	102.0	1224	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	51	0.05	0.25	125.00	14406.25	6286.80	8119.45	2.03	15.68	1068.80	-93
14.696	2.116	-92	116.25	103.0	1236	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	51.5	0.04	0.25	125.00	14531.25	6349.20	8182.05	2.05	15.76	1084.55	-94
14.696	2.116	-93	117.25	104.0	1248	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	52	0.04	0.25	125.00	14656.25	6411.60	8244.65	2.06	15.83	1100.39	-95
14.696	2.116	-94	118.25	105.0	1260	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	52.5	0.03	0.25	125.00	14781.25	6474.00	8307.25	2.08	15.90	1116.29	-96
14.696	2.116	-95	119.25	106.0	1272	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	53	0.02	0.25	125.00	14906.25	6536.40	8369.85	2.09	15.98	1132.27	-97
14.696	2.116	-96	120.25	107.0	1284	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	53.5	0.02	0.25	125.00	15031.25	6598.80	8432.45	2.11	16.05	1148.32	-98
14.696	2.116	-97	121.25	108.0	1296	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	54	0.01	0.25	125.00	15156.25	6661.20	8495.05	2.12	16.12	1164.44	-99
14.696	2.116	-98	122.25	109.0	1308	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	54.5	0.00	0.25	125.00	15281.25	6723.60	8557.65	2.14	16.19	1180.63	-100
14.696	2.116	-99	123.25	110.0	1320	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	55	0.00	0.25	125.00	15406.25	6786.00	8620.25	2.16	16.26	1196.89	-101
14.696	2.116	-100	124.25	111.0	1332	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	55.5	-0.01	0.25	125.00	15531.25	6848.40	8682.85	2.17	16.33	1213.22	-102
14.696	2.116	-101	125.25	112.0	1344	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	56	-0.01	0.25	125.00	15656.25	6910.80	8745.45	2.19	16.40	1229.61	-103
14.696	2.116	-102	126.25	113.0	1356	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	56.5	-0.02	0.25	125.00	15781.25	6973.20	8808.05	2.20	16.47	1246.08	-104
14.696	2.116	-103	127.25	114.0	1368	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	57	-0.03	0.25	125.00	15906.25	7035.60	8870.65	2.22	16.53	1262.61	-105
14.696	2.116	-104	128.25	115.0	1380	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	57.5	-0.03	0.25	125.00	16031.25	7098.00	8933.25	2.23	16.60	1279.21	-106
14.696	2.116	-105	129.25	116.0	1392	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	58	-0.04	0.25	125.00	16156.25	7160.40	8995.85	2.25	16.67	1295.88	-107
14.696	2.116	-106	130.25	117.0	1404	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	58.5	-0.04	0.25	125.00	16281.25	7222.80	9058.45	2.26	16.73	1312.61	-108
14.696	2.116	-107	131.25	118.0	1416	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	59	-0.05	0.25	125.00	16406.25	7285.20	9121.05	2.28	16.80	1329.41	-109
14.696	2.116	-108	132.25	119.0	1428	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	59.5	-0.06	0.25	125.00	16531.25	7347.60	9183.65	2.30	16.86	1346.27	-110
14.696	2.116	-109	133.25	120.0	1440	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	60	-0.06	0.25	125.00	16656.25	7410.00	9246.25	2.31	16.93	1363.19	-111
14.696	2.116	-110	134.25	121.0	1452	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	60.5	-0.07	0.25	125.00	16781.25	7472.40	9308.85	2.33	16.99	1380.18	-112
14.696	2.116	-111	135.25	122.0	1464	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	61	-0.07	0.25	125.00	16906.25	7534.80	9371.45	2.34	17.05	1397.23	-113
14.696	2.116	-112	136.25	123.0	1476	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	61.5	-0.08	0.25	125.00	17031.25	7597.20	9434.05	2.36	17.11	1414.35	-114
14.696	2.116	-113	137.25	124.0	1488	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	62	-0.08	0.25	125.00	17156.25	7659.60	9496.65	2.37	17.18	1431.52	-115
14.696	2.116	-114	138.25	125.0	1500	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	62.5	-0.09	0.25	125.00	17281.25	7722.00	9559.25	2.39	17.24	1448.76	-116
14.696	2.116	-115	139.25	126.0	1512	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	63	-0.10	0.25	125.00	17406.25	7784.40	9621.85	2.41	17.30	1466.06	-117
14.696	2.116	-116	140.25	127.0	1524	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	63.5	-0.10	0.25	125.00	17531.25	7846.80	9684.45	2.42	17.36	1483.41	-118
14.696	2.116	-117	141.25	128.0	1536	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	64	-0.11	0.25	125.00	17656.25	7909.20	9747.05	2.44	17.42	1500.83	-119
14.696	2.116	-118	142.25	129.0	1548	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	64.5	-0.11	0.25	125.00	17781.25	7971.60	9809.65	2.45	17.47	1518.30	-120
14.696	2.116	-119	143.25	130.0	1560	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	65	-0.12	0.25	125.00	17906.25	8034.00	9872.25	2.47	17.53	1535.83	-121
14.696	2.116	-120	144.25	131.0	1572	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	65.5	-0.12	0.25	125.00	18031.25	8096.40	9934.85	2.48	17.59	1553.42	-122
14.696	2.116	-121	145.25	132.0	1584	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	66	-0.13	0.25	125.00	18156.25	8158.80	9997.45	2.50	17.65	1571.07	-123
14.696	2.116	-122	146.25	133.0	1596	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	66.5	-0.14	0.25	125.00	18281.25	8221.20	10060.05	2.52	17.70	1588.77	-124
14.696	2.116	-123	147.25	134.0	1608	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	67	-0.14	0.25	125.00	18406.25	8283.60	10122.65	2.53	17.76	1606.53	-125
14.696	2.116	-124	148.25	135.0	1620	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	67.5	-0.15	0.25	125.00	18531.25	8346.00	10185.25	2.55	17.81	1624.34	-126
14.696	2.116	-125	149.25	136.0	1632	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	68	-0.15	0.25	125.00	18656.25	8408.40	10247.85	2.56	17.87	1642.21	-127
14.696	2.116	-126	150.25	137.0	1644	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	68.5	-0.16	0.25	125.00	18781.25	8470.80	10310.45	2.58	#N/A	#N/A	-128
14.696	2.116	-127	151.25	138.0	1656	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	69	-0.16	0.25	125.00	18906.25	8533.20	10373.05	2.59	#N/A	#N/A	-129
14.696	2.116	-128	152.25	139.0	1668	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	69.5	-0.17	0.25	125.00	19031.25	8595.60	10435.65	2.61	#N/A	#N/A	-130
14.696	2.116	-129	153.25	140.0	1680	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70	-0.17	0.25	125.00	19156.25	8658.00	10498.25	2.62	#N/A	#N/A	-131
14.696	2.116	-130	154.25	141.0	1692	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	70.5	-0.18	0.25	125.00	19281.25	8720.40	10560.85	2.64	#N/A	#N/A	-132

29th AVE. Abut 8

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	24.50
Bottom of footing elevation / Pile top elevation (feet)	16.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-43.50

steps:
1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

											Cohesive Soil						Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	17	8	0.0	0	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.00	0.00	0.00	15
14.696	2.116	16	9	1.0	12	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.00	0.00	0.00	14
14.696	2.116	15	10	2.0	24	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	6.74	6.74	13
14.696	2.116	14	11	3.0	36	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.70	0.70	125.00	1375.00	0.00	1375.00	0.96	6.57	13.30	12
14.696	2.116	13	12	4.0	48	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.69	0.69	125.00	1500.00	0.00	1500.00	1.03	6.39	19.70	11
14.696	2.116	12	13	5.0	60	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.67	0.67	125.00	1625.00	0.00	1625.00	1.10	6.22	25.92	10
14.696	2.116	11	14	6.0	72	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.66	0.66	125.00	1750.00	0.00	1750.00	1.16	6.05	31.97	9
14.696	2.116	10	15	7.0	84	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.65	0.65	125.00	1875.00	31.20	1843.80	1.20	5.87	37.84	8
14.696	2.116	9	16	8.0	96	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.64	0.64	125.00	2000.00	93.60	1906.40	1.22	5.70	43.54	7
14.696	2.116	8	17	9.0	108	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.63	0.63	125.00	2125.00	156.00	1969.00	1.24	5.53	49.07	6
14.696	2.116	7	18	10.0	120	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.62	0.62	125.00	2250.00	218.40	2031.60	1.25	5.36	54.43	5
14.696	2.116	6	19	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2375.00	280.80	2094.20	1.27	5.18	59.61	4
14.696	2.116	5	20	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2500.00	343.20	2156.80	1.29	5.18	64.80	3
14.696	2.116	4	21	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	405.60	2219.40	1.30	5.18	69.98	2
14.696	2.116	3	22	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	468.00	2282.00	1.32	5.18	75.16	1
14.696	2.116	2	23	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2875.00	530.40	2344.60	1.33	5.18	80.35	-1
14.696	2.116	1	24	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3000.00	592.80	2407.20	1.34	5.18	85.53	-2
14.696	2.116	-1	25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3125.00	655.20	2469.80	1.36	5.18	90.71	-3
14.696	2.116	-2	26	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3250.00	717.60	2532.40	1.37	5.18	95.90	-4
14.696	2.116	-3	27	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3375.00	780.00	2595.00	1.38	5.18	101.08	-5
14.696	2.116	-4	28	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3500.00	842.40	2657.60	1.39	5.18	106.26	-6
14.696	2.116	-5	29	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.54	0.54	125.00	3625.00	904.80	2720.20	1.47	5.18	111.45	-7
14.696	2.116	-6	30	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.56	0.56	125.00	3750.00	967.20	2782.80	1.55	5.18	116.63	-8
14.696	2.116	-7	31	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.57	0.57	125.00	3875.00	1029.60	2845.40	1.63	5.18	121.82	-9
14.696	2.116	-8	32	24.0	288	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12	0.59	0.59	125.00	4000.00	1092.00	2908.00	1.71	5.25	127.07	-10
14.696	2.116	-9	33	25.0	300	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	12.5	0.60	0.60	125.00	4125.00	1154.40	2970.60	1.79	5.35	132.41	-11
14.696	2.116	-10	34	26.0	312	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	13	0.62	0.62	125.00	4250.00	1216.80	3033.20	1.87	5.44	137.86	-12
14.696	2.116	-11	35	27.0	324	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	13.5	0.63	0.63	125.00	4375.00	1279.20	3095.80	1.95	5.54	143.40	-13
14.696	2.116	-12	36	28.0	336	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	14	0.64	0.64	125.00	4500.00	1341.60	3158.40	2.03	5.64	149.04	-14
14.696	2.116	-13	37	29.0	348	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	14.5	0.65	0.65	125.00	4625.00	1404.00	3221.00	2.11	5.74	154.78	-15
14.696	2.116	-14	38	30.0	360	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	15	0.67	0.67	125.00	4750.00	1466.40	3283.60	2.19	5.83	160.61	-16
14.696	2.116	-15	39	31.0	372	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	15.5	0.66	0.66	125.00	4875.00	1528.80	3346.20	2.19	5.93	166.54	-17
14.696	2.116	-16	40	32.0	384	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	16	0.64	0.64	125.00	5000.00	1591.20	3408.80	2.20	6.03	172.57	-18
14.696	2.116	-17	41	33.0	396	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	16.5	0.63	0.63	125.00	5125.00	1653.60	3471.40	2.20	6.13	178.70	-19
14.696	2.116	-18	42	34.0	408	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	17	0.62	0.62	125.00	5250.00	1716.00	3534.00	2.20	6.22	184.92	-20
14.696	2.116	-19	43	35.0	420	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	17.5	0.61	0.61	125.00	5375.00	1778.40	3596.60	2.20	6.32	191.24	-21
14.696	2.116	-20	44	36.0	432	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	18	0.60	0.60	125.00	5500.00	1840.80	3659.20	2.21	6.42	197.66	-22
14.696	2.116	-21	45	37.0	444	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	18.5	0.59	0.59	125.00	5625.00	1903.20	3721.80	2.21	6.52	204.18	-23
14.696	2.116	-22	46	38.0	456	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	19	0.58	0.58	125.00	5750.00	1965.60	3784.40	2.20	6.61	210.79	-24
14.696	2.116	-23	47	39.0	468	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	19.5	0.57	0.57	125.00	5875.00	2028.00	3847.00	2.20	6.71	217.50	-25
14.696	2.116	-24	48	40.0	480	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	20	0.56	0.56	125.00	6000.00	2090.40	3909.60	2.20	6.81	224.31	-26
14.696	2.116	-25	49	41.0	492	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	20.5	0.55	0.55	125.00	6125.00	2152.80	3972.20	2.20	6.91	231.21	-27
14.696	2.116	-26	50	42.0	504	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	21	0.54	0.54	125.00	6250.00	2215.20	4034.80	2.19	7.00	238.22	-28
14.696	2.116	-27	51	43.0	516	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	21.5	0.53	0.53	125.00	6375.00	2277.60	4097.40	2.19	7.10	245.32	-29
14.696	2.116	-28	52	44.0	528	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	22	0.52	0.52	125.00	6500.00	2340.00	4160.00	2.18	7.20	252.51	-30
14.696	2.116	-29	53	45.0	540	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	22.5	0.52	0.52	125.00	6625.00	2402.40	4222.60	2.18	7.29	259.81	-31
14.696	2.116	-30	54	46.0	552	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	23	0.51	0.51	125.00	6750.00	2464.80	4285.20	2.17	7.39	267.20	-32
14.696	2.116	-31	55	47.0	564	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	23.5	0.50	0.50	125.00	6875.00	2527.20	4347.80	2.16	7.49	274.69	-33
14.696	2.116	-32	56	48.0	576	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	24	0.49	0.49	125.00	7000.00	2589.60	4410.40	2.15	7.59	282.28	-34
14.696	2.116	-33	57	49.0	588	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	24.5	0.48	0.48	125.00	7125.00	2652.00	4473.00	2.14	7.68	289.96	-35
14.696	2.116	-34	58	50.0	600	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	25	0.47	0.47	125.00	7250.00	2714.40	4535.60	2.13	7.78	297.74	-36
14.696	2.116	-35	59	51.0	612	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	25.5	0.46	0.46	125.00	7375.00	2776.80	4598.20	2.12	7.88	305.62	-37
14.696	2.116	-36	60	52.0	624	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	26	0.45	0.45	125.00	7500.00	2839.20	4660.80	2.11	7.98	313.60	-38
14.696	2.116	-37	61	53.0	636	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	26.5	0.44	0.44	125.00	7625.00	2901.60	4723.40	2.10	8.07	321.67	-39
14.696	2.116	-38	62	54.0	648	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	27	0.43	0.43	125.00	7750.00	2964.00	4786.00	2.08	8.17	329.84	-40
14.696	2.116	-39	63	55.0	660	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27.5	0.43	0.43	125.00	7875.00	3026.40	4848.60	2.07	8.27	338.11	-41
14.696	2.116	-40	64	56.0	672	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	28	0.42	0.42	125.00	8000.00	3088.80	4911.20	2.05	8.37	346.47	-42
14.696	2.116	-41	65	57.0	684	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	28.5	0.41	0.41	125.00	8125.00	3151.20	4973.80	2.04	8.46	354.94	-43
14.696	2.116	-42	66	58.0	696	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	29	0.40	0.40	125.00	8250.00	3213.60	5036.40	2.02	8.56	363.50	-44
14.696	2.116	-43	67	59.0	708	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	29.5	0.39	0.39	125.00	8375.00	3276.00	5099.00	2.00	8.66	372.16	-45
14.696	2.116	-44	68	60.0	720	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	30	0.38	0.38	125.00	8500.00	3338.40	5161.60	1.99	8.75	380.91	-46
14.696	2.116	-45	69	61.0	732	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	30.5	0.38	0.38	125.00	8625.00	3400.80	5224.20	1.97	8.85	389.76	-47
14.696	2.116	-46	70	62.0	744	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	31	0.37	0.37	125.00	8750.00	3463.20	5286.80	1.95	8.95	398.71	-48
14.696	2.116	-47	71	63.0	756	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	31.5	0.36	0.36	125.00	8875.00	3525.60	5349.40	1.93	9.05	407.76	-49
14.696	2.116	-48	72	64.0	768	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	32	0.35	0.35	125.00	9000.00	3588.00	5412.00	1.91	9.14	416.90	-50
14.696	2.116	-49	73	65.0	780	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	32.5	0.34	0.34	125.00	9125.00	3650.40	5474.60	1.89	9.24	426.14	-51
14.696	2.116	-50	74	66.0	792	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	33	0.34	0.34	125.00	9250.00	3712.80	5537.20	1.86	9.34	435.48	-52
14.696	2.116	-51	75	67.0	804	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	33.5	0.33	0.33	125.00	9375.00	3775.20	5599.80	1.84	9.44	444.92	-53
14.696	2.116	-52	76	68.0	816	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	34	0.32	0.32	125.00	9500.00	3837.60	5662.40	1.82	9.53	454.45	-54
14.696	2.116	-53	77	69.0	828	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	34.5	0.31	0.31	125.00	9625.00	3900.00	5725.00	1.79	9.63	464.08	-55
14.696	2.116	-54	78	70.0	840	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	35	0.31	0.31	125.00	9750.00	3962.40	5787.60	1.77	9.73	473.81	-56
14.696	2.116	-55	79	71.0	852	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	35.5	0.30	0.30	125.00	9875.00	4024.80	5850.20	1.74	9.83	483.64	-57
14.696	2.116	-56	80	72.0	864	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	36	0.29	0.29	125.00	10000.00	4087.20	5912.80	1.72	9.92	493.56	-58
14.696	2.116	-57	81	73.0	876	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	36.5	0.28	0.28	125.00	10125.00	4149.60	5975.40	1.69	10.02	503.58	-59
14.696	2.116	-58	82	74.0	888	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	37	0.28	0.28	125.00	10250.00	4212.00	6038.00	1.66	10.12	513.70	-60
14.696	2.116	-59	83	75.0	900	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	37.5	0.27	0.27	125.00	10375.00	4274.40	6100.60	1.63	10.22	523.91	-61
14.696	2.116	-60	84	76.0	912	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	38	0.26	0.26	125.00	10500.00	4336.80	6163.20	1.60	10.31	534.23	-62
14.696	2.116	-61	85	77.0	924	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	38.5	0.25	0.25	125.00	10625.00	4399.20	6225.80	1.57	10.41	544.64	-63
14.696	2.116	-62	86	78.0	936	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	39	0.25	0.25	125.00	10750.00	4461.60	6288.40	1.57	10.51	555.14	-64
14.696	2.116	-63	87	79.0	948	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	39.5	0.24	0.25	125.00	10875.00	4524.00	6351.00	1.59	10.60	565.75	-65
14.696	2.116	-64	88	80.0	960	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	40	0.23	0.25	125.00	11000.00	4586.40	6413.60	1.60	10.70	576.45	-66
14.696	2.116	-65	89	81.0	972	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	40.5	0.22	0.25	125.00	11125.00	4648.80	6476.20	1.62	10.80	587.25	-67
14.696	2.116	-66	90	82.0	984	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	41	0.22	0.25	125.00	11250.00	4711.20	6538.80	1.63	10.90	598.15	-68
14.696	2.116	-67	91	83.0	996	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	41.5	0.21	0.25	125.00	11375.00	4773.60	6601.40	1.65	10.99	609.13	-69
14.696	2.116	-68	92	84.0	1008	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	42	0.20	0.25	125.00	11500.00	4836.00	6664.00	1.67	11.06	620.19	-70
14.696	2.116	-69	93	85.0	1020	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	42.5	0.20	0.25	125.00	11625.00	4898.40	6726.60	1.68	11.13	631.32	-71
14.696	2.116	-70	94	86.0	1032	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	43	0.19	0.25	125.00	11750.00	4960.80	6789.20	1.70	11.20	642.52	-72
14.696	2.116	-71	95	87.0	1044	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	43.5	0.18	0.25	125.00	11875.00	5023.20	6851.80	1.71	11.27	653.78	-73
14.696	2.116	-72	96	88.0	1056	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	44	0.17	0.25	125.00	12000.00	5085.60	6914.40	1.73	11.33	665.12	-74
14.696	2.116	-73	97	89.0	1068	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	44.5	0.17	0.25	125.00	12125.00	5148.00	6977.00	1.74	11.40	676.52	-75
14.696	2.116	-74	98	90.0	1080	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	45	0.16	0.25	125.00	12250.00	5210.40	7039.60	1.76	11.47	687.99	-76
14.696	2.116	-75	99	91.0	1092	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	45.5	0.15	0.25	125.00	12375.00	5272.80	7102.20	1.78	11.54	699.53	-77
14.696	2.116	-76	100	92.0	1104	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	46	0.15	0.25	125.00	12500.00	5335.20	7164.80	1.79	11.60	711.13	-78
14.696	2.116	-77	101	93.0	1116	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	46.5	0.14	0.25	125.00	12625.00	5397.60	7227.40	1.81	11.67	722.80	-79
14.696	2.116	-78	102	94.0	1128	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	47	0.13	0.25	125.00	12750.00	5460.00	7290.00	1.82	11.74	734.54	-80
14.696	2.116	-79	103	95.0	1140	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	47.5	0.13	0.25	125.00	12875.00	5522.40	7352.60	1.84	11.80	746.34	-81
14.696	2.116	-80	104	96.0	1152	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	48	0.12	0.25	125.00	13000.00	5584.80	7415.20	1.85	11.87	758.21	-82
14.696	2.116	-81	105	97.0	1164	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	48.5	0.11	0.25	125.00	13125.00	5647.20	7477.80	1.87	11.93	770.14	-83
14.696	2.116	-82	106	98.0	1176	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	49	0.11	0.25	125.00	13250.00	5709.60	7540.40	1.89	11.99	782.13	-84
14.696	2.116	-83	107	99.0	1188	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	49.5	0.10	0.25	125.00	13375.00	5772.00	7603.00	1.90	12.06	794.19	-85
14.696	2.116	-84	108	100.0	1200	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	50	0.09	0.25	125.00	13500.00	5834.40	7665.60	1.92	12.12	806.31	-86
14.696	2.116	-85	109	101.0	1212	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	50.5	0.09	0.25	125.00	13625.00	5896.80	7728.20	1.93	12.18	818.49	-87
14.696	2.116	-86	110	102.0	1224	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	51	0.08	0.25	125.00	13750.00	5959.20	7790.80	1.95	12.25	830.74	-88
14.696	2.116	-87	111	103.0	1236	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	51.5	0.07	0.25	125.00	13875.00	6021.60	7853.40	1.96	12.31	843.05	-89
14.696	2.116	-88	112	104.0	1248	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	52	0.07	0.25	125.00	14000.00	6084.00	7916.00	1.98	12.37	855.41	-90
14.696	2.116	-89	113	105.0	1260	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	52.5	0.06	0.25	125.00	14125.00	6146.40	7978.60	1.99	12.43	867.84	-91
14.696	2.116	-90	114	106.0	1272	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	53	0.06	0.25	125.00	14250.00	6208.80	8041.20	2.01	12.49	880.33	-92
14.696	2.116	-91	115	107.0	1284	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	53.5	0.05	0.25	125.00	14375.00	6271.20	8103.80	2.03	12.55	892.88	-93
14.696	2.116	-92	116	108.0	1296	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	54	0.04	0.25	125.00	14500.00	6333.60	8166.40	2.04	12.61	905.48	-94
14.696	2.116	-93	117	109.0	1308	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	54.5	0.04	0.25	125.00	14625.00	6396.00	8229.00	2.06	12.67	918.15	-95
14.696	2.116	-94	118	110.0	1320	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	55	0.03	0.25	125.00	14750.00	6458.40	8291.60	2.07	12.72	930.87	-96
14.696	2.116	-95	119	111.0	1332	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	55.5	0.02	0.25	125.00	14875.00	6520.80	8354.20	2.09	12.78	943.66	-97
14.696	2.116	-96	120	112.0	1344	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	56	0.02	0.25	125.00	15000.00	6583.20	8416.80	2.10	12.84	956.49	-98
14.696	2.116	-97	121	113.0	1356	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	56.5	0.01	0.25	125.00	15125.00	6645.60	8479.40	2.12	12.90	969.39	-99
14.696	2.116	-98	122	114.0	1368	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	57	0.01	0.25	125.00	15250.00	6708.00	8542.00	2.14	12.95	982.34	-100
14.696	2.116	-99	123	115.0	1380	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	57.5	0.00	0.25	125.00	15375.00	6770.40	8604.60	2.15	13.01	995.35	-101
14.696	2.116	-100	124	116.0	1392	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	58	-0.01	0.25	125.00	15500.00	6832.80	8667.20	2.17	13.06	1008.41	-102
14.696	2.116	-101	125	117.0	1404	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	58.5	-0.01	0.25	125.00	15625.00	6895.20	8729.80	2.18	13.12	1021.53	-103
14.696	2.116	-102	126	118.0	1416	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	59	-0.02	0.25	125.00	15750.00	6957.60	8792.40	2.20	13.17	1034.70	-104
14.696	2.116	-103	127	119.0	1428	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	59.5	-0.02	0.25	125.00	15875.00	7020.00	8855.00	2.21	13.23	1047.93	-105
14.696	2.116	-104	128	120.0	1440	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	60	-0.03	0.25	125.00	16000.00	7082.40	8917.60	2.23	13.28	1061.21	-106
14.696	2.116	-105	129	121.0	1452	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	60.5	-0.04	0.25	125.00	16125.00	7144.80	8980.20	2.25	13.33	1074.54	-107
14.696	2.116	-106	130	122.0	1464	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	61	-0.04	0.25	125.00	16250.00	7207.20	9042.80	2.26	13.39	1087.93	-108
14.696	2.116	-107	131	123.0	1476	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	61.5	-0.05	0.25	125.00	16375.00	7269.60	9105.40	2.28	13.44	1101.37	-109
14.696	2.116	-108	132	124.0	1488	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	62	-0.05	0.25	125.00	16500.00	7332.00	9168.00	2.29	13.49	1114.86	-110
14.696	2.116	-109	133	125.0	1500	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	62.5	-0.06	0.25	125.00	16625.00	7394.40	9230.60	2.31	13.54	1128.40	-111
14.696	2.116	-110	134	126.0	1512	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	63	-0.07	0.25	125.00	16750.00	7456.80	9293.20	2.32	13.59	1141.99	-112
14.696	2.116	-111	135	127.0	1524	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	63.5	-0.07	0.25	125.00	16875.00	7519.20	9355.80	2.34	13.64	1155.63	-113
14.696	2.116	-112	136	128.0	1536	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	64	-0.08	0.25	125.00	17000.00	7581.60	9418.40	2.35	13.69	1169.32	-114
14.696	2.116	-113	137	129.0	1548	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	64.5	-0.08	0.25	125.00	17125.00	7644.00	9481.00	2.37	13.74	1183.06	-115
14.696	2.116	-114	138	130.0	1560	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	65	-0.09	0.25	125.00	17250.00	7706.40	9543.60	2.39	13.79	1196.85	-116
14.696	2.116	-115	139	131.0	1572	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	65.5	-0.09	0.25	125.00	17375.00	7768.80	9606.20	2.40	13.84	1210.68	-117
14.696	2.116	-116	140	132.0	1584	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	66	-0.10	0.25	125.00	17500.00	7831.20	9668.80	2.42	13.88	1224.57	-118
14.696	2.116	-117	141	133.0	1596	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	66.5	-0.11	0.25	125.00	17625.00	7893.60	9731.40	2.43	13.93	1238.50	-119
14.696	2.116	-118	142	134.0	1608	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	67	-0.11	0.25	125.00	17750.00	7956.00	9794.00	2.45	13.98	1252.48	-120
14.696	2.116	-119	143	135.0	1620	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	67.5	-0.12	0.25	125.00	17875.00	8018.40	9856.60	2.46	14.03	1266.51	-121
14.696	2.116	-120	144	136.0	1632	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	68	-0.12	0.25	125.00	18000.00	8080.80	9919.20	2.48	14.07	1280.58	-122
14.696	2.116	-121	145	137.0	1644	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	68.5	-0.13	0.25	125.00	18125.00	8143.20	9981.80	2.50	14.12	1294.70	-123
14.696	2.116	-122	146	138.0	1656	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	69	-0.13	0.25	125.00	18250.00	8205.60	10044.40	2.51	14.16	1308.86	-124
14.696	2.116	-123	147	139.0	1668	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	69.5	-0.14	0.25	125.00	18375.00	8268.00	10107.00	2.53	14.21	1323.06	-125
14.696	2.116	-124	148	140.0	1680	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	70	-0.15	0.25	125.00	18500.00	8330.40	10169.60	2.54	14.25	1337.31	-126
14.696	2.116	-125	149	141.0	1692	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	70.5	-0.15	0.25	125.00	18625.00	8392.80	10232.20	2.56	14.29	1351.61	-127

29th AVE. Abut 8 RW Left

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	22.75
Bottom of footing elevation / Pile top elevation (feet)	16.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-43.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	17	6.25	0.0	0	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	781.25	0.00	781.25	0.00	0.00	0.00	15
14.696	2.116	16	7.25	1.0	12	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	906.25	0.00	906.25	0.00	0.00	0.00	14
14.696	2.116	15	8.25	2.0	24	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.74	0.74	125.00	1031.25	0.00	1031.25	0.76	6.74	6.74	13
14.696	2.116	14	9.25	3.0	36	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.73	0.73	125.00	1156.25	0.00	1156.25	0.84	6.57	13.30	12
14.696	2.116	13	10.25	4.0	48	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.71	0.71	125.00	1281.25	0.00	1281.25	0.91	6.39	19.70	11
14.696	2.116	12	11.25	5.0	60	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.70	0.70	125.00	1406.25	0.00	1406.25	0.98	6.22	25.92	10
14.696	2.116	11	12.25	6.0	72	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1531.25	0.00	1531.25	1.05	6.05	31.97	9
14.696	2.116	10	13.25	7.0	84	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1656.25	31.20	1625.05	1.09	5.87	37.84	8
14.696	2.116	9	14.25	8.0	96	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.66	0.66	125.00	1781.25	93.60	1687.65	1.11	5.70	43.54	7
14.696	2.116	8	15.25	9.0	108	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.65	0.65	125.00	1906.25	156.00	1750.25	1.13	5.53	49.07	6
14.696	2.116	7	16.25	10.0	120	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	2031.25	218.40	1812.85	1.15	5.36	54.43	5
14.696	2.116	6	17.25	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2156.25	280.80	1875.45	1.17	5.18	59.61	4
14.696	2.116	5	18.25	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2281.25	343.20	1938.05	1.19	5.18	64.80	3
14.696	2.116	4	19.25	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2406.25	405.60	2000.65	1.21	5.18	69.98	2
14.696	2.116	3	20.25	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2531.25	468.00	2063.25	1.23	5.18	75.16	1
14.696	2.116	2	21.25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2656.25	530.40	2125.85	1.24	5.18	80.35	-1
14.696	2.116	1	22.25	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2781.25	592.80	2188.45	1.26	5.18	85.53	-2
14.696	2.116	-1	23.25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2906.25	655.20	2251.05	1.27	5.18	90.71	-3
14.696	2.116	-2	24.25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3031.25	717.60	2313.65	1.29	5.18	95.90	-4
14.696	2.116	-3	25.25	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3156.25	780.00	2376.25	1.30	5.18	101.08	-5
14.696	2.116	-4	26.25	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3281.25	842.40	2438.85	1.31	5.18	106.26	-6
14.696	2.116	-5	27.25	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3406.25	904.80	2501.45	1.39	5.18	111.45	-7
14.696	2.116	-6	28.25	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.57	0.57	125.00	3531.25	967.20	2564.05	1.47	5.18	116.63	-8
14.696	2.116	-7	29.25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.59	0.59	125.00	3656.25	1029.60	2626.65	1.55	5.18	121.82	-9
14.696	2.116	-8	30.25	24.0	288	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12	0.60	0.60	125.00	3781.25	1092.00	2689.25	1.63	5.25	127.07	-10
14.696	2.116	-9	31.25	25.0	300	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	12.5	0.62	0.62	125.00	3906.25	1154.40	2751.85	1.71	5.35	132.41	-11
14.696	2.116	-10	32.25	26.0	312	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	13	0.63	0.63	125.00	4031.25	1216.80	2814.45	1.79	5.44	137.86	-12
14.696	2.116	-11	33.25	27.0	324	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	13.5	0.65	0.65	125.00	4156.25	1279.20	2877.05	1.86	5.54	143.40	-13
14.696	2.116	-12	34.25	28.0	336	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	14	0.66	0.66	125.00	4281.25	1341.60	2939.65	1.94	5.64	149.04	-14
14.696	2.116	-13	35.25	29.0	348	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	14.5	0.67	0.67	125.00	4406.25	1404.00	3002.25	2.02	5.74	154.78	-15
14.696	2.116	-14	36.25	30.0	360	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	15	0.69	0.69	125.00	4531.25	1466.40	3064.85	2.10	5.83	160.61	-16
14.696	2.116	-15	37.25	31.0	372	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	15.5	0.67	0.67	125.00	4656.25	1528.80	3127.45	2.11	5.93	166.54	-17
14.696	2.116	-16	38.25	32.0	384	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	16	0.66	0.66	125.00	4781.25	1591.20	3190.05	2.12	6.03	172.57	-18
14.696	2.116	-17	39.25	33.0	396	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	16.5	0.65	0.65	125.00	4906.25	1653.60	3252.65	2.12	6.13	178.70	-19
14.696	2.116	-18	40.25	34.0	408	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	17	0.64	0.64	125.00	5031.25	1716.00	3315.25	2.13	6.22	184.92	-20
14.696	2.116	-19	41.25	35.0	420	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	17.5	0.63	0.63	125.00	5156.25	1778.40	3377.85	2.13	6.32	191.24	-21
14.696	2.116	-20	42.25	36.0	432	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	18	0.62	0.62	125.00	5281.25	1840.80	3440.45	2.14	6.42	197.66	-22
14.696	2.116	-21	43.25	37.0	444	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	18.5	0.61	0.61	125.00	5406.25	1903.20	3503.05	2.14	6.52	204.18	-23
14.696	2.116	-22	44.25	38.0	456	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	19	0.60	0.60	125.00	5531.25	1965.60	3565.65	2.14	6.61	210.79	-24
14.696	2.116	-23	45.25	39.0	468	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	19.5	0.59	0.59	125.00	5656.25	2028.00	3628.25	2.14	6.71	217.50	-25
14.696	2.116	-24	46.25	40.0	480	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	20	0.58	0.58	125.00	5781.25	2090.40	3690.85	2.14	6.81	224.31	-26
14.696	2.116	-25	47.25	41.0	492	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	20.5	0.57	0.57	125.00	5906.25	2152.80	3753.45	2.14	6.91	231.21	-27
14.696	2.116	-26	48.25	42.0	504	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	21	0.56	0.56	125.00	6031.25	2215.20	3816.05	2.14	7.00	238.22	-28
14.696	2.116	-27	49.25	43.0	516	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	21.5	0.55	0.55	125.00	6156.25	2277.60	3878.65	2.14	7.10	245.32	-29
14.696	2.116	-28	50.25	44.0	528	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	22	0.54	0.54	125.00	6281.25	2340.00	3941.25	2.13	7.20	252.51	-30
14.696	2.116	-29	51.25	45.0	540	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	22.5	0.53	0.53	125.00	6406.25	2402.40	4003.85	2.13	7.29	259.81	-31
14.696	2.116	-30	52.25	46.0	552	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	23	0.52	0.52	125.00	6531.25	2464.80	4066.45	2.12	7.39	267.20	-32
14.696	2.116	-31	53.25	47.0	564	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	23.5	0.51	0.51	125.00	6656.25	2527.20	4129.05	2.12	7.49	274.69	-33
14.696	2.116	-32	54.25	48.0	576	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	24	0.50	0.50	125.00	6781.25	2589.60	4191.65	2.11	7.59	282.28	-34
14.696	2.116	-33	55.25	49.0	588	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	24.5	0.49	0.49	125.00	6906.25	2652.00	4254.25	2.10	7.68	289.96	-35
14.696	2.116	-34	56.25	50.0	600	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	25	0.49	0.49	125.00	7031.25	2714.40	4316.85	2.10	7.78	297.74	-36
14.696	2.116	-35	57.25	51.0	612	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	25.5	0.48	0.48	125.00	7156.25	2776.80	4379.45	2.09	7.88	305.62	-37
14.696	2.116	-36	58.25	52.0	624	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	26	0.47	0.47	125.00	7281.25	2839.20	4442.05	2.08	7.98	313.60	-38
14.696	2.116	-37	59.25	53.0	636	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	26.5	0.46	0.46	125.00	7406.25	2901.60	4504.65	2.07	8.07	321.67	-39
14.696	2.116	-38	60.25	54.0	648	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	27	0.45	0.45	125.00	7531.25	2964.00	4567.25	2.06	8.17	329.84	-40
14.696	2.116	-39	61.25	55.0	660	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27.5	0.44	0.44	125.00	7656.25	3026.40	4629.85	2.04	8.27	338.11	-41
14.696	2.116	-40	62.25	56.0	672	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	28	0.43	0.43	125.00	7781.25	3088.80	4692.45	2.03	8.37	346.47	-42
14.696	2.116	-41	63.25	57.0	684	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	28.5	0.42	0.42	125.00	7906.25	3151.20	4755.05	2.02	8.46	354.94	-43
14.696	2.116	-42	64.25	58.0	696	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	29	0.42	0.42	125.00	8031.25	3213.60	4817.65	2.00	8.56	363.50	-44
14.696	2.116	-43	65.25	59.0	708	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	29.5	0.41	0.41	125.00	8156.25	3276.00	4880.25	1.99	8.66	372.16	-45
14.696	2.116	-44	66.25	60.0	720	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	30	0.40	0.40	125.00	8281.25	3338.40	4942.85	1.97	8.75	380.91	-46
14.696	2.116	-45	67.25	61.0	732	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	30.5	0.39	0.39	125.00	8406.25	3400.80	5005.45	1.96	8.85	389.76	-47
14.696	2.116	-46	68.25	62.0	744	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	31	0.38	0.38	125.00	8531.25	3463.20	5068.05	1.94	8.95	398.71	-48
14.696	2.116	-47	69.25	63.0	756	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	31.5	0.37	0.37	125.00	8656.25	3525.60	5130.65	1.92	9.05	407.76	-49
14.696	2.116	-48	70.25	64.0	768	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	32	0.37	0.37	125.00	8781.25	3588.00	5193.25	1.90	9.14	416.90	-50
14.696	2.116	-49	71.25	65.0	780	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	32.5	0.36	0.36	125.00	8906.25	3650.40	5255.85	1.88	9.24	426.14	-51
14.696	2.116	-50	72.25	66.0	792	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	33	0.35	0.35	125.00	9031.25	3712.80	5318.45	1.86	9.34	435.48	-52
14.696	2.116	-51	73.25	67.0	804	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	33.5	0.34	0.34	125.00	9156.25	3775.20	5381.05	1.84	9.44	444.92	-53
14.696	2.116	-52	74.25	68.0	816	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	34	0.33	0.33	125.00	9281.25	3837.60	5443.65	1.82	9.53	454.45	-54
14.696	2.116	-53	75.25	69.0	828	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	34.5	0.33	0.33	125.00	9406.25	3900.00	5506.25	1.80	9.63	464.08	-55
14.696	2.116	-54	76.25	70.0	840	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	35	0.32	0.32	125.00	9531.25	3962.40	5568.85	1.78	9.73	473.81	-56
14.696	2.116	-55	77.25	71.0	852	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	35.5	0.31	0.31	125.00	9656.25	4024.80	5631.45	1.75	9.83	483.64	-57
14.696	2.116	-56	78.25	72.0	864	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	36	0.30	0.30	125.00	9781.25	4087.20	5694.05	1.73	9.92	493.56	-58
14.696	2.116	-57	79.25	73.0	876	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	36.5	0.30	0.30	125.00	9906.25	4149.60	5756.65	1.70	10.02	503.58	-59
14.696	2.116	-58	80.25	74.0	888	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	37	0.29	0.29	125.00	10031.25	4212.00	5819.25	1.68	10.12	513.70	-60
14.696	2.116	-59	81.25	75.0	900	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	37.5	0.28	0.28	125.00	10156.25	4274.40	5881.85	1.65	10.22	523.91	-61
14.696	2.116	-60	82.25	76.0	912	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	38	0.27	0.27	125.00	10281.25	4336.80	5944.45	1.62	10.31	534.23	-62
14.696	2.116	-61	83.25	77.0	924	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	38.5	0.27	0.27	125.00	10406.25	4399.20	6007.05	1.60	10.41	544.64	-63
14.696	2.116	-62	84.25	78.0	936	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	39	0.26	0.26	125.00	10531.25	4461.60	6069.65	1.57	10.51	555.14	-64
14.696	2.116	-63	85.25	79.0	948	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	39.5	0.25	0.25	125.00	10656.25	4524.00	6132.25	1.54	10.60	565.75	-65
14.696	2.116	-64	86.25	80.0	960	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	40	0.24	0.25	125.00	10781.25	4586.40	6194.85	1.55	10.70	576.45	-66
14.696	2.116	-65	87.25	81.0	972	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	40.5	0.24	0.25	125.00	10906.25	4648.80	6257.45	1.56	10.80	587.25	-67
14.696	2.116	-66	88.25	82.0	984	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	41	0.23	0.25	125.00	11031.25	4711.20	6320.05	1.58	10.90	598.15	-68
14.696	2.116	-67	89.25	83.0	996	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	41.5	0.22	0.25	125.00	11156.25	4773.60	6382.65	1.60	10.99	609.13	-69
14.696	2.116	-68	90.25	84.0	1008	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	42	0.22	0.25	125.00	11281.25	4836.00	6445.25	1.61	11.06	620.19	-70
14.696	2.116	-69	91.25	85.0	1020	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	42.5	0.21	0.25	125.00	11406.25	4898.40	6507.85	1.63	11.13	631.32	-71
14.696	2.116	-70	92.25	86.0	1032	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	43	0.20	0.25	125.00	11531.25	4960.80	6570.45	1.64	11.20	642.52	-72
14.696	2.116	-71	93.25	87.0	1044	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	43.5	0.19	0.25	125.00	11656.25	5023.20	6633.05	1.66	11.27	653.78	-73
14.696	2.116	-72	94.25	88.0	1056	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	44	0.19	0.25	125.00	11781.25	5085.60	6695.65	1.67	11.33	665.12	-74
14.696	2.116	-73	95.25	89.0	1068	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	44.5	0.18	0.25	125.00	11906.25	5148.00	6758.25	1.69	11.40	676.52	-75
14.696	2.116	-74	96.25	90.0	1080	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	45	0.17	0.25	125.00	12031.25	5210.40	6820.85	1.71	11.47	687.99	-76
14.696	2.116	-75	97.25	91.0	1092	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	45.5	0.17	0.25	125.00	12156.25	5272.80	6883.45	1.72	11.54	699.53	-77
14.696	2.116	-76	98.25	92.0	1104	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	46	0.16	0.25	125.00	12281.25	5335.20	6946.05	1.74	11.60	711.13	-78
14.696	2.116	-77	99.25	93.0	1116	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	46.5	0.15	0.25	125.00	12406.25	5397.60	7008.65	1.75	11.67	722.80	-79
14.696	2.116	-78	100.25	94.0	1128	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	47	0.15	0.25	125.00	12531.25	5460.00	7071.25	1.77	11.74	734.54	-80
14.696	2.116	-79	101.25	95.0	1140	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	47.5	0.14	0.25	125.00	12656.25	5522.40	7133.85	1.78	11.80	746.34	-81
14.696	2.116	-80	102.25	96.0	1152	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	48	0.13	0.25	125.00	12781.25	5584.80	7196.45	1.80	11.87	758.21	-82
14.696	2.116	-81	103.25	97.0	1164	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	48.5	0.13	0.25	125.00	12906.25	5647.20	7259.05	1.81	11.93	770.14	-83
14.696	2.116	-82	104.25	98.0	1176	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	49	0.12	0.25	125.00	13031.25	5709.60	7321.65	1.83	11.99	782.13	-84
14.696	2.116	-83	105.25	99.0	1188	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	49.5	0.11	0.25	125.00	13156.25	5772.00	7384.25	1.85	12.06	794.19	-85
14.696	2.116	-84	106.25	100.0	1200	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	50	0.11	0.25	125.00	13281.25	5834.40	7446.85	1.86	12.12	806.31	-86
14.696	2.116	-85	107.25	101.0	1212	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	50.5	0.10	0.25	125.00	13406.25	5896.80	7509.45	1.88	12.18	818.49	-87
14.696	2.116	-86	108.25	102.0	1224	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	51	0.09	0.25	125.00	13531.25	5959.20	7572.05	1.89	12.25	830.74	-88
14.696	2.116	-87	109.25	103.0	1236	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	51.5	0.09	0.25	125.00	13656.25	6021.60	7634.65	1.91	12.31	843.05	-89
14.696	2.116	-88	110.25	104.0	1248	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	52	0.08	0.25	125.00	13781.25	6084.00	7697.25	1.92	12.37	855.41	-90
14.696	2.116	-89	111.25	105.0	1260	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	52.5	0.07	0.25	125.00	13906.25	6146.40	7759.85	1.94	12.43	867.84	-91
14.696	2.116	-90	112.25	106.0	1272	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	53	0.07	0.25	125.00	14031.25	6208.80	7822.45	1.96	12.49	880.33	-92
14.696	2.116	-91	113.25	107.0	1284	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	53.5	0.06	0.25	125.00	14156.25	6271.20	7885.05	1.97	12.55	892.88	-93
14.696	2.116	-92	114.25	108.0	1296	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	54	0.05	0.25	125.00	14281.25	6333.60	7947.65	1.99	12.61	905.48	-94
14.696	2.116	-93	115.25	109.0	1308	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	54.5	0.05	0.25	125.00	14406.25	6396.00	8010.25	2.00	12.67	918.15	-95
14.696	2.116	-94	116.25	110.0	1320	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	55	0.04	0.25	125.00	14531.25	6458.40	8072.85	2.02	12.72	930.87	-96
14.696	2.116	-95	117.25	111.0	1332	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	55.5	0.04	0.25	125.00	14656.25	6520.80	8135.45	2.03	12.78	943.66	-97
14.696	2.116	-96	118.25	112.0	1344	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	56	0.03	0.25	125.00	14781.25	6583.20	8198.05	2.05	12.84	956.49	-98
14.696	2.116	-97	119.25	113.0	1356	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	56.5	0.02	0.25	125.00	14906.25	6645.60	8260.65	2.07	12.90	969.39	-99
14.696	2.116	-98	120.25	114.0	1368	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	57	0.02	0.25	125.00	15031.25	6708.00	8323.25	2.08	12.95	982.34	-100
14.696	2.116	-99	121.25	115.0	1380	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	57.5	0.01	0.25	125.00	15156.25	6770.40	8385.85	2.10	13.01	995.35	-101
14.696	2.116	-100	122.25	116.0	1392	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	58	0.00	0.25	125.00	15281.25	6832.80	8448.45	2.11	13.06	1008.41	-102
14.696	2.116	-101	123.25	117.0	1404	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	58.5	0.00	0.25	125.00	15406.25	6895.20	8511.05	2.13	13.12	1021.53	-103
14.696	2.116	-102	124.25	118.0	1416	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	59	-0.01	0.25	125.00	15531.25	6957.60	8573.65	2.14	13.17	1034.70	-104
14.696	2.116	-103	125.25	119.0	1428	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	59.5	-0.01	0.25	125.00	15656.25	7020.00	8636.25	2.16	13.23	1047.93	-105
14.696	2.116	-104	126.25	120.0	1440	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	60	-0.02	0.25	125.00	15781.25	7082.40	8698.85	2.17	13.28	1061.21	-106
14.696	2.116	-105	127.25	121.0	1452	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	60.5	-0.03	0.25	125.00	15906.25	7144.80	8761.45	2.19	13.33	1074.54	-107
14.696	2.116	-106	128.25	122.0	1464	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	61	-0.03	0.25	125.00	16031.25	7207.20	8824.05	2.21	13.39	1087.93	-108
14.696	2.116	-107	129.25	123.0	1476	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	61.5	-0.04	0.25	125.00	16156.25	7269.60	8886.65	2.22	13.44	1101.37	-109
14.696	2.116	-108	130.25	124.0	1488	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	62	-0.04	0.25	125.00	16281.25	7332.00	8949.25	2.24	13.49	1114.86	-110
14.696	2.116	-109	131.25	125.0	1500	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	62.5	-0.05	0.25	125.00	16406.25	7394.40	9011.85	2.25	13.54	1128.40	-111
14.696	2.116	-110	132.25	126.0	1512	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	63	-0.06	0.25	125.00	16531.25	7456.80	9074.45	2.27	13.59	1141.99	-112
14.696	2.116	-111	133.25	127.0	1524	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	63.5	-0.06	0.25	125.00	16656.25	7519.20	9137.05	2.28	13.64	1155.63	-113
14.696	2.116	-112	134.25	128.0	1536	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	64	-0.07	0.25	125.00	16781.25	7581.60	9199.65	2.30	13.69	1169.32	-114
14.696	2.116	-113	135.25	129.0	1548	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	64.5	-0.07	0.25	125.00	16906.25	7644.00	9262.25	2.32	13.74	1183.06	-115
14.696	2.116	-114	136.25	130.0	1560	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	65	-0.08	0.25	125.00	17031.25	7706.40	9324.85	2.33	13.79	1196.85	-116
14.696	2.116	-115	137.25	131.0	1572	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	65.5	-0.08	0.25	125.00	17156.25	7768.80	9387.45	2.35	13.84	1210.68	-117
14.696	2.116	-116	138.25	132.0	1584	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	66	-0.09	0.25	125.00	17281.25	7831.20	9450.05	2.36	13.88	1224.57	-118
14.696	2.116	-117	139.25	133.0	1596	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	66.5	-0.10	0.25	125.00	17406.25	7893.60	9512.65	2.38	13.93	1238.50	-119
14.696	2.116	-118	140.25	134.0	1608	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	67	-0.10	0.25	125.00	17531.25	7956.00	9575.25	2.39	13.98	1252.48	-120
14.696	2.116	-119	141.25	135.0	1620	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	67.5	-0.11	0.25	125.00	17656.25	8018.40	9637.85	2.41	14.03	1266.51	-121
14.696	2.116	-120	142.25	136.0	1632	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	68	-0.11	0.25	125.00	17781.25	8080.80	9700.45	2.43	14.07	1280.58	-122
14.696	2.116	-121	143.25	137.0	1644	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	68.5	-0.12	0.25	125.00	17906.25	8143.20	9763.05	2.44	14.12	1294.70	-123
14.696	2.116	-122	144.25	138.0	1656	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	69	-0.12	0.25	125.00	18031.25	8205.60	9825.65	2.46	14.16	1308.86	-124
14.696	2.116	-123	145.25	139.0	1668	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	69.5	-0.13	0.25	125.00	18156.25	8268.00	9888.25	2.47	14.21	1323.06	-125
14.696	2.116	-124	146.25	140.0	1680	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	70	-0.14	0.25	125.00	18281.25	8330.40	9950.85	2.49	14.25	1337.31	-126
14.696	2.116	-125	147.25	141.0	1692	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	70.5	-0.14	0.25	125.00	18406.25	8392.80	10013.45	2.50	14.29	1351.61	-127

29th AVE. Abut 8 RW Right

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	26.50
Bottom of footing elevation / Pile top elevation (feet)	16.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-43.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	17	10	0.0	0	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.00	0.00	0.00	15
14.696	2.116	16	11	1.0	12	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.70	0.70	125.00	1375.00	0.00	1375.00	0.00	0.00	0.00	14
14.696	2.116	15	12	2.0	24	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.69	0.69	125.00	1500.00	0.00	1500.00	1.03	6.74	6.74	13
14.696	2.116	14	13	3.0	36	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.67	0.67	125.00	1625.00	0.00	1625.00	1.10	6.57	13.30	12
14.696	2.116	13	14	4.0	48	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.66	0.66	125.00	1750.00	0.00	1750.00	1.16	6.39	19.70	11
14.696	2.116	12	15	5.0	60	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.65	0.65	125.00	1875.00	0.00	1875.00	1.22	6.22	25.92	10
14.696	2.116	11	16	6.0	72	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.64	0.64	125.00	2000.00	0.00	2000.00	1.28	6.05	31.97	9
14.696	2.116	10	17	7.0	84	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.63	0.63	125.00	2125.00	31.20	2093.80	1.32	5.87	37.84	8
14.696	2.116	9	18	8.0	96	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.62	0.62	125.00	2250.00	93.60	2156.40	1.33	5.70	43.54	7
14.696	2.116	8	19	9.0	108	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.61	0.61	125.00	2375.00	156.00	2219.00	1.35	5.53	49.07	6
14.696	2.116	7	20	10.0	120	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.60	0.60	125.00	2500.00	218.40	2281.60	1.36	5.36	54.43	5
14.696	2.116	6	21	11.0	132	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	280.80	2344.20	1.38	5.18	59.61	4
14.696	2.116	5	22	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	343.20	2406.80	1.39	5.18	64.80	3
14.696	2.116	4	23	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2875.00	405.60	2469.40	1.40	5.18	69.98	2
14.696	2.116	3	24	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3000.00	468.00	2532.00	1.41	5.18	75.16	1
14.696	2.116	2	25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3125.00	530.40	2594.60	1.42	5.18	80.35	-1
14.696	2.116	1	26	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.54	0.54	125.00	3250.00	592.80	2657.20	1.44	5.18	85.53	-2
14.696	2.116	-1	27	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.53	0.53	125.00	3375.00	655.20	2719.80	1.45	5.18	90.71	-3
14.696	2.116	-2	28	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.52	0.52	125.00	3500.00	717.60	2782.40	1.45	5.18	95.90	-4
14.696	2.116	-3	29	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3625.00	780.00	2845.00	1.46	5.18	101.08	-5
14.696	2.116	-4	30	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.51	0.51	125.00	3750.00	842.40	2907.60	1.47	5.18	106.26	-6
14.696	2.116	-5	31	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.52	0.52	125.00	3875.00	904.80	2970.20	1.55	5.18	111.45	-7
14.696	2.116	-6	32	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.54	0.54	125.00	4000.00	967.20	3032.80	1.63	5.18	116.63	-8
14.696	2.116	-7	33	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.55	0.55	125.00	4125.00	1029.60	3095.40	1.72	5.18	121.82	-9
14.696	2.116	-8	34	24.0	288	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12	0.57	0.57	125.00	4250.00	1092.00	3158.00	1.80	5.25	127.07	-10
14.696	2.116	-9	35	25.0	300	1.55	10.75	0.731	0	0.55	0.55	0.851	5.91	12.5	0.58	0.58	125.00	4375.00	1154.40	3220.60	1.88	5.35	132.41	-11
14.696	2.116	-10	36	26.0	312	1.58	10.94	0.745	0	0.55	0.55	0.867	6.02	13	0.60	0.60	125.00	4500.00	1216.80	3283.20	1.96	5.44	137.86	-12
14.696	2.116	-11	37	27.0	324	1.60	11.14	0.758	0	0.55	0.55	0.882	6.13	13.5	0.61	0.61	125.00	4625.00	1279.20	3345.80	2.04	5.54	143.40	-13
14.696	2.116	-12	38	28.0	336	1.63	11.33	0.771	0	0.55	0.55	0.898	6.23	14	0.62	0.62	125.00	4750.00	1341.60	3408.40	2.12	5.64	149.04	-14
14.696	2.116	-13	39	29.0	348	1.66	11.53	0.784	0	0.55	0.55	0.913	6.34	14.5	0.63	0.63	125.00	4875.00	1404.00	3471.00	2.20	5.74	154.78	-15
14.696	2.116	-14	40	30.0	360	1.69	11.72	0.798	0	0.55	0.55	0.929	6.45	15	0.64	0.64	125.00	5000.00	1466.40	3533.60	2.28	5.83	160.61	-16
14.696	2.116	-15	41	31.0	372	1.72	11.92	0.811	0	0.55	0.55	0.944	6.56	15.5	0.63	0.63	125.00	5125.00	1528.80	3596.20	2.28	5.93	166.54	-17
14.696	2.116	-16	42	32.0	384	1.74	12.12	0.824	0	0.55	0.55	0.960	6.66	16	0.62	0.62	125.00	5250.00	1591.20	3658.80	2.28	6.03	172.57	-18
14.696	2.116	-17	43	33.0	396	1.77	12.31	0.838	0	0.55	0.55	0.975	6.77	16.5	0.61	0.61	125.00	5375.00	1653.60	3721.40	2.28	6.13	178.70	-19
14.696	2.116	-18	44	34.0	408	1.80	12.51	0.851	0	0.55	0.55	0.991	6.88	17	0.60	0.60	125.00	5500.00	1716.00	3784.00	2.28	6.22	184.92	-20
14.696	2.116	-19	45	35.0	420	1.83	12.70	0.864	0	0.55	0.55	1.006	6.99	17.5	0.59	0.59	125.00	5625.00	1778.40	3846.60	2.28	6.32	191.24	-21
14.696	2.116	-20	46	36.0	432	1.86	12.90	0.878	0	0.55	0.55	1.022	7.09	18	0.58	0.58	125.00	5750.00	1840.80	3909.20	2.28	6.42	197.66	-22
14.696	2.116	-21	47	37.0	444	1.89	13.09	0.891	0	0.55	0.55	1.037	7.20	18.5	0.57	0.57	125.00	5875.00	1903.20	3971.80	2.27	6.52	204.18	-23
14.696	2.116	-22	48	38.0	456	1.91	13.29	0.904	0	0.55	0.55	1.053	7.31	19	0.56	0.56	125.00	6000.00	1965.60	4034.40	2.27	6.61	210.79	-24
14.696	2.116	-23	49	39.0	468	1.94	13.49	0.918	0	0.55	0.55	1.068	7.42	19.5	0.55	0.55	125.00	6125.00	2028.00	4097.00	2.27	6.71	217.50	-25
14.696	2.116	-24	50	40.0	480	1.97	13.68	0.931	0	0.55	0.55	1.084	7.52	20	0.54	0.54	125.00	6250.00	2090.40	4159.60	2.26	6.81	224.31	-26
14.696	2.116	-25	51	41.0	492	2.00	13.88	0.944	0	0.55	0.55	1.099	7.63	20.5	0.53	0.53	125.00	6375.00	2152.80	4222.20	2.25	6.91	231.21	-27
14.696	2.116	-26	52	42.0	504	2.03	14.07	0.958	0	0.55	0.55	1.114	7.74	21	0.52	0.52	125.00	6500.00	2215.20	4284.80	2.25	7.00	238.22	-28
14.696	2.116	-27	53	43.0	516	2.05	14.27	0.971	0	0.55	0.55	1.130	7.85	21.5	0.52	0.52	125.00	6625.00	2277.60	4347.40	2.24	7.10	245.32	-29
14.696	2.116	-28	54	44.0	528	2.08	14.46	0.984	0	0.55	0.55	1.145	7.95	22	0.51	0.51	125.00	6750.00	2340.00	4410.00	2.23	7.20	252.51	-30
14.696	2.116	-29	55	45.0	540	2.11	14.66	0.997	0	0.55	0.55	1.161	8.06	22.5	0.50	0.50	125.00	6875.00	2402.40	4472.60	2.22	7.29	259.81	-31
14.696	2.116	-30	56	46.0	552	2.14	14.85	1.011	0	0.55	0.55	1.176	8.17	23	0.49	0.49	125.00	7000.00	2464.80	4535.20	2.21	7.39	267.20	-32
14.696	2.116	-31	57	47.0	564	2.17	15.05	1.024	0	0.55	0.55	1.192	8.28	23.5	0.48	0.48	125.00	7125.00	2527.20	4597.80	2.20	7.49	274.69	-33
14.696	2.116	-32	58	48.0	576	2.20	15.25	1.037	0	0.55	0.55	1.207	8.39	24	0.47	0.47	125.00	7250.00	2589.60	4660.40	2.19	7.59	282.28	-34
14.696	2.116	-33	59	49.0	588	2.22	15.44	1.051	0	0.55	0.55	1.223	8.49	24.5	0.46	0.46	125.00	7375.00	2652.00	4723.00	2.18	7.68	289.96	-35
14.696	2.116	-34	60	50.0	600	2.25	15.64	1.064	0	0.55	0.55	1.238	8.60	25	0.45	0.45	125.00	7500.00	2714.40	4785.60	2.16	7.78	297.74	-36
14.696	2.116	-35	61	51.0	612	2.28	15.83	1.077	0	0.55	0.55	1.254	8.71	25.5	0.44	0.44	125.00	7625.00	2776.80	4848.20	2.15	7.88	305.62	-37
14.696	2.116	-36	62	52.0	624	2.31	16.03	1.091	0	0.55	0.55	1.269	8.82	26	0.43	0.43	125.00	7750.00	2839.20	4910.80	2.14	7.98	313.60	-38
14.696	2.116	-37	63	53.0	636	2.34	16.22	1.104	0	0.55	0.55	1.285	8.92	26.5	0.43	0.43	125.00	7875.00	2901.60	4973.40	2.12	8.07	321.67	-39
14.696	2.116	-38	64	54.0	648	2.36	16.42	1.117	0	0.55	0.55	1.300	9.03	27	0.42	0.42	125.00	8000.00	2964.00	5036.00	2.10	8.17	329.84	-40
14.696	2.116	-39	65	55.0	660	2.39	16.62	1.131	0	0.55	0.55	1.316	9.14	27.5	0.41	0.41	125.00	8125.00	3026.40	5098.60	2.09	8.27	338.11	-41
14.696	2.116	-40	66	56.0	672	2.42	16.81	1.144	0	0.55	0.55	1.331	9.25	28	0.40	0.40	125.00	8250.00	3088.80	5161.20	2.07	8.37	346.47	-42
14.696	2.116	-41	67	57.0	684	2.45	17.01	1.157	0	0.55	0.55	1.347	9.35	28.5	0.39	0.39	125.00	8375.00	3151.20	5223.80	2.05	8.46	354.94	-43
14.696	2.116	-42	68	58.0	696	2.48	17.20	1.171	0	0.55	0.55	1.362	9.46	29	0.38	0.38	125.00	8500.00	3213.60	5286.40	2.03	8.56	363.50	-44
14.696	2.116	-43	69	59.0	708	2.51	17.40	1.184	0	0.55	0.55	1.378	9.57	29.5	0.38	0.38	125.00	8625.00	3276.00	5349.00	2.01	8.66	372.16	-45
14.696	2.116	-44	70	60.0	720	2.53	17.59	1.197	0	0.55	0.55	1.393	9.68	30	0.37	0.37	125.00	8750.00	3338.40	5411.60	1.99	8.75	380.91	-46
14.696	2.116	-45	71	61.0	732	2.56	17.79	1.210	0	0.55	0.55	1.409	9.78	30.5	0.36	0.36	125.00	8875.00	3400.80	5474.20	1.97	8.85	389.76	-47
14.696	2.116	-46	72	62.0	744	2.59	17.98	1.224	0	0.55	0.55	1.424	9.89	31	0.35	0.35	125.00	9000.00	3463.20	5536.80	1.95	8.95	398.71	-48
14.696	2.116	-47	73	63.0	756	2.62	18.18	1.237	0	0.55	0.55	1.440	10.00	31.5	0.34	0.34	125.00	9125.00	3525.60	5599.40	1.93	9.05	407.76	-49
14.696	2.116	-48	74	64.0	768	2.65	18.38	1.250	0	0.55	0.55	1.455	10.11	32	0.34	0.34	125.00	9250.00	3588.00	5662.00	1.90	9.14	416.90	-50
14.696	2.116	-49	75	65.0	780	2.67	18.57	1.264	0	0.55	0.55	1.471	10.21	32.5	0.33	0.33	125.00	9375.00	3650.40	5724.60	1.88	9.24	426.14	-51
14.696	2.116	-50	76	66.0	792	2.70	18.77	1.277	0	0.55	0.55	1.486	10.32	33	0.32	0.32	125.00	9500.00	3712.80	5787.20	1.86	9.34	435.48	-52
14.696	2.116	-51	77	67.0	804	2.73	18.96	1.290	0	0.55	0.55	1.502	10.43	33.5	0.31	0.31	125.00	9625.00	3775.20	5849.80	1.83	9.44	444.92	-53
14.696	2.116	-52	78	68.0	816	2.76	19.16	1.304	0	0.55	0.55	1.517	10.54	34	0.31	0.31	125.00	9750.00	3837.60	5912.40	1.81	9.53	454.45	-54
14.696	2.116	-53	79	69.0	828	2.79	19.35	1.317	0	0.55	0.55	1.533	10.64	34.5	0.30	0.30	125.00	9875.00	3900.00	5975.00	1.78	9.63	464.08	-55
14.696	2.116	-54	80	70.0	840	2.82	19.55	1.330	0	0.55	0.55	1.548	10.75	35	0.29	0.29	125.00	10000.00	3962.40	6037.60	1.75	9.73	473.81	-56
14.696	2.116	-55	81	71.0	852	2.84	19.75	1.344	0	0.55	0.55	1.564	10.86	35.5	0.28	0.28	125.00	10125.00	4024.80	6100.20	1.72	9.83	483.64	-57
14.696	2.116	-56	82	72.0	864	2.87	19.94	1.357	0	0.55	0.55	1.579	10.97	36	0.28	0.28	125.00	10250.00	4087.20	6162.80	1.70	9.92	493.56	-58
14.696	2.116	-57	83	73.0	876	2.90	20.14	1.370	0	0.55	0.55	1.595	11.07	36.5	0.27	0.27	125.00	10375.00	4149.60	6225.40	1.67	10.02	503.58	-59
14.696	2.116	-58	84	74.0	888	2.93	20.33	1.383	0	0.55	0.55	1.610	11.18	37	0.26	0.26	125.00	10500.00	4212.00	6288.00	1.64	10.12	513.70	-60
14.696	2.116	-59	85	75.0	900	2.96	20.53	1.397	0	0.55	0.55	1.626	11.29	37.5	0.25	0.25	125.00	10625.00	4274.40	6350.60	1.61	10.22	523.91	-61
14.696	2.116	-60	86	76.0	912	2.98	20.72	1.410	0	0.55	0.55	1.641	11.40	38	0.25	0.25	125.00	10750.00	4336.80	6413.20	1.60	10.31	534.23	-62
14.696	2.116	-61	87	77.0	924	3.01	20.92	1.423	0	0.55	0.55	1.657	11.51	38.5	0.24	0.25	125.00	10875.00	4399.20	6475.80	1.62	10.41	544.64	-63
14.696	2.116	-62	88	78.0	936	3.04	21.11	1.437	0	0.55	0.55	1.672	11.61	39	0.23	0.25	125.00	11000.00	4461.60	6538.40	1.63	10.51	555.14	-64
14.696	2.116	-63	89	79.0	948	3.07	21.31	1.450	0	0.55	0.55	1.688	11.72	39.5	0.22	0.25	125.00	11125.00	4524.00	6601.00	1.65	10.60	565.75	-65
14.696	2.116	-64	90	80.0	960	3.10	21.51	1.463	0	0.55	0.55	1.703	11.83	40	0.22	0.25	125.00	11250.00	4586.40	6663.60	1.67	10.70	576.45	-66
14.696	2.116	-65	91	81.0	972	3.12	21.70	1.477	0	0.55	0.55	1.719	11.94	40.5	0.21	0.25	125.00	11375.00	4648.80	6726.20	1.68	10.80	587.25	-67
14.696	2.116	-66	92	82.0	984	3.15	21.90	1.490	0	0.55	0.55	1.734	12.04	41	0.20	0.25	125.00	11500.00	4711.20	6788.80	1.70	10.90	598.15	-68
14.696	2.116	-67	93	83.0	996	3.18	22.09	1.503	0	0.55	0.55	1.749	12.14	41.5	0.20	0.25	125.00	11625.00	4773.60	6851.40	1.71	10.99	609.13	-69
14.696	2.116	-68	94	84.0	1008	3.21	22.29	1.517	0	0.55	0.55	1.760	12.22	42	0.19	0.25	125.00	11750.00	4836.00	6914.00	1.73	11.06	620.19	-70
14.696	2.116	-69	95	85.0	1020	3.24	22.48	1.530	0	0.55	0.55	1.771	12.30	42.5	0.18	0.25	125.00	11875.00	4898.40	6976.60	1.74	11.13	631.32	-71
14.696	2.116	-70	96	86.0	1032	3.27	22.68	1.543	0	0.55	0.55	1.782	12.38	43	0.17	0.25	125.00	12000.00	4960.80	7039.20	1.76	11.20	642.52	-72
14.696	2.116	-71	97	87.0	1044	3.29	22.88	1.557	0	0.54	0.54	1.793	12.45	43.5	0.17	0.25	125.00	12125.00	5023.20	7101.80	1.78	11.27	653.78	-73
14.696	2.116	-72	98	88.0	1056	3.32	23.07	1.570	0	0.54	0.54	1.804	12.53	44	0.16	0.25	125.00	12250.00	5085.60	7164.40	1.79	11.33	665.12	-74
14.696	2.116	-73	99	89.0	1068	3.35	23.27	1.583	0	0.54	0.54	1.815	12.60	44.5	0.15	0.25	125.00	12375.00	5148.00	7227.00	1.81	11.40	676.52	-75
14.696	2.116	-74	100	90.0	1080	3.38	23.46	1.596	0	0.54	0.54	1.826	12.68	45	0.15	0.25	125.00	12500.00	5210.40	7289.60	1.82	11.47	687.99	-76
14.696	2.116	-75	101	91.0	1092	3.41	23.66	1.610	0	0.54	0.54	1.836	12.75	45.5	0.14	0.25	125.00	12625.00	5272.80	7352.20	1.84	11.54	699.53	-77
14.696	2.116	-76	102	92.0	1104	3.43	23.85	1.623	0	0.54	0.54	1.847	12.83	46	0.13	0.25	125.00	12750.00	5335.20	7414.80	1.85	11.60	711.13	-78
14.696	2.116	-77	103	93.0	1116	3.46	24.05	1.636	0	0.54	0.54	1.857	12.90	46.5	0.13	0.25	125.00	12875.00	5397.60	7477.40	1.87	11.67	722.80	-79
14.696	2.116	-78	104	94.0	1128	3.49	24.24	1.650	0	0.54	0.54	1.868	12.97	47	0.12	0.25	125.00	13000.00	5460.00	7540.00	1.89	11.74	734.54	-80
14.696	2.116	-79	105	95.0	1140	3.52	24.44	1.663	0	0.53	0.53	1.878	13.04	47.5	0.11	0.25	125.00	13125.00	5522.40	7602.60	1.90	11.80	746.34	-81
14.696	2.116	-80	106	96.0	1152	3.55	24.64	1.676	0	0.53	0.53	1.889	13.12	48	0.11	0.25	125.00	13250.00	5584.80	7665.20	1.92	11.87	758.21	-82
14.696	2.116	-81	107	97.0	1164	3.58	24.83	1.690	0	0.53	0.53	1.899	13.19	48.5	0.10	0.25	125.00	13375.00	5647.20	7727.80	1.93	11.93	770.14	-83
14.696	2.116	-82	108	98.0	1176	3.60	25.03	1.703	0	0.53	0.53	1.909	13.26	49	0.09	0.25	125.00	13500.00	5709.60	7790.40	1.95	11.99	782.13	-84
14.696	2.116	-83	109	99.0	1188	3.63	25.22	1.716	0	0.53	0.53	1.919	13.33	49.5	0.09	0.25	125.00	13625.00	5772.00	7853.00	1.96	12.06	794.19	-85
14.696	2.116	-84	110	100.0	1200	3.66	25.42	1.730	0	0.53	0.53	1.929	13.40	50	0.08	0.25	125.00	13750.00	5834.40	7915.60	1.98	12.12	806.31	-86
14.696	2.116	-85	111	101.0	1212	3.69	25.61	1.743	0	0.53	0.53	1.939	13.47	50.5	0.07	0.25	125.00	13875.00	5896.80	7978.20	1.99	12.18	818.49	-87
14.696	2.116	-86	112	102.0	1224	3.72	25.81	1.756	0	0.52	0.52	1.949	13.53	51	0.07	0.25	125.00	14000.00	5959.20	8040.80	2.01	12.25	830.74	-88
14.696	2.116	-87	113	103.0	1236	3.74	26.01	1.770	0	0.52	0.52	1.959	13.60	51.5	0.06	0.25	125.00	14125.00	6021.60	8103.40	2.03	12.31	843.05	-89
14.696	2.116	-88	114	104.0	1248	3.77	26.20	1.783	0	0.52	0.52	1.968	13.67	52	0.06	0.25	125.00	14250.00	6084.00	8166.00	2.04	12.37	855.41	-90
14.696	2.116	-89	115	105.0	1260	3.80	26.40	1.796	0	0.52	0.52	1.978	13.74	52.5	0.05	0.25	125.00	14375.00	6146.40	8228.60	2.06	12.43	867.84	-91
14.696	2.116	-90	116	106.0	1272	3.83	26.59	1.809	0	0.52	0.52	1.988	13.80	53	0.04	0.25	125.00	14500.00	6208.80	8291.20	2.07	12.49	880.33	-92
14.696	2.116	-91	117	107.0	1284	3.86	26.79	1.823	0	0.52	0.52	1.997	13.87	53.5	0.04	0.25	125.00	14625.00	6271.20	8353.80	2.09	12.55	892.88	-93
14.696	2.116	-92	118	108.0	1296	3.89	26.98	1.836	0	0.52	0.52	2.006	13.93	54	0.03	0.25	125.00	14750.00	6333.60	8416.40	2.10	12.61	905.48	-94
14.696	2.116	-93	119	109.0	1308	3.91	27.18	1.849	0	0.52	0.52	2.016	14.00	54.5	0.02	0.25	125.00	14875.00	6396.00	8479.00	2.12	12.67	918.15	-95
14.696	2.116	-94	120	110.0	1320	3.94	27.37	1.863	0	0.51	0.51	2.025	14.06	55	0.02	0.25	125.00	15000.00	6458.40	8541.60	2.14	12.72	930.87	-96
14.696	2.116	-95	121	111.0	1332	3.97	27.57	1.876	0	0.51	0.51	2.034	14.13	55.5	0.01	0.25	125.00	15125.00	6520.80	8604.20	2.15	12.78	943.66	-97
14.696	2.116	-96	122	112.0	1344	4.00	27.77	1.889	0	0.51	0.51	2.043	14.19	56	0.01	0.25	125.00	15250.00	6583.20	8666.80	2.17	12.84	956.49	-98
14.696	2.116	-97	123	113.0	1356	4.03	27.96	1.903	0	0.51	0.51	2.052	14.25	56.5	0.00	0.25	125.00	15375.00	6645.60	8729.40	2.18	12.90	969.39	-99
14.696	2.116	-98	124	114.0	1368	4.05	28.16	1.916	0	0.51	0.51	2.061	14.32	57	-0.01	0.25	125.00	15500.00	6708.00	8792.00	2.20	12.95	982.34	-100
14.696	2.116	-99	125	115.0	1380	4.08	28.35	1.929	0	0.51	0.51	2.070	14.38	57.5	-0.01	0.25	125.00	15625.00	6770.40	8854.60	2.21	13.01	995.35	-101
14.696	2.116	-100	126	116.0	1392	4.11	28.55	1.943	0	0.51	0.51	2.079	14.44	58	-0.02	0.25	125.00	15750.00	6832.80	8917.20	2.23	13.06	1008.41	-102
14.696	2.116	-101	127	117.0	1404	4.14	28.74	1.956	0	0.50	0.50	2.088	14.50	58.5	-0.02	0.25	125.00	15875.00	6895.20	8979.80	2.24	13.12	1021.53	-103
14.696	2.116	-102	128	118.0	1416	4.17	28.94	1.969	0	0.50	0.50	2.096	14.56	59	-0.03	0.25	125.00	16000.00	6957.60	9042.40	2.26	13.17	1034.70	-104
14.696	2.116	-103	129	119.0	1428	4.20	29.14	1.983	0	0.50	0.50	2.105	14.62	59.5	-0.04	0.25	125.00	16125.00	7020.00	9105.00	2.28	13.23	1047.93	-105
14.696	2.116	-104	130	120.0	1440	4.22	29.33	1.996	0	0.50	0.50	2.114	14.68	60	-0.04	0.25	125.00	16250.00	7082.40	9167.60	2.29	13.28	1061.21	-106
14.696	2.116	-105	131	121.0	1452	4.25	29.53	2.009	0	0.50	0.50	2.122	14.74	60.5	-0.05	0.25	125.00	16375.00	7144.80	9230.20	2.31	13.33	1074.54	-107
14.696	2.116	-106	132	122.0	1464	4.28	29.72	2.022	0	0.50	0.50	2.130	14.79	61	-0.05	0.25	125.00	16500.00	7207.20	9292.80	2.32	13.39	1087.93	-108
14.696	2.116	-107	133	123.0	1476	4.31	29.92	2.036	0	0.50	0.50	2.139	14.85	61.5	-0.06	0.25	125.00	16625.00	7269.60	9355.40	2.34	13.44	1101.37	-109
14.696	2.116	-108	134	124.0	1488	4.34	30.11	2.049	0	0.50	0.50	2.147	14.91	62	-0.07	0.25	125.00	16750.00	7332.00	9418.00	2.35	13.49	1114.86	-110
14.696	2.116	-109	135	125.0	1500	4.36	30.31	2.062	0	0.49	0.49	2.155	14.97	62.5	-0.07	0.25	125.00	16875.00	7394.40	9480.60	2.37	13.54	1128.40	-111
14.696	2.116	-110	136	126.0	1512	4.39	30.50	2.076	0	0.49	0.49	2.163	15.02	63	-0.08	0.25	125.00	17000.00	7456.80	9543.20	2.39	13.59	1141.99	-112
14.696	2.116	-111	137	127.0	1524	4.42	30.70	2.089	0	0.49	0.49	2.171	15.08	63.5	-0.08	0.25	125.00	17125.00	7519.20	9605.80	2.40	13.64	1155.63	-113
14.696	2.116	-112	138	128.0	1536	4.45	30.90	2.102	0	0.49	0.49	2.179	15.13	64	-0.09	0.25	125.00	17250.00	7581.60	9668.40	2.42	13.69	1169.32	-114
14.696	2.116	-113	139	129.0	1548	4.48	31.09	2.116	0	0.49	0.49	2.187	15.19	64.5	-0.09	0.25	125.00	17375.00	7644.00	9731.00	2.43	13.74	1183.06	-115
14.696	2.116	-114	140	130.0	1560	4.51	31.29	2.129	0	0.49	0.49	2.195	15.24	65	-0.10	0.25	125.00	17500.00	7706.40	9793.60	2.45	13.79	1196.85	-116
14.696	2.116	-115	141	131.0	1572	4.53	31.48	2.142	0	0.49	0.49	2.202	15.29	65.5	-0.11	0.25	125.00	17625.00	7768.80	9856.20	2.46	13.84	1210.68	-117
14.696	2.116	-116	142	132.0	1584	4.56	31.68	2.156	0	0.48	0.48	2.210	15.35	66	-0.11	0.25	125.00	17750.00	7831.20	9918.80	2.48	13.88	1224.57	-118
14.696	2.116	-117	143	133.0	1596	4.59	31.87	2.169	0	0.48	0.48	2.217	15.40	66.5	-0.12	0.25	125.00	17875.00	7893.60	9981.40	2.50	13.93	1238.50	-119
14.696	2.116	-118	144	134.0	1608	4.62	32.07	2.182	0	0.48	0.48	2.225	15.45	67	-0.12	0.25	125.00	18000.00	7956.00	10044.00	2.51	13.98	1252.48	-120
14.696	2.116	-119	145	135.0	1620	4.65	32.27	2.195	0	0.48	0.48	2.232	15.50	67.5	-0.13	0.25	125.00	18125.00	8018.40	10106.60	2.53	14.03	1266.51	-121
14.696	2.116	-120	146	136.0	1632	4.67	32.46	2.209	0	0.48	0.48	2.240	15.55	68	-0.13	0.25	125.00	18250.00	8080.80	10169.20	2.54	14.07	1280.58	-122
14.696	2.116	-121	147	137.0	1644	4.70	32.66	2.222	0	0.48	0.48	2.247	15.60	68.5	-0.14	0.25	125.00	18375.00	8143.20	10231.80	2.56	14.12	1294.70	-123
14.696	2.116	-122	148	138.0	1656	4.73	32.85	2.235	0	0.48	0.48	2.254	15.65	69	-0.15	0.25	125.00	18500.00	8205.60	10294.40	2.57	14.16	1308.86	-124
14.696	2.116	-123	149	139.0	1668	4.76	33.05	2.249	0	0.48	0.48	2.261	15.70	69.5	-0.15	0.25	125.00	18625.00	8268.00	10357.00	2.59	14.21	1323.06	-125
14.696	2.116	-124	150	140.0	1680	4.79	33.24	2.262	0	0.47	0.47	2.268	15.75	70	-0.16	0.25	125.00	18750.00	8330.40	10419.60	2.60	14.25	1337.31	-126
14.696	2.116	-125	151	141.0	1692	4.82	33.44	2.275	0	0.47	0.47	2.275	15.80	70.5	-0.16	0.25	125.00	18875.00	8392.80	10482.20	2.62	14.29	1351.61	-127

```
LPILEP6
TITLE
Project Name:
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853733000000E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  4.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.97500000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.50000000000000E+0000  9.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        9.50000000000000E+0000  2.20000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```

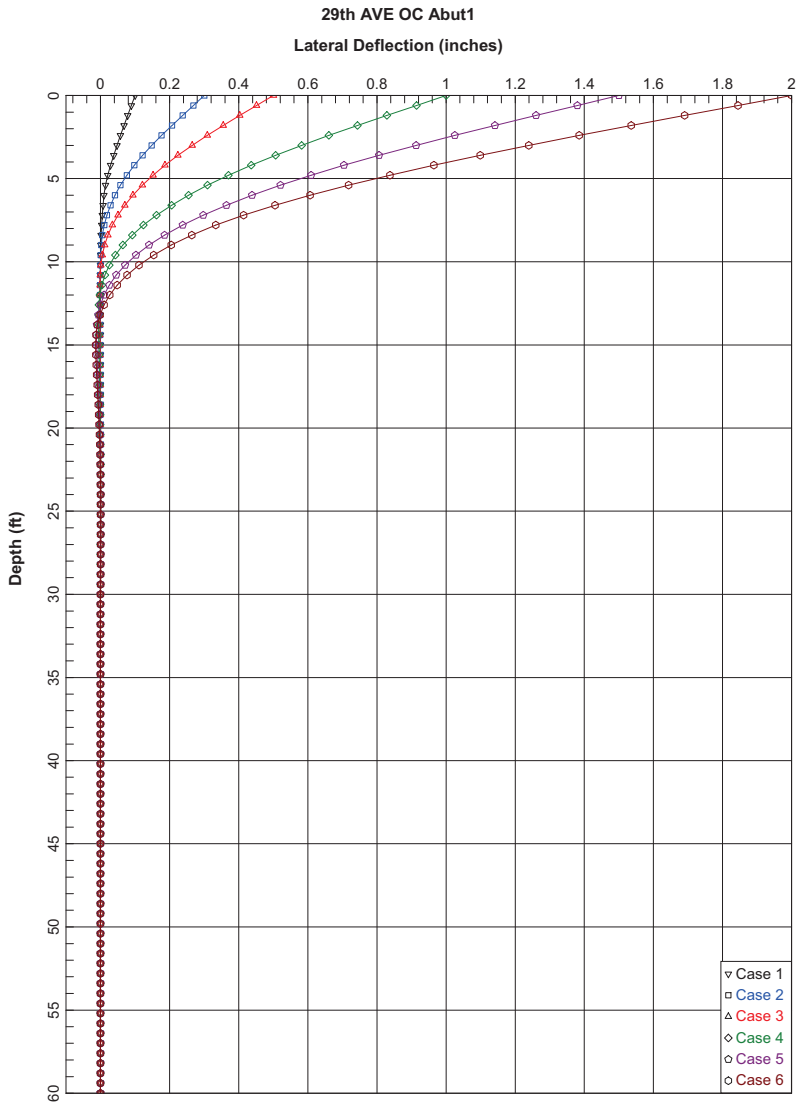


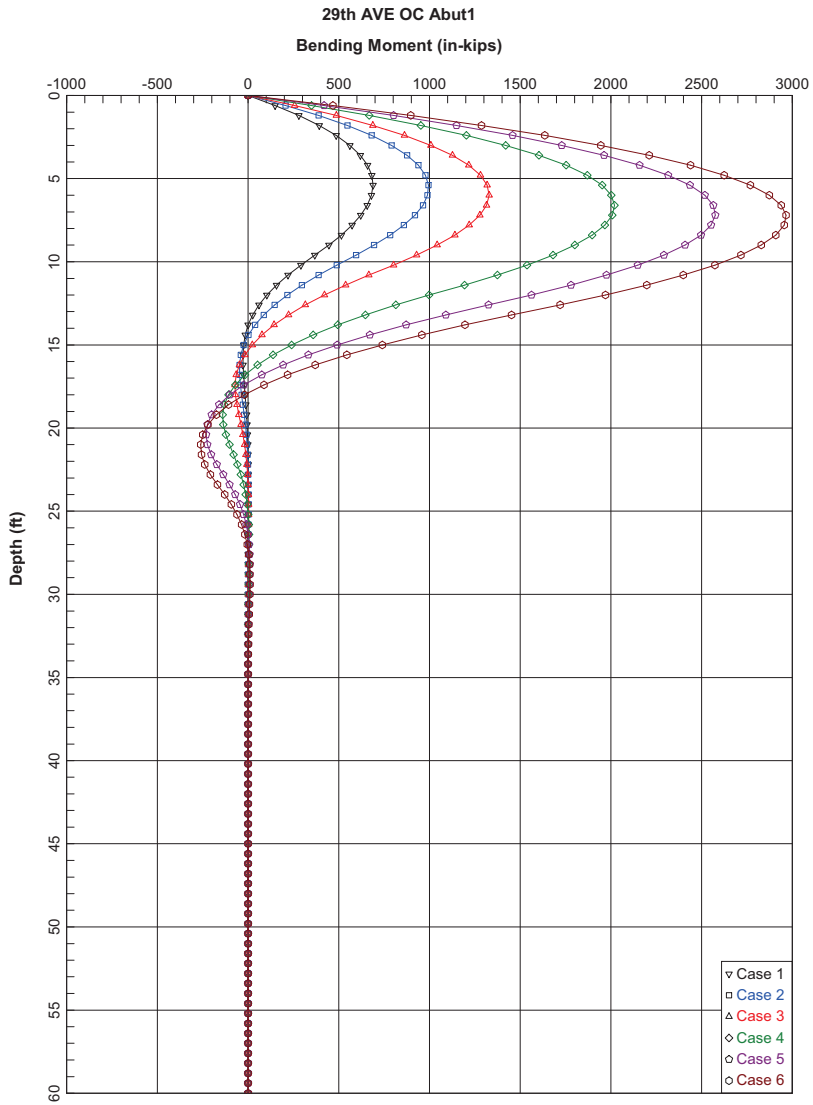
```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.20000000000000E+0001  3.95000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.95000000000000E+0001  9.45000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.55000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
6 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

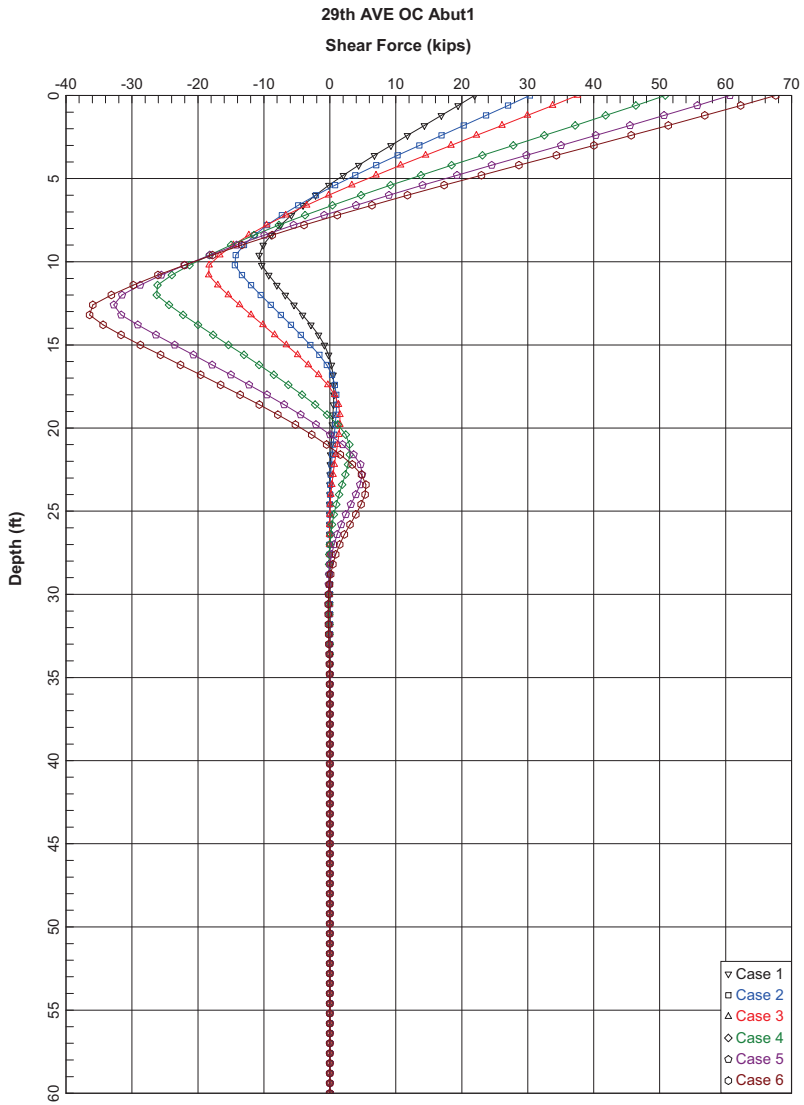
```
LPILEP6
TITLE
New LPILE Plus 5.0 Data File
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.00000000000000E+0001 = Section length (ft)
 2.40000000000000E+0001 = Shaft diameter (in)
 4.00000000000000E+0003 = Concrete Compressive Strength (psi)
 7.50000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.00000000000000E+0004 = yield stress of bars (psi)
 2.90000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.00000000000000E+0000 = bar diameter (in)
 7.90000000000000E-0001 = bar area (sq. in.)
 1.49853732932032E+0000 = rebar cover (in)
 0.00000000000000E+0000 = rebar offset (in)
SOIL LAYERS
5 = number of soil layers
3        0.00000000000000E+0000  6.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.07500000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        6.50000000000000E+0000  1.15000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.15000000000000E+0001  2.40000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = bot gamma
```

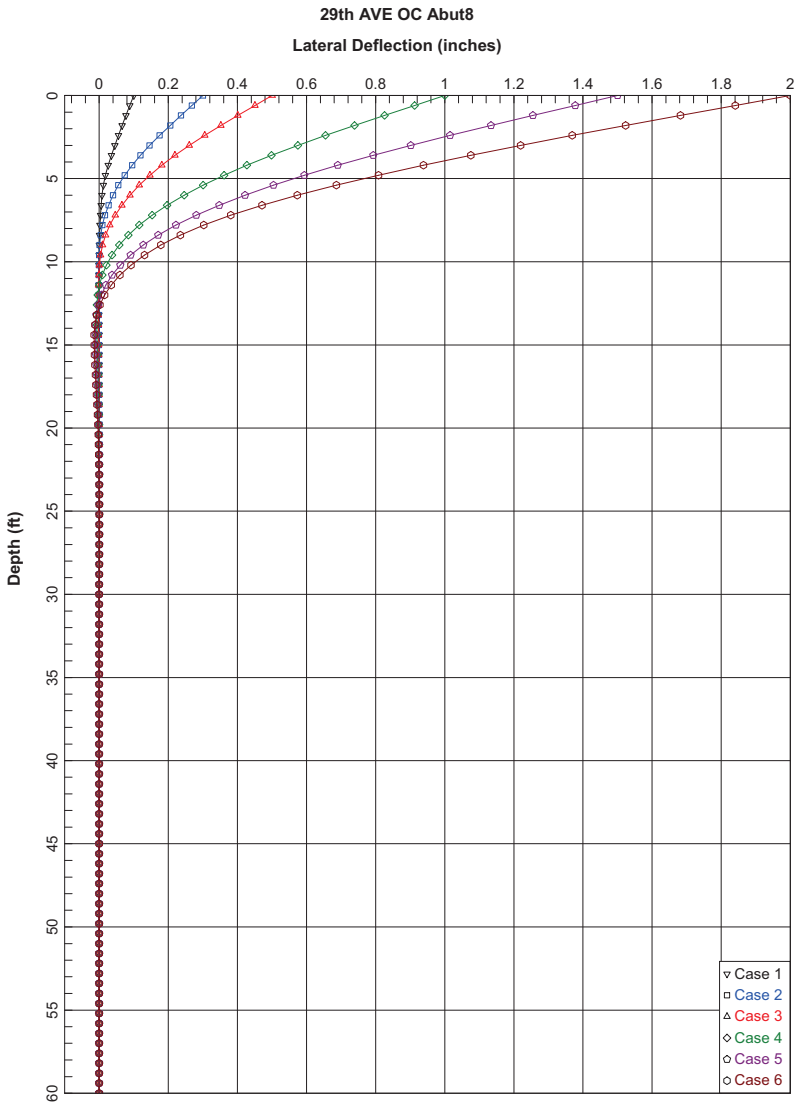


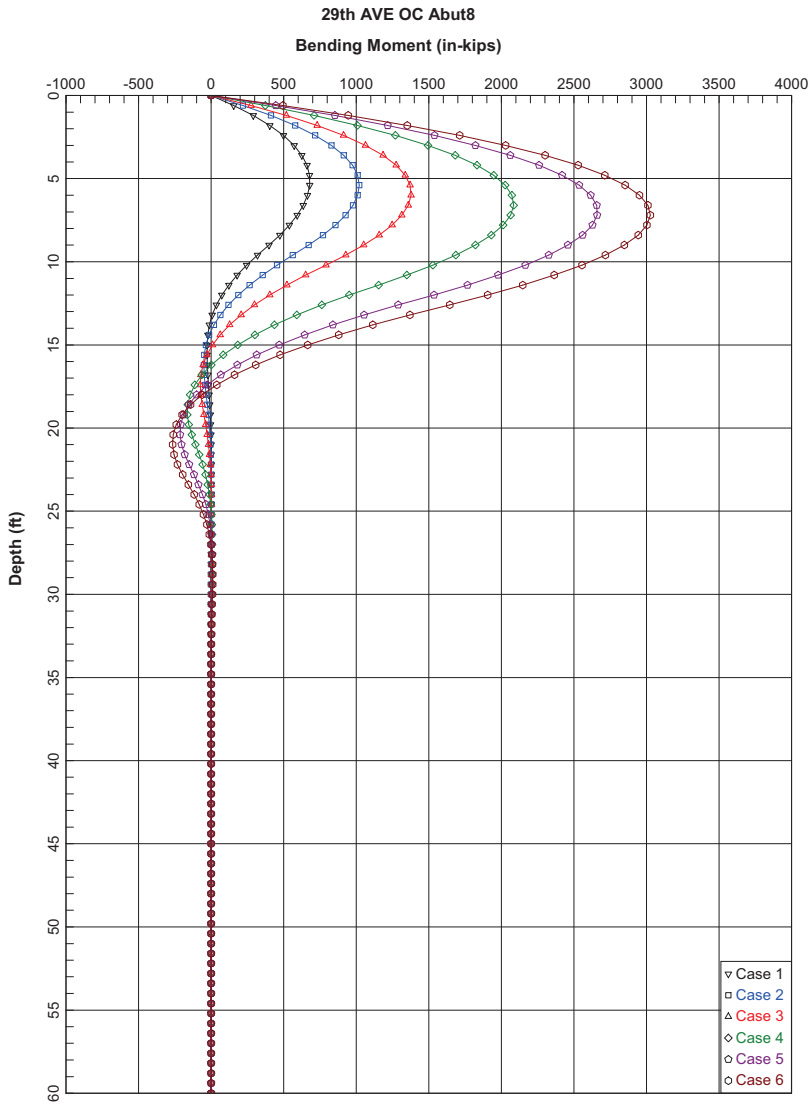
```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.40000000000000E+0001  4.15000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  1.50000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.15000000000000E+0001  9.65000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.25000000000000E+0001  2.00000000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.25000000000000E+0001  3.55000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
6 = Number of load cases
1       4        1.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       4        3.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       4        5.00000000000000E-0001  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       4        1.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5       4        1.50000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6       4        2.00000000000000E+0000  0.00000000000000E+0000
0.00000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

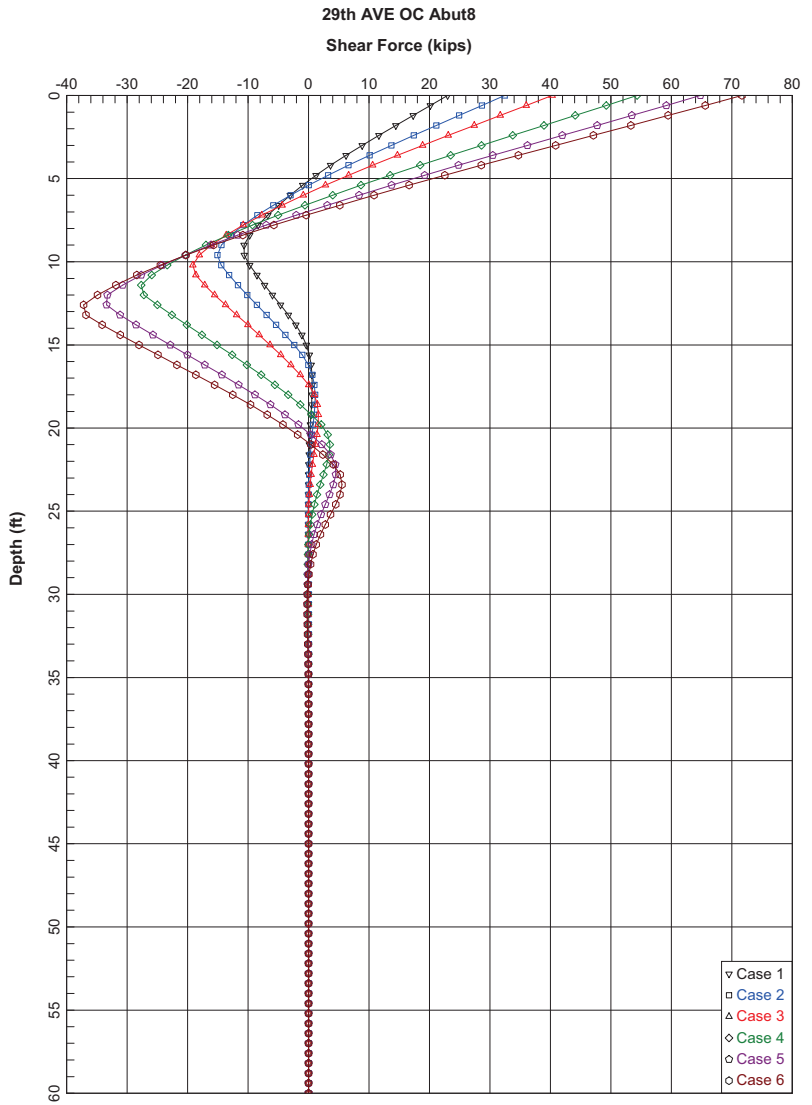

29th AVE OC Abut1
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


29th AVE OC Abut1
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


29th AVE OC Abut1
Shear Force (kips)
Depth (ft)
-40 -30 -20 -10 0 10 20 30 40 50 60 70
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


29th AVE OC Abut8
Lateral Deflection (inches)
Depth (ft)
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

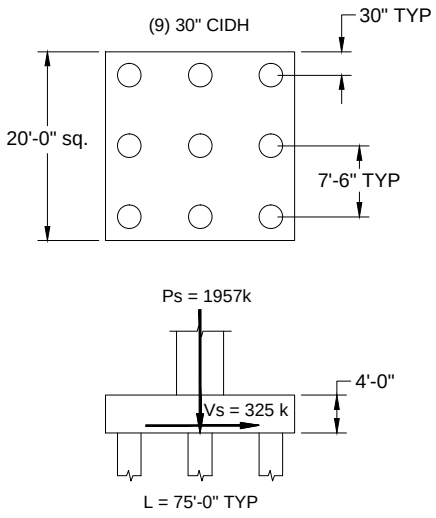

29th AVE OC Abut8
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


29th AVE OC Abut8
Shear Force (kips)
Depth (ft)
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

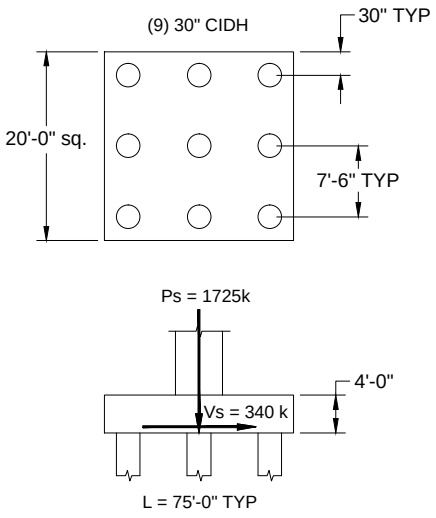
SERVICE-1 LOAD CASE

CIDH Material Properties
f'c = 4,000 psi
Ec = 3,834 ksi
fy = 60,000 psi
Es = 29,000,000 psi

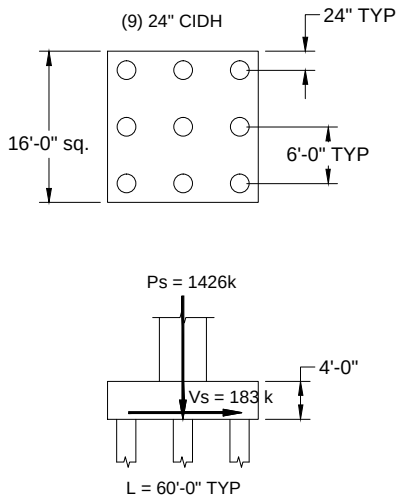
BENT 2



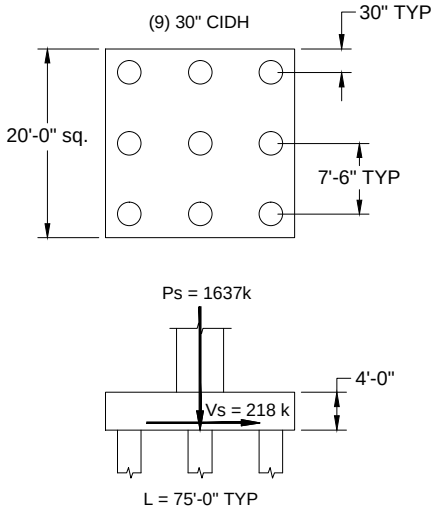
BENT 3



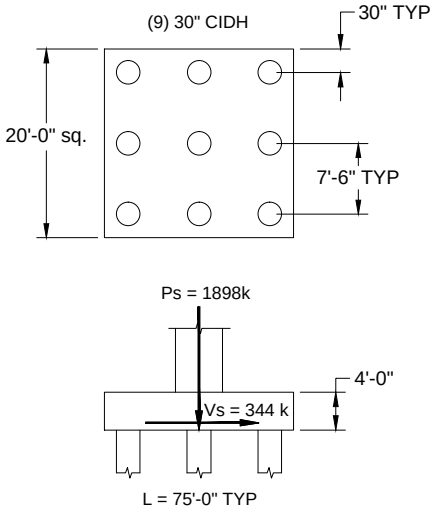
BENT 4



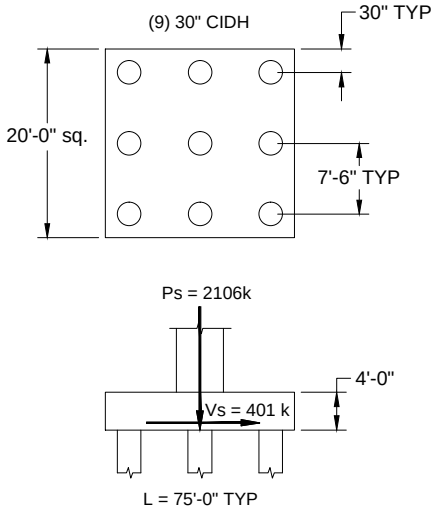
BENT 5



BENT 6



BENT 7

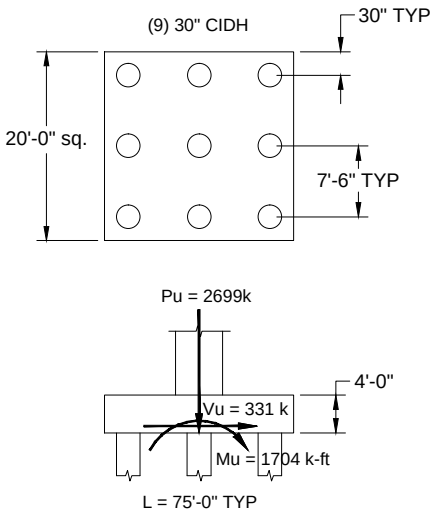


Note: All loads shown are applied at top of pile group.

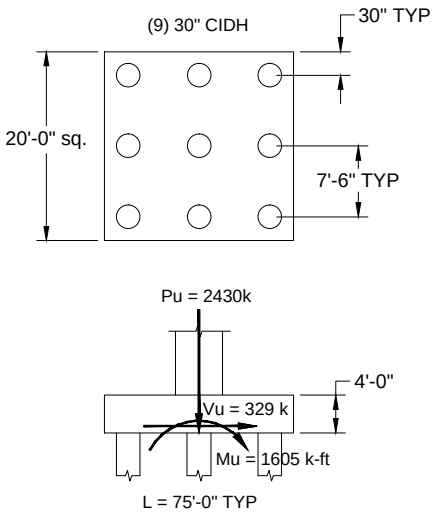
STRENGTH LOAD CASE

CIDH Material Properties
f'c = 4,000 psi
Ec = 3,834 ksi
fy = 60,000 psi
Es = 29,000,000 psi

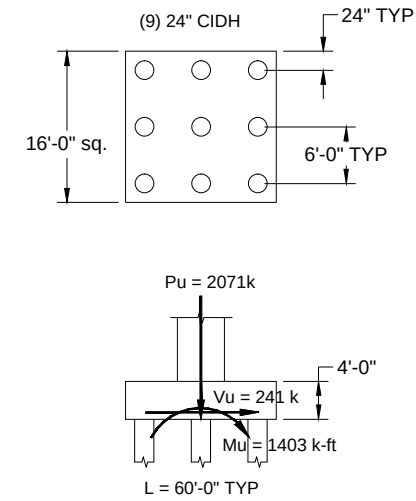
BENT 2



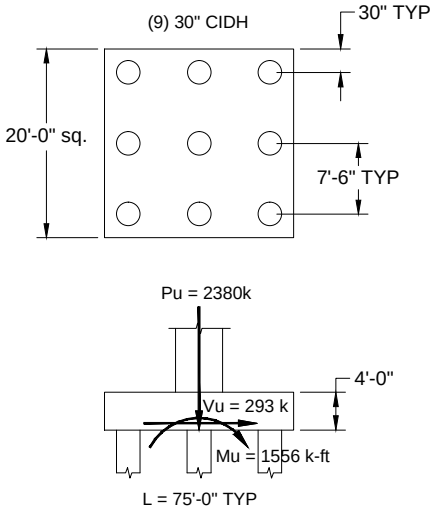
BENT 3



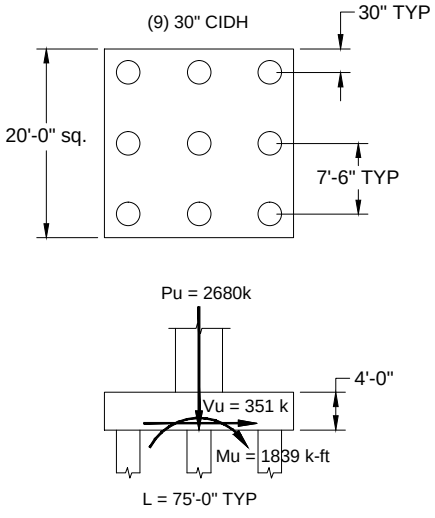
BENT 4



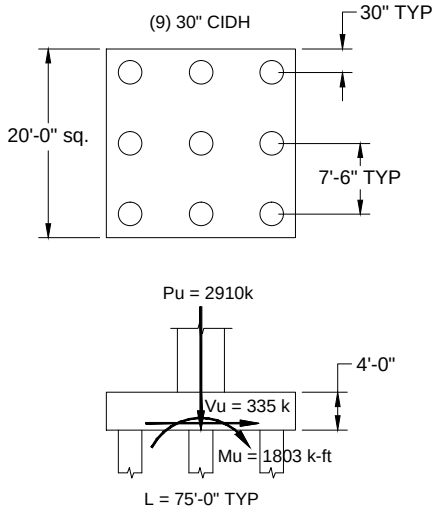
BENT 5



BENT 6



BENT 7

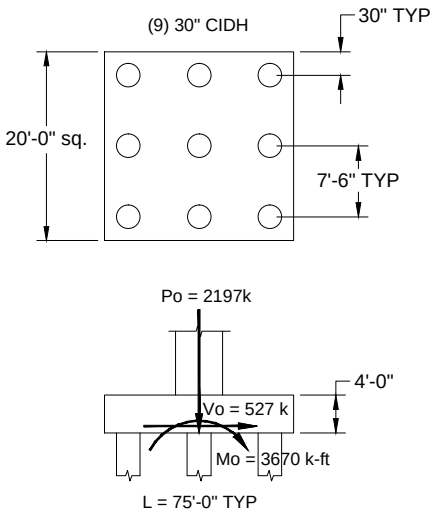


Note: All loads shown are applied at top of pile group.

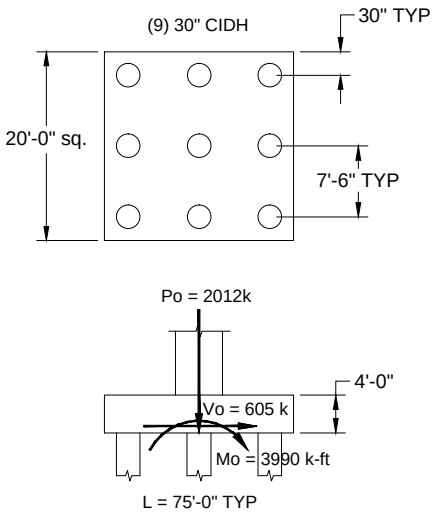
EXTREME EVENT LOAD CASE

CIDH Material Properties
f'c = 5,200 psi (expected properties)
Ec = 4,372 ksi (expected properties)
fy = 68,000 psi (expected properties)
Es = 29,000,000 psi

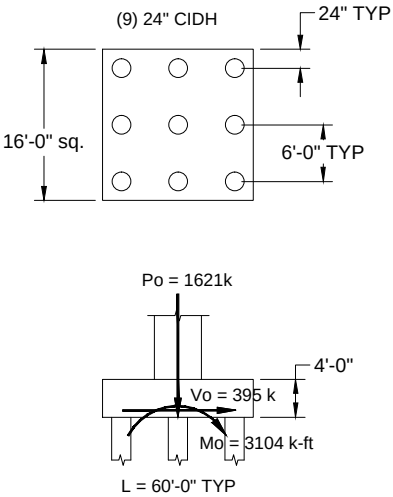
BENT 2



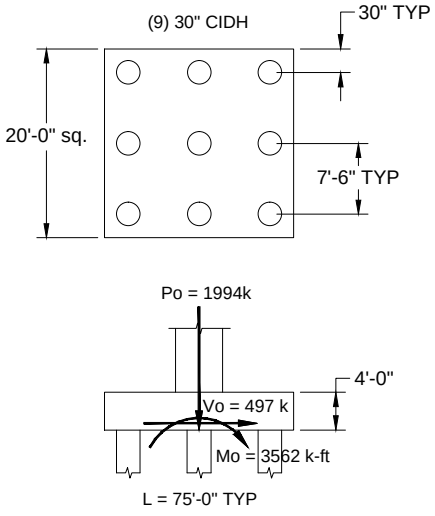
BENT 3



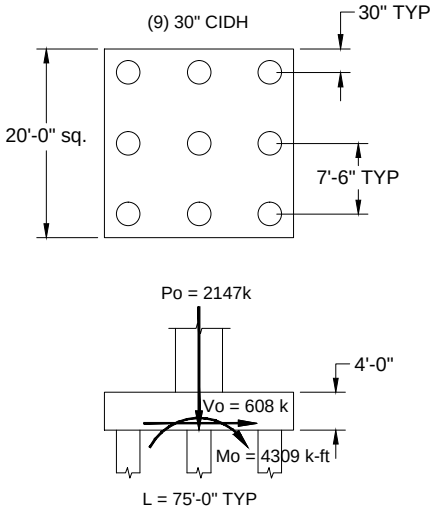
BENT 4



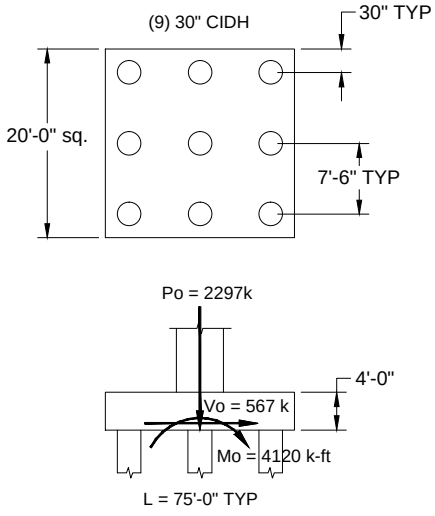
BENT 5



BENT 6



BENT 7



Note: All loads shown are applied at top of pile group.

```
New Group
GROUP8.0.14
* Analysis Parameters
1 2 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
2.4000000E+02 2.4000000E+02 4.8000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 1 0 0
0 1 1 0
1
1957000 325000 0 0 0 0 0 0 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
3
1 3 1 0 0
0 90 1 1 1
0 -90 0 -141
1 3 1 0 0
0 90 1 1 1
0 0 0 -141
1 3 1 0 0
0 90 1 1 1
0 90 0 -141
* Pile Properties
1
0 1
100 900 3600000 2
0 900 1 1 1
* Pile Cross Sections
1
0 0 0
Section
30 0 1 1 0 0 0.1 0.1
1 706.9 39761 39761 79522 1.1451168E11 0 0 0 0
* Soil Layers
4
0 3
-141 3
2 10
0.072 16.319444 0 0 0 0.005 0 0 0 0
0.072 12.152778 0 0 0 0.007 0 0 0 0
1 3
3 63
2 10
0.036 12.152778 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
2 3
63 213
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
213 1083
2 10
```

```
                                3x3 30 inch pile bent 2
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 24.652778 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 10
0 0
1400000 1E-5
1400000 3E-5
4700000 0.0001
5700000 0.00013
6000000 0.00016
6450000 0.00022
6850000 0.00028
6950000 0.0004
7000000 0.0005
* End of file
```

```
New Group
GROUP8.0.14
* Analysis Parameters
1 2 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
2.4000000E+02 2.4000000E+02 4.8000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 1 0 0
0 1 1 0
1
1725000 340000 0 0 0 0 0 0 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
3
1 3 1 0 0
0 90 1 1 1
0 -90 0 -81
1 3 1 0 0
0 90 1 1 1
0 0 0 -81
1 3 1 0 0
0 90 1 1 1
0 90 0 -81
* Pile Properties
1
0 1
100 900 3600000 2
0 900 1 1 0
* Pile Cross Sections
1
0 0 0
Section
30 0 1 1 0 0 0.1 0.1
1 706.9 39761 39761 0 0 0 0 0 0
* Soil Layers
4
0 3
-81 75
2 10
0.072 16.666667 0 0 0 0.005 0 0 0 0
0.072 12.152778 0 0 0 0.007 0 0 0 0
1 3
75 135
2 10
0.036 12.152778 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
2 3
135 285
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
285 1155
2 10
```

```
                                3x3 30 inch pile bent 3
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 24.652778 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 10
0 0
1400000 1E-5
1400000 3E-5
4700000 0.0001
5700000 0.00013
6000000 0.00016
6450000 0.00022
6850000 0.00028
6950000 0.0004
7000000 0.00055
* End of file
```

```
New Group
GROUP8.0.14
* Analysis Parameters
1 2 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
1.9200000E+02 1.9200000E+02 4.8000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 1 0 0
0 1 1 0
1
1426000 183000 0 0 0 0 0 0 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
3
1 3 1 0 0
0 72 1 1 1
0 -72 0 -81
1 3 1 0 0
0 72 1 1 1
0 0 0 -81
1 3 1 0 0
0 72 1 1 1
0 72 0 -81
* Pile Properties
1
0 1
100 720 3600000 2
0 720 1 1 0
* Pile Cross Sections
1
0 0 0
Section
24 0 1 1 0 0 0.1 0.1
1 452.4 39761 39761 0 0 0 0 0 0
* Soil Layers
4
0 3
-81 51
2 10
0.072 15.972222 0 0 0 0.005 0 0 0 0
0.072 12.152778 0 0 0 0.007 0 0 0 0
1 3
51 111
2 10
0.036 12.152778 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
2 3
111 261
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
261 1131
2 10
```

3x3 24 inch pile bent 4
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 24.652778 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 8
0 0
660000 1E-5
660000 3.5E-5
2480000 0.00014
2840000 0.000165
3360000 0.00033
3400000 0.0005
3430000 0.0008
* End of file

```
New Group
GROUP8.0.14
* Analysis Parameters
1 2 1 0 0 0 0 1 1 0 1 0
* Pile Cap Dimensions
2.4000000E+02 2.4000000E+02 4.8000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 1 0 0
0 1 1 0
1
1637000 218000 0 0 0 0 0 0 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
1
1
0 0
* Pile Group Configuration
3
1 3 1 0 0
0 90 1 1 1
0 -90 0 -69
1 3 1 0 0
0 90 1 1 1
0 0 0 -69
1 3 1 0 0
0 90 1 1 1
0 90 0 -69
* Pile Properties
1
0 1
100 900 3600000 2
0 900 1 1 0
* Pile Cross Sections
1
0 0 0
Section
30 0 1 1 0 0 0.1 0.1
1 706.9 39761 39761 0 0 0 0 0 0
* Soil Layers
4
0 3
-69 51
2 10
0.072 15.625 0 0 0 0.005 0 0 0 0
0.072 12.152778 0 0 0 0.007 0 0 0 0
1 3
51 111
2 10
0.036 12.152778 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
2 3
111 261
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
```

```
261 1131
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 24.652778 0 0 0 0.005 0 0 0 0
* Print py curves
1
1 0
0
* User defined MC curves
1
1 1
0
1 10
0 0
1400000 1E-5
1400000 3E-5
4700000 0.0001
5700000 0.00013
6000000 0.00016
6450000 0.00022
6850000 0.00028
6950000 0.0004
7000000 0.00055
* End of file
```

```
New Group
GROUP8.0.14
* Analysis Parameters
1 2 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
2.4000000E+02 2.4000000E+02 4.8000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 1 0 0
0 1 1 0
1
1898000 344000 0 0 0 0 0 0 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
3
1 3 1 0 0
0 90 1 1 1
0 -90 0 -87
1 3 1 0 0
0 90 1 1 1
0 0 0 -87
1 3 1 0 0
0 90 1 1 1
0 90 0 -87
* Pile Properties
1
0 1
100 900 3834000 2
0 900 1 1 0
* Pile Cross Sections
1
0 0 0
Section
30 0 1 1 0 0 0.1 0.1
1 707 39761 39761 0 0 0 0 0 0
* Soil Layers
4
0 3
-87 63
2 10
0.072 16.493056 0 0 0 0.005 0 0 0 0
0.072 12.152778 0 0 0 0.007 0 0 0 0
1 3
63 123
2 10
0.036 12.152778 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
2 3
123 273
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
273 1143
2 10
```

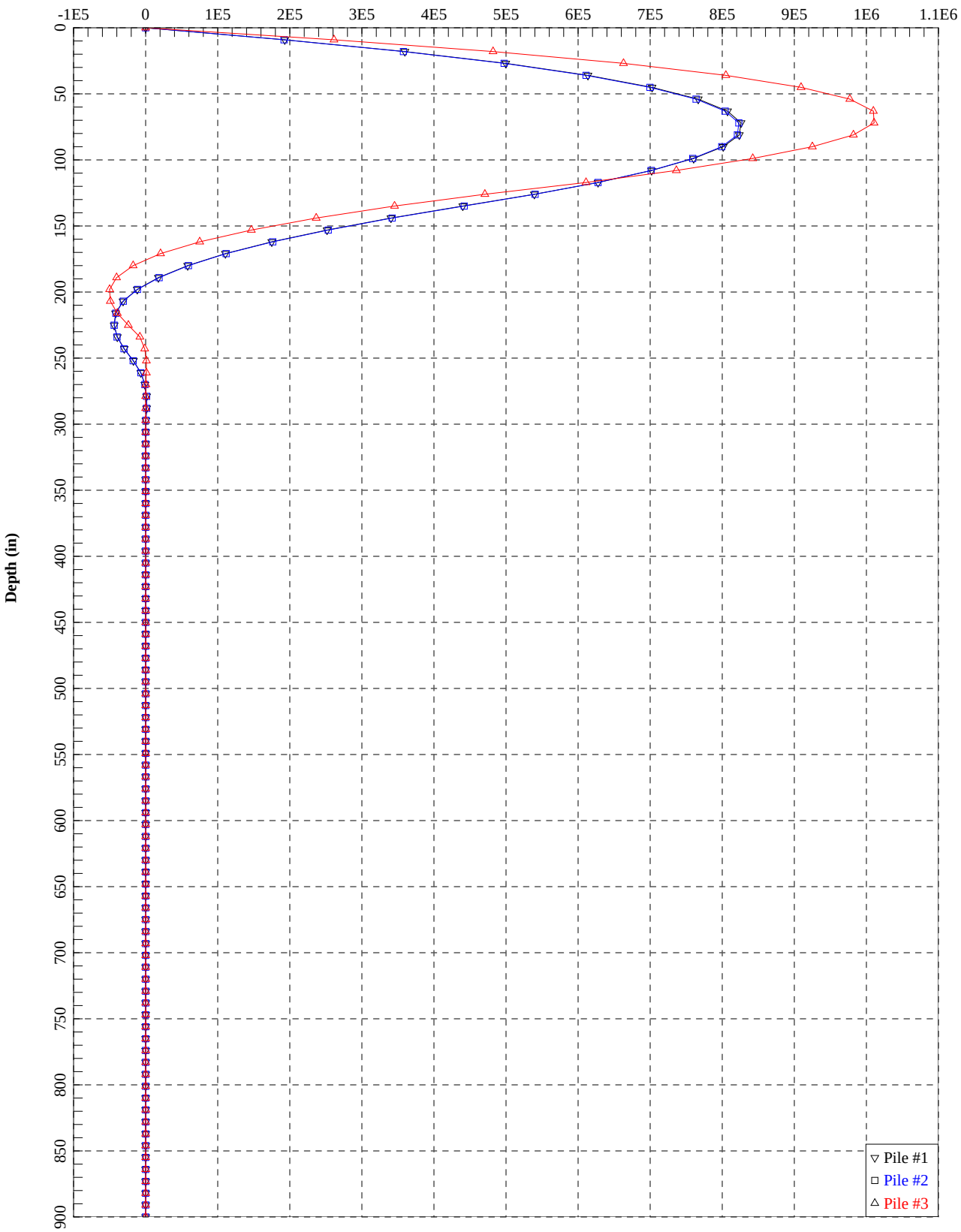
3x3 30 inch pile bent 6
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 24.652778 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 10
0 0
1400000 1E-5
1400000 3E-5
4700000 0.0001
5700000 0.00013
6000000 0.00016
6450000 0.00022
6850000 0.00028
6950000 0.0004
7000000 0.00055
* End of file

```
New Group
GROUP8.0.14
* Analysis Parameters
1 2 1 0 0 0 0 1 1 0 0 0
* Pile Cap Dimensions
2.4000000E+02 2.4000000E+02 4.8000000E+01
* Load Cases
1 0 0 1
0 1 0 1 1 100 100
0.0001 0.0001 1 1
Load Case
0 0 0 0 1 0 0
0 1 1 0
1
2106000 401000 0 0 0 0 0 0 0
0
0
* Load Combinations
0 0 0 1
* Distributed Load Sets
0
* Pile Group Configuration
3
1 3 1 0 0
0 90 1 1 1
0 -90 0 -159
1 3 1 0 0
0 90 1 1 1
0 0 0 -159
1 3 1 0 0
0 90 1 1 1
0 90 0 -159
* Pile Properties
1
0 1
100 900 3834000 2
0 900 1 1 0
* Pile Cross Sections
1
0 0 0
Section
30 0 1 1 0 0 0.1 0.1
1 707 39761 39761 0 0 0 0 0 0
* Soil Layers
4
0 3
-159 15
2 10
0.072 17.1875 0 0 0 0.005 0 0 0 0
0.072 12.152778 0 0 0 0.007 0 0 0 0
1 3
15 75
2 10
0.036 12.152778 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
2 3
75 225
2 10
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 10.416667 0 0 0 0.007 0 0 0 0
3 3
225 1095
2 10
```

```
                                3x3 30 inch pile bent 7
0.036 10.416667 0 0 0 0.007 0 0 0 0
0.036 24.652778 0 0 0 0.005 0 0 0 0
* User defined MC curves
1
1 1
0
1 10
0 0
1400000 1E-5
1400000 3E-5
4700000 0.0001
5700000 0.00013
6000000 0.00016
6450000 0.00022
6850000 0.00028
6950000 0.0004
7000000 0.00055
* End of file
```

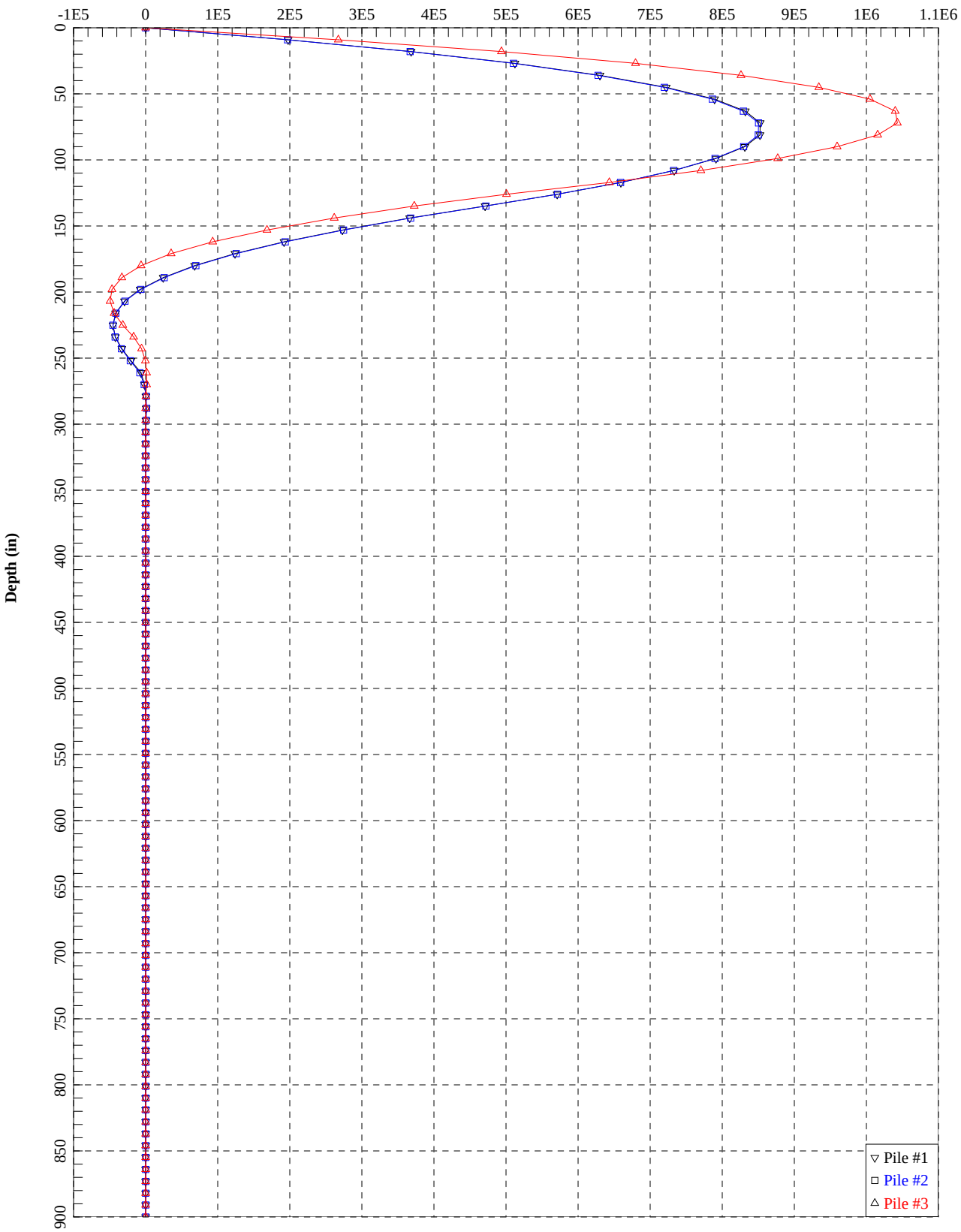
29th Ave OC Bent 2 - Service Load

Moment (lbs-in)



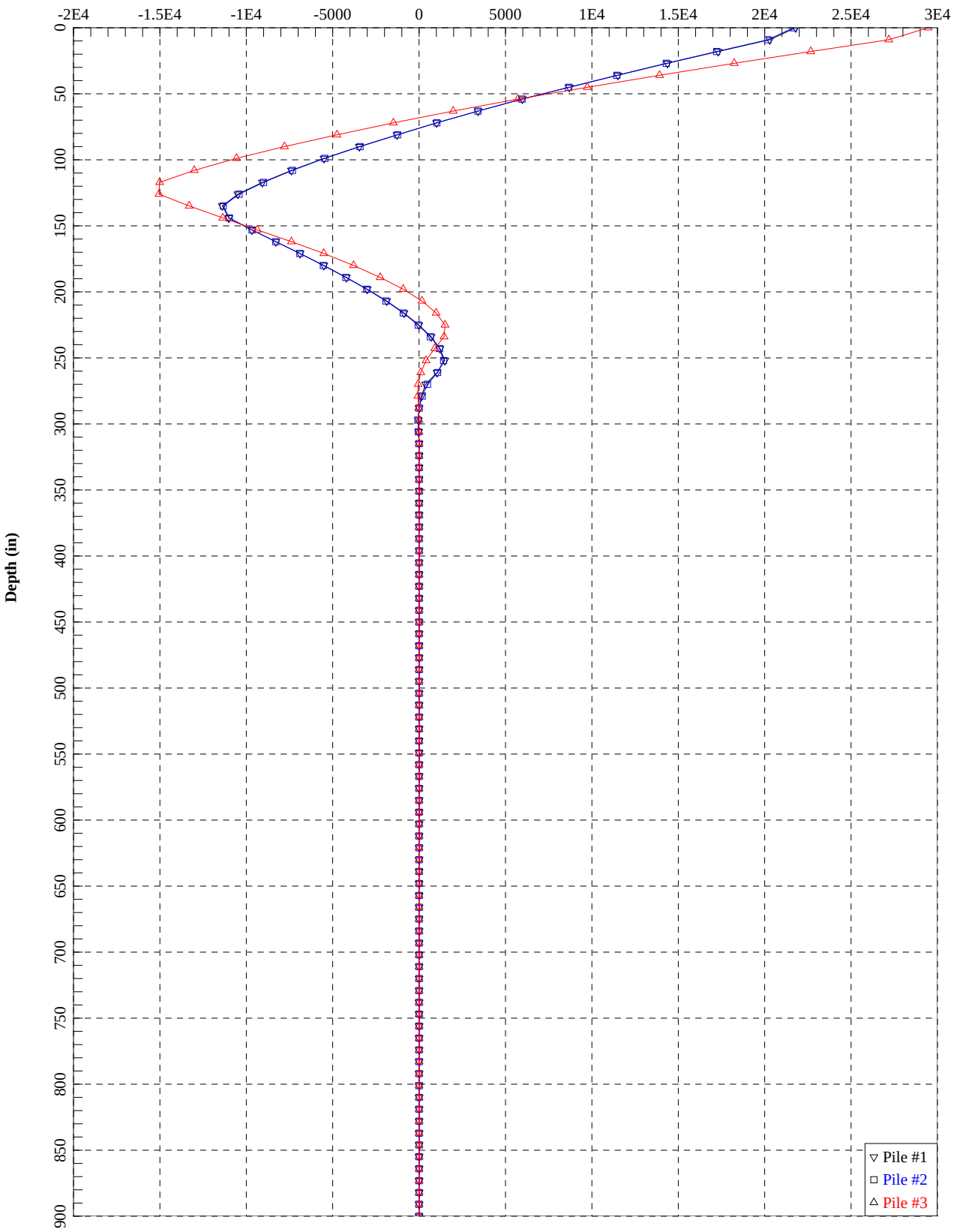
29th Ave OC Bent 2 - Strength Load

Moment (lbs-in)

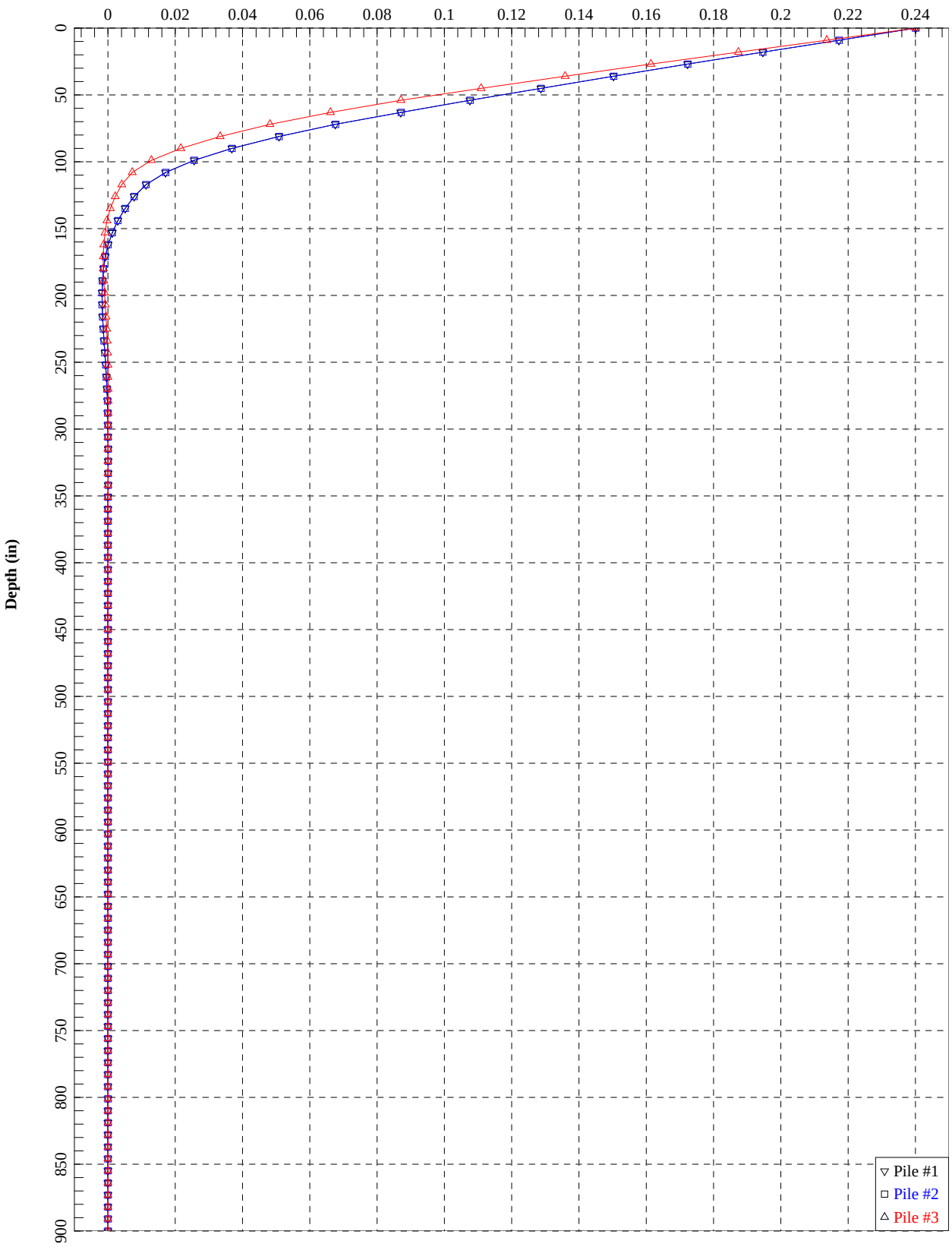


29th Ave OC Bent 2 - Strength Load

Shear (lbs)

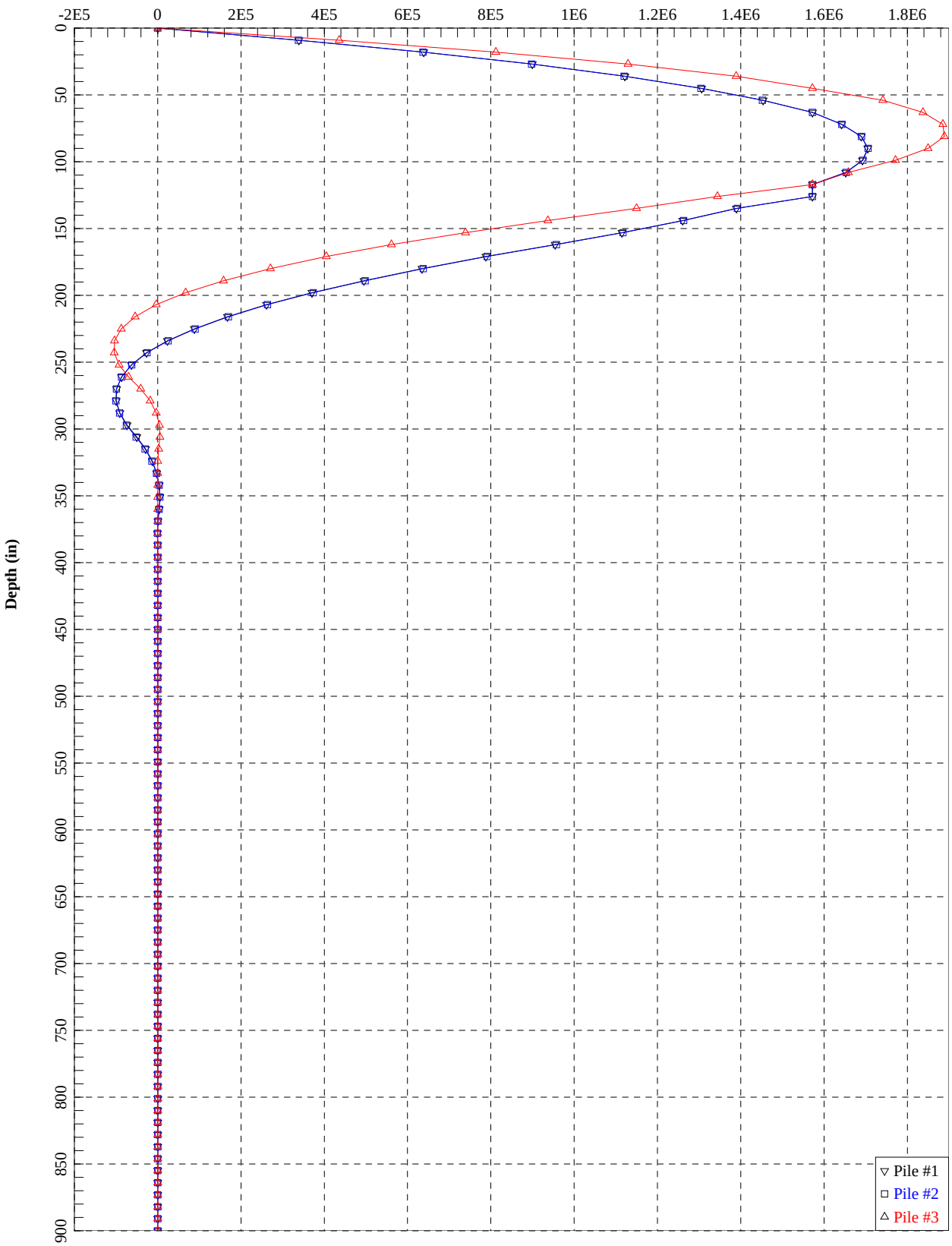


29th Ave OC Bent 2 - Seismic Load



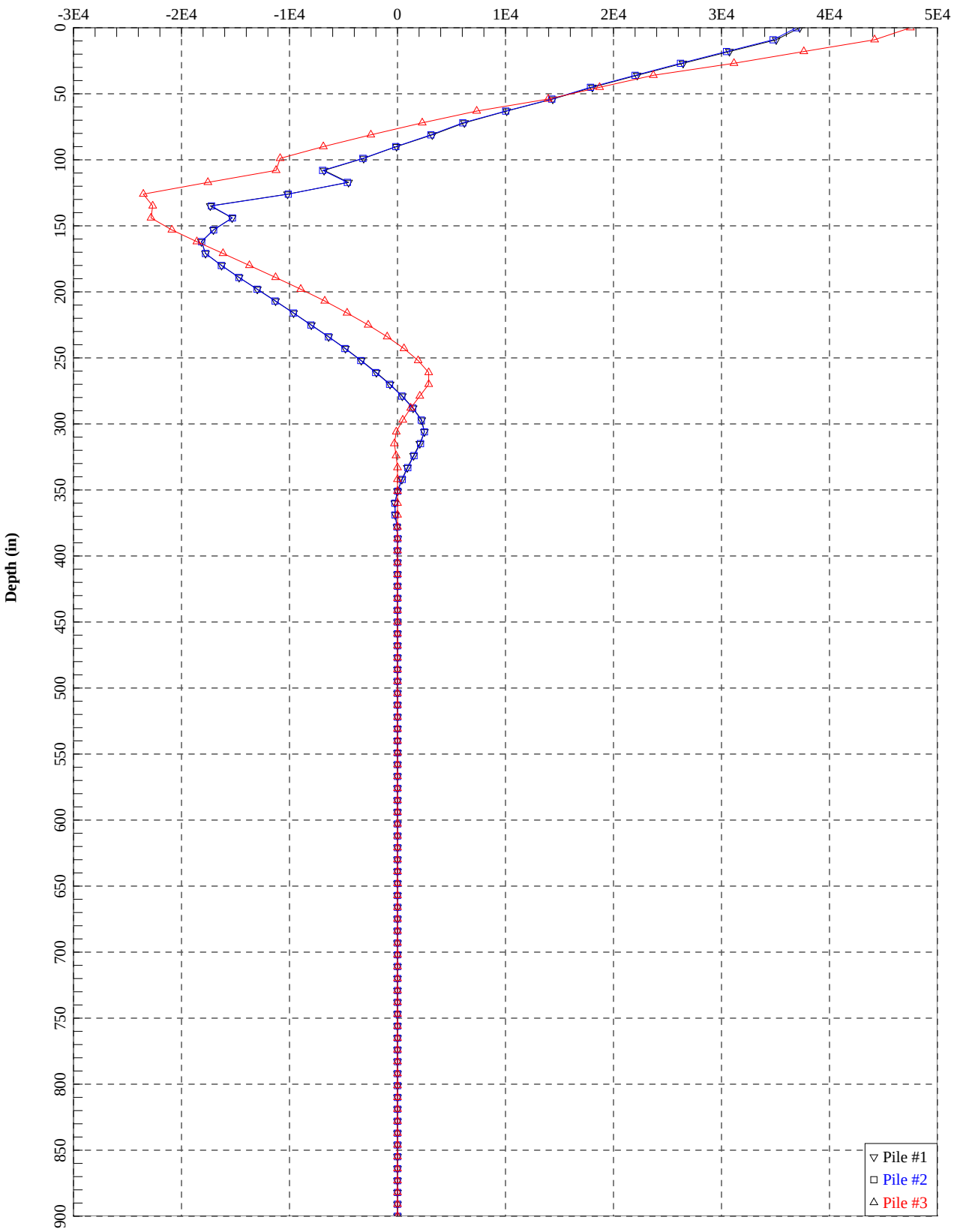
29th Ave OC Bent 2 - Seismic Load

Moment (lbs-in)



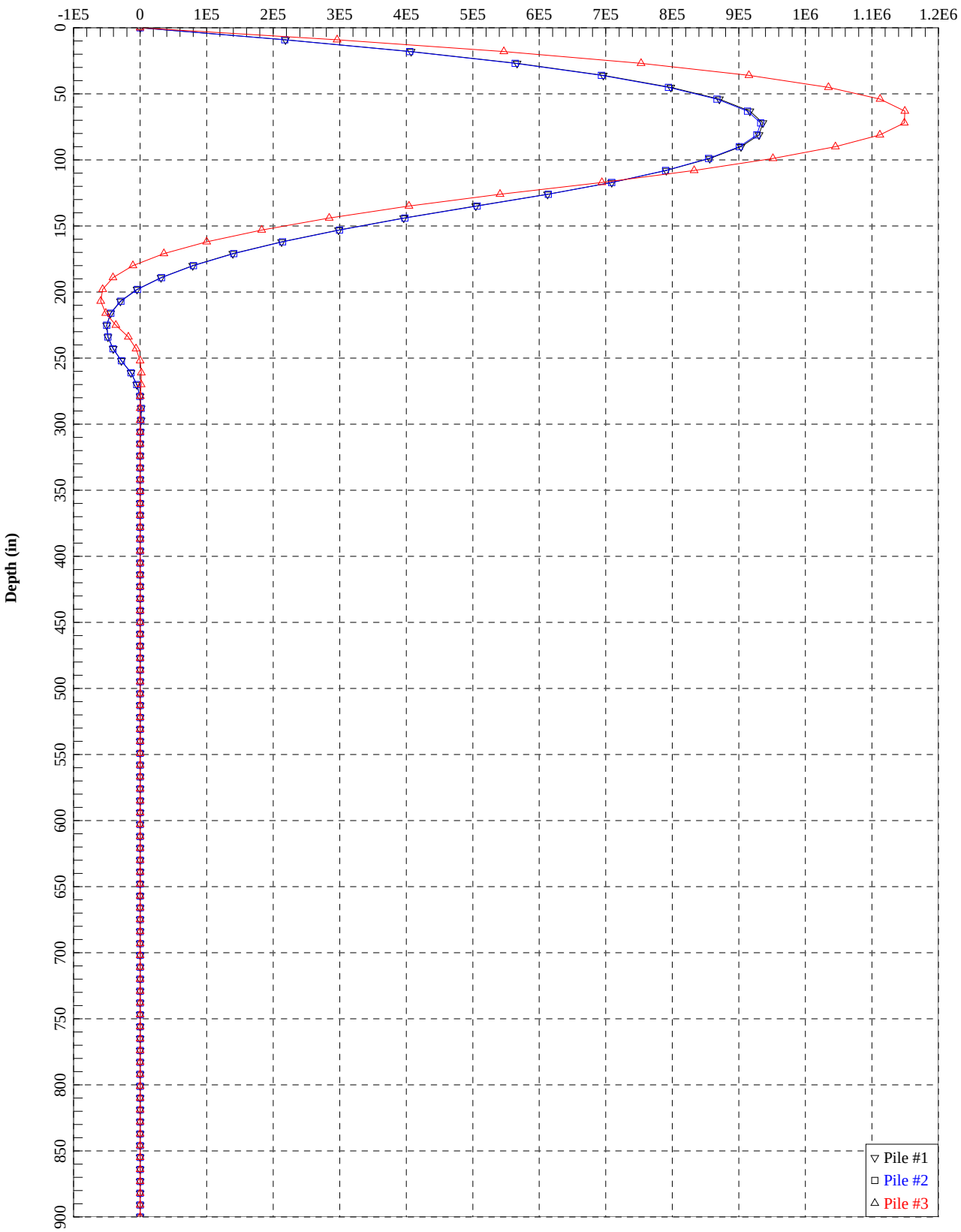
29th Ave OC Bent 2 - Seismic Load

Shear (lbs)



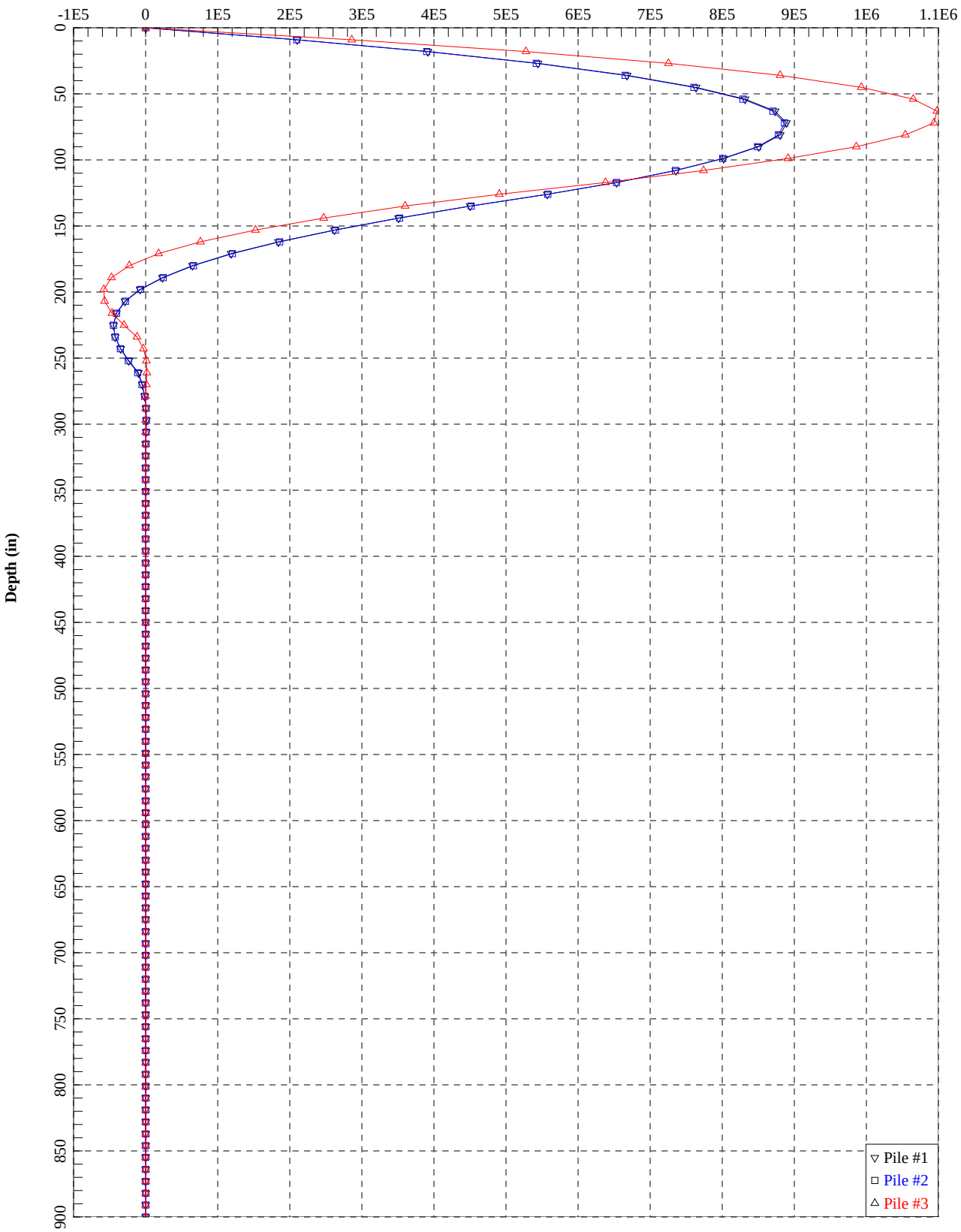
29th Ave OC Bent 3 - Service Load

Moment (lbs-in)



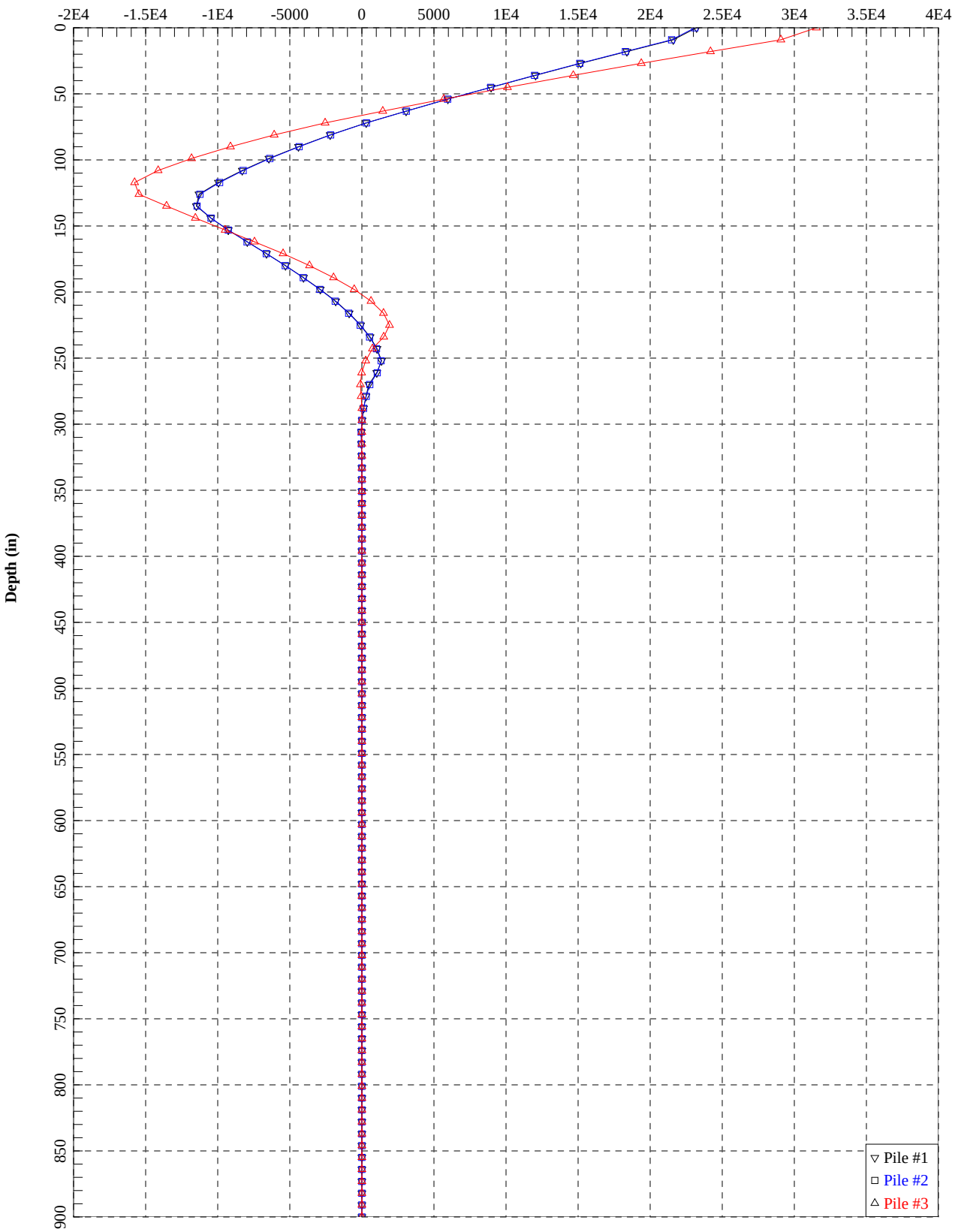
29th Ave OC Bent 3 - Strength Load

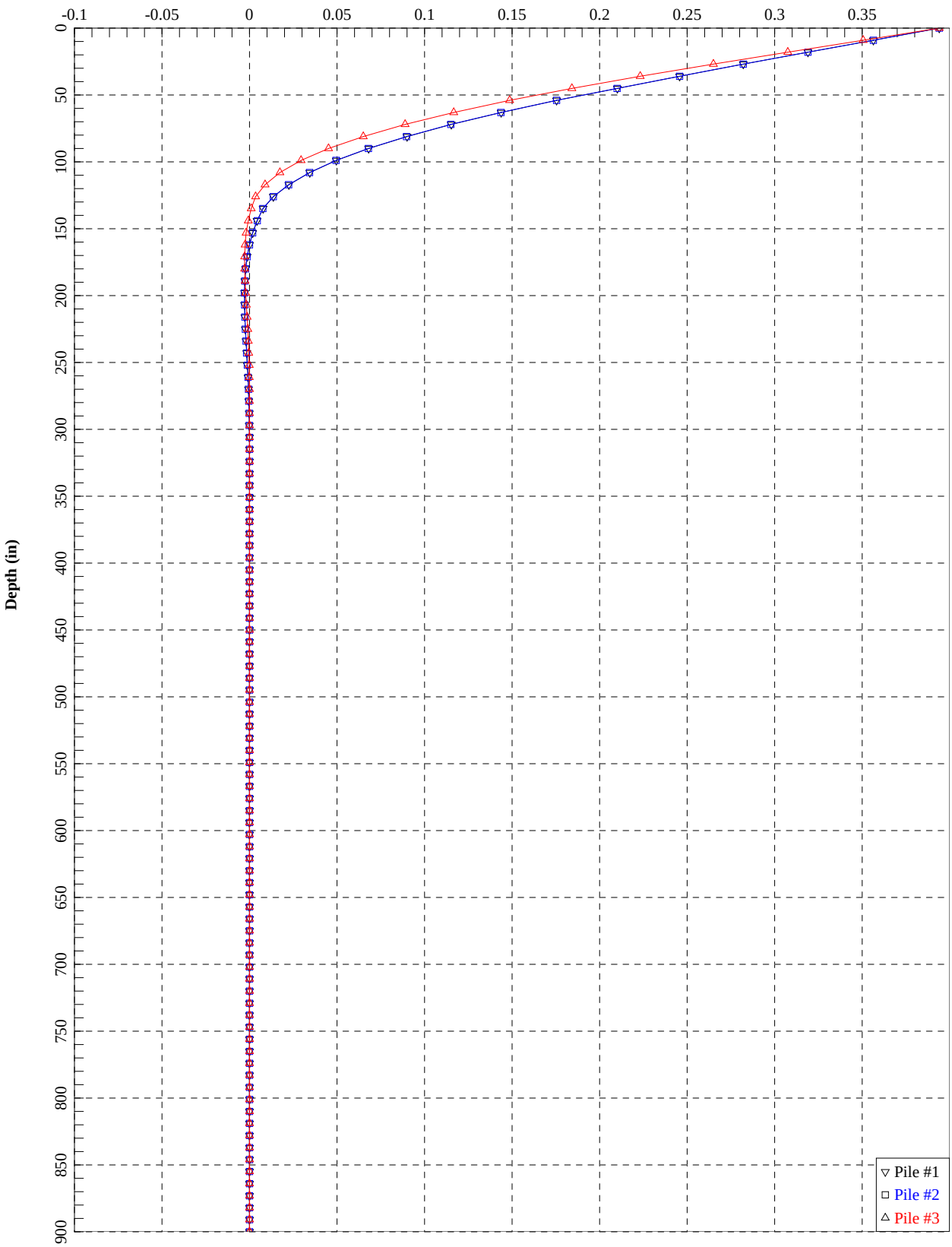
Moment (lbs-in)



29th Ave OC Bent 3 - Strength Load

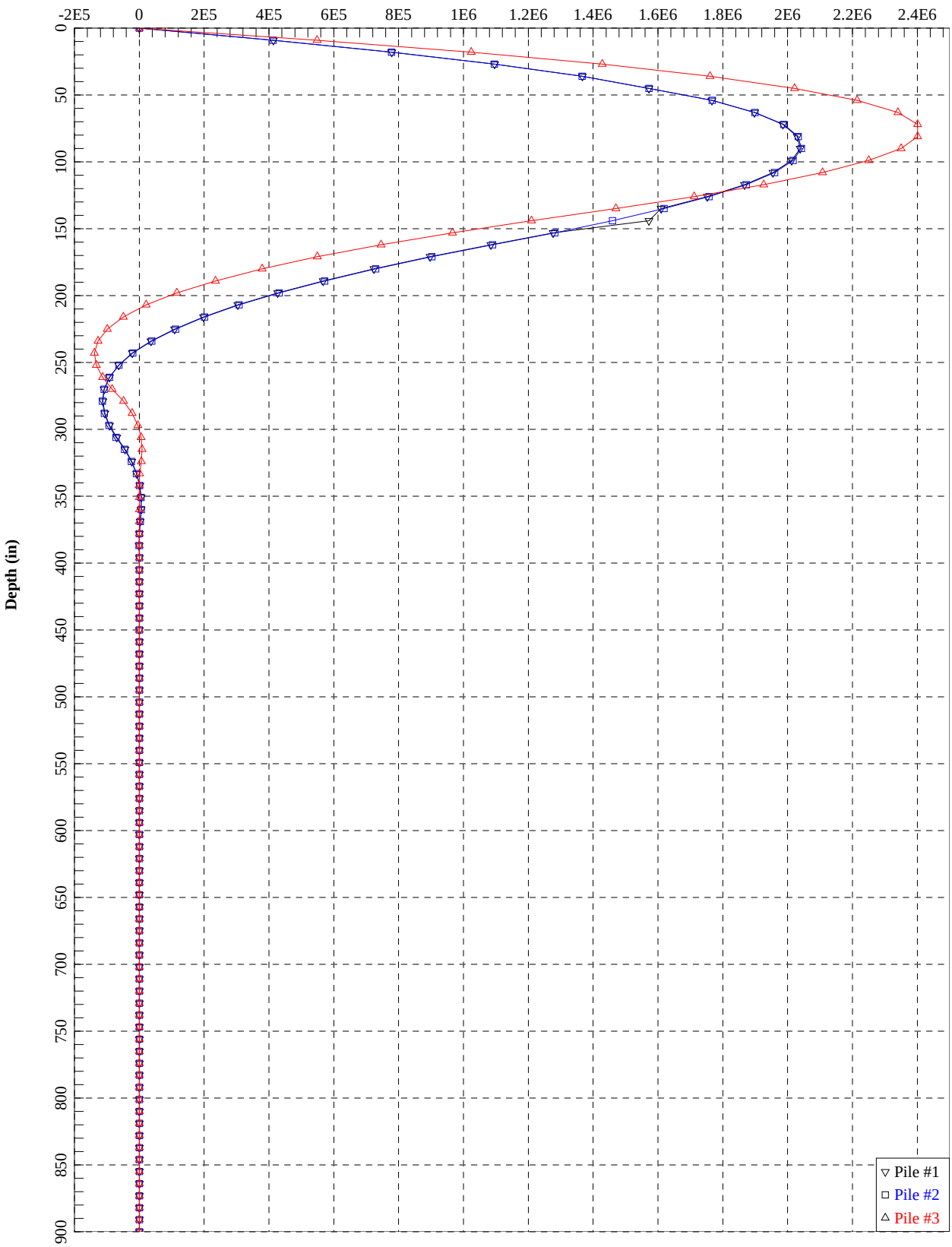
Shear (lbs)




29th Ave OC Bent 3 - Seismic Load
Deflection (in)
Depth (in)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
Pile #1
Pile #2
Pile #3

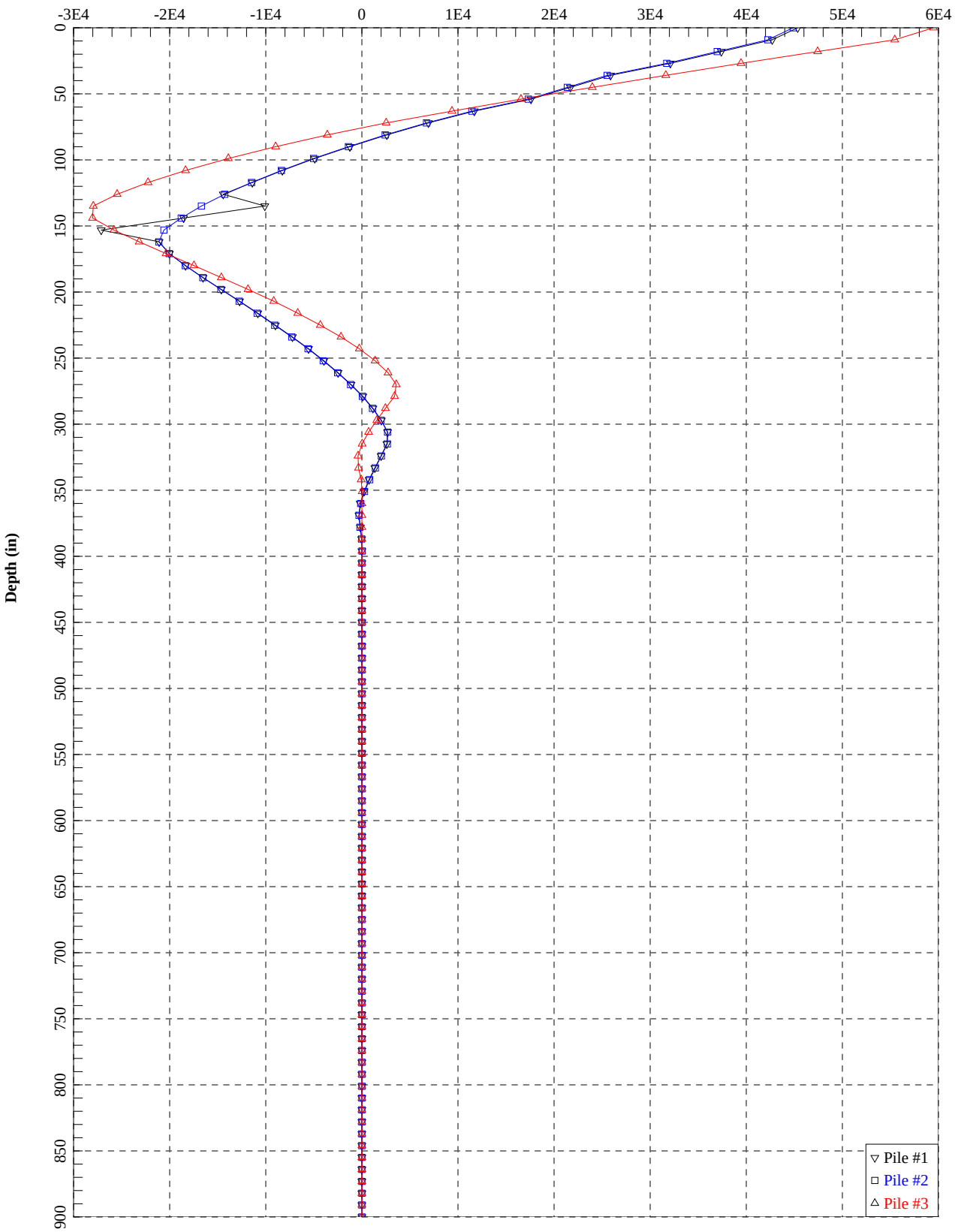
29th Ave OC Bent 3 - Seismic Load

Moment (lbs-in)



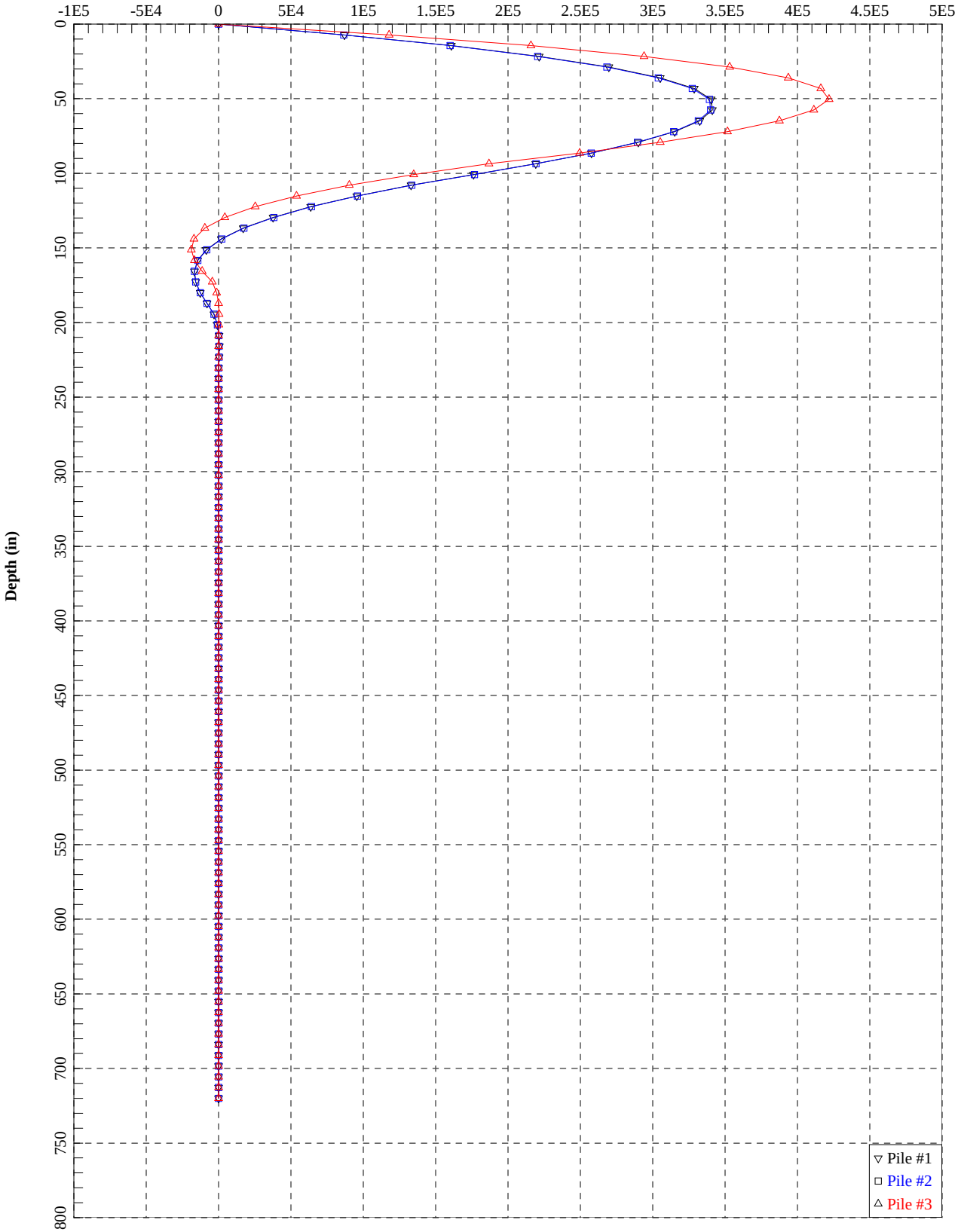
29th Ave OC Bent 3 - Seismic Load

Shear (lbs)



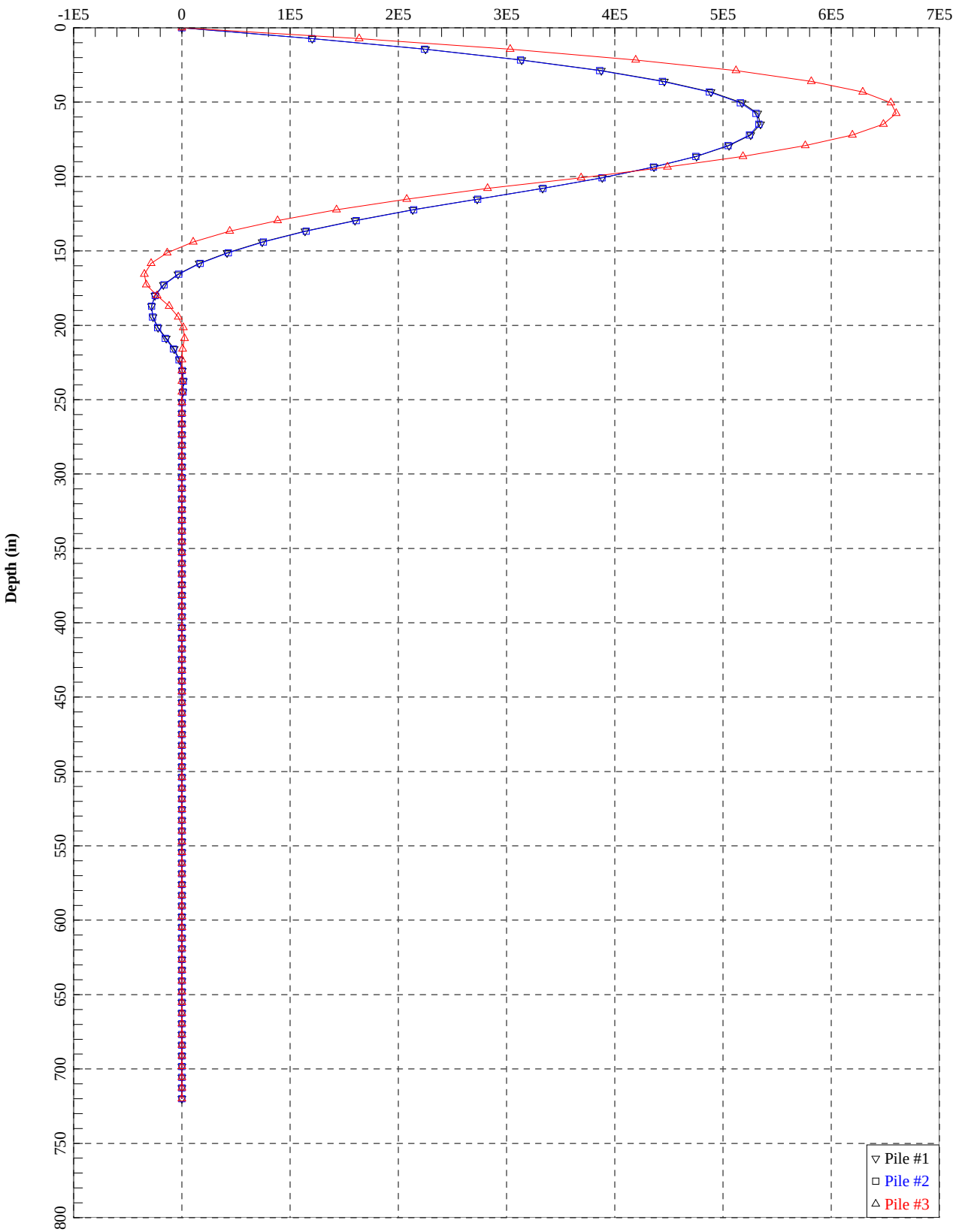
29th Ave OC Bent 4 - Service Load

Moment (lbs-in)



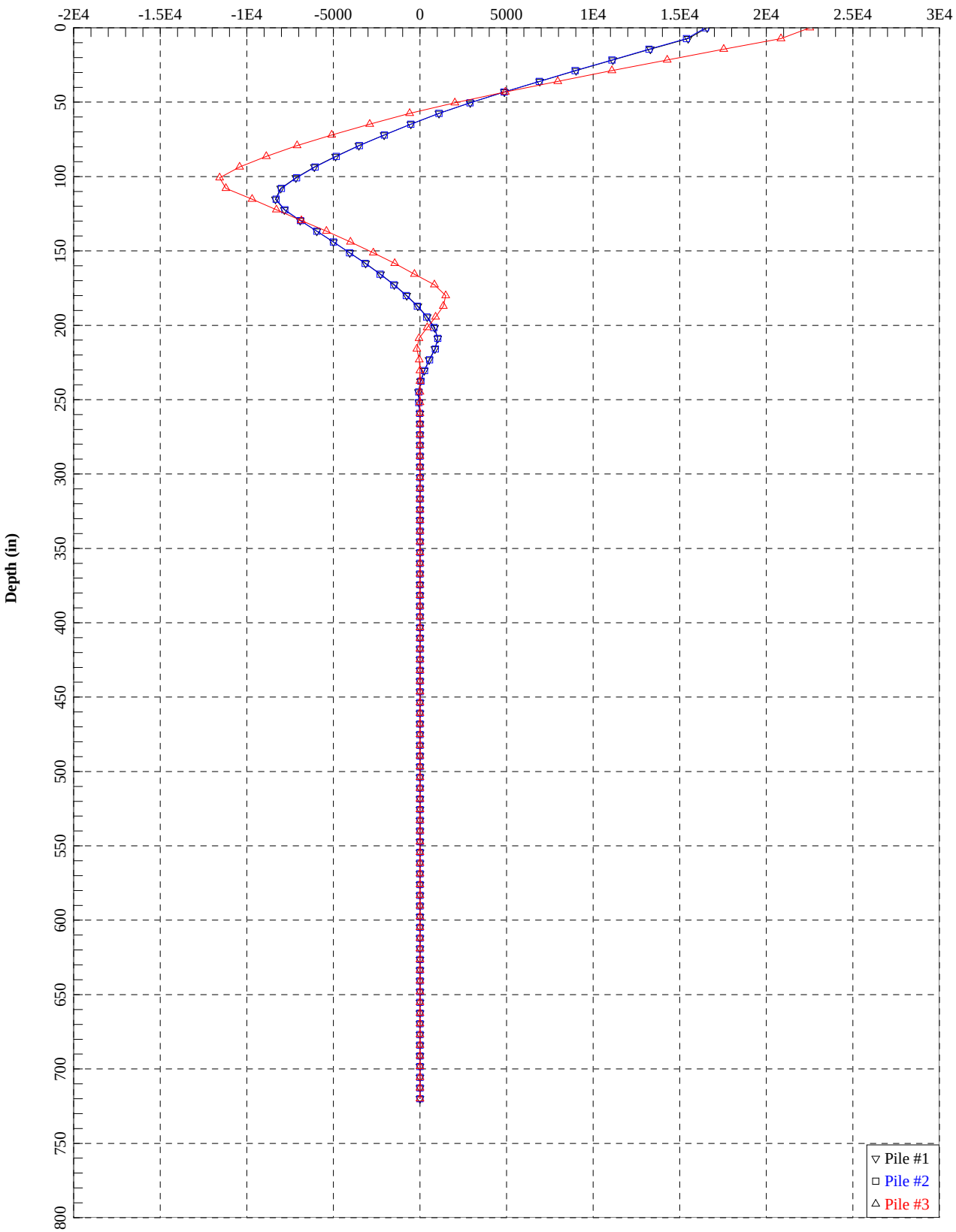
29th Ave OC Bent 4 - Strength Load

Moment (lbs-in)

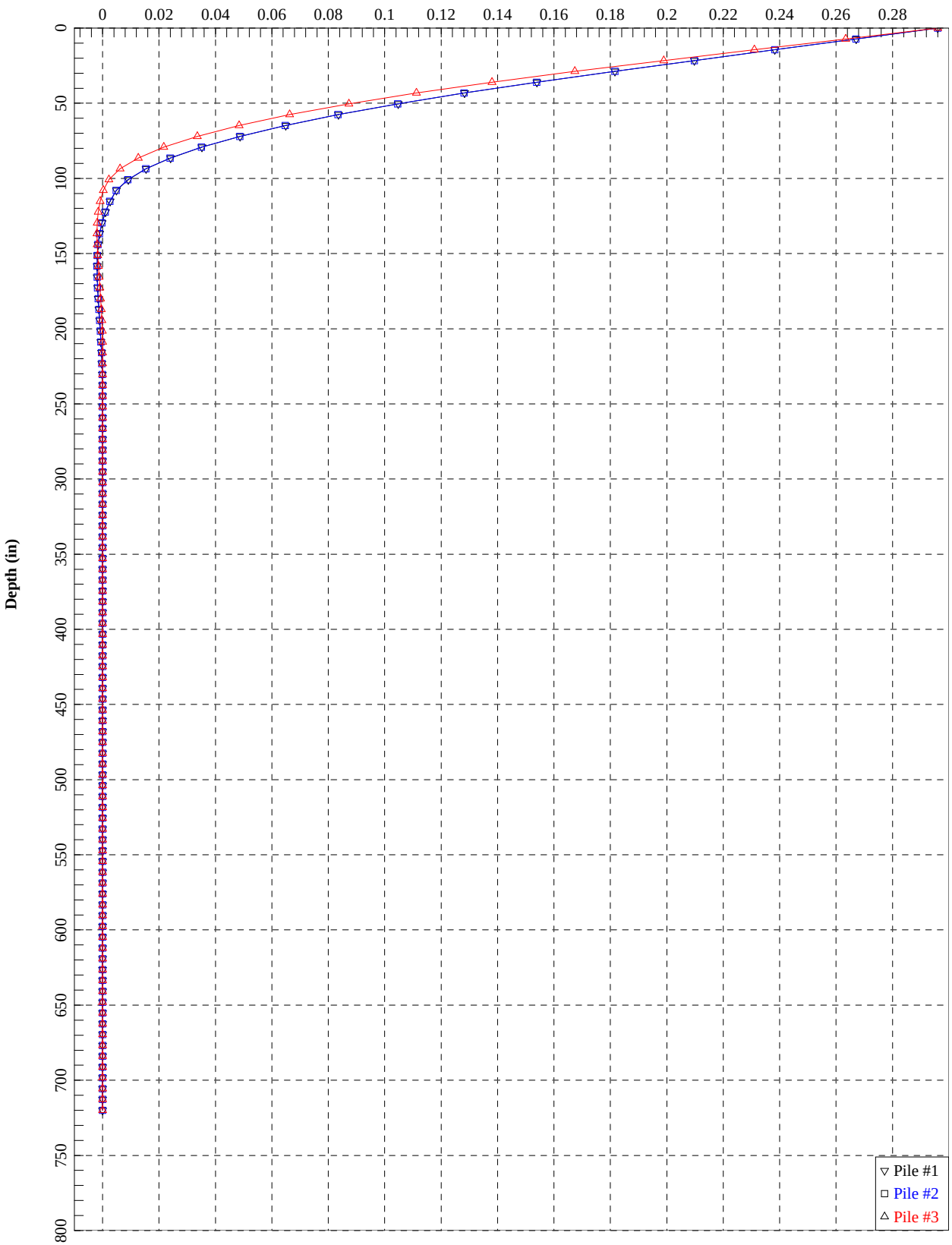


29th Ave OC Bent 4 - Strength Load

Shear (lbs)

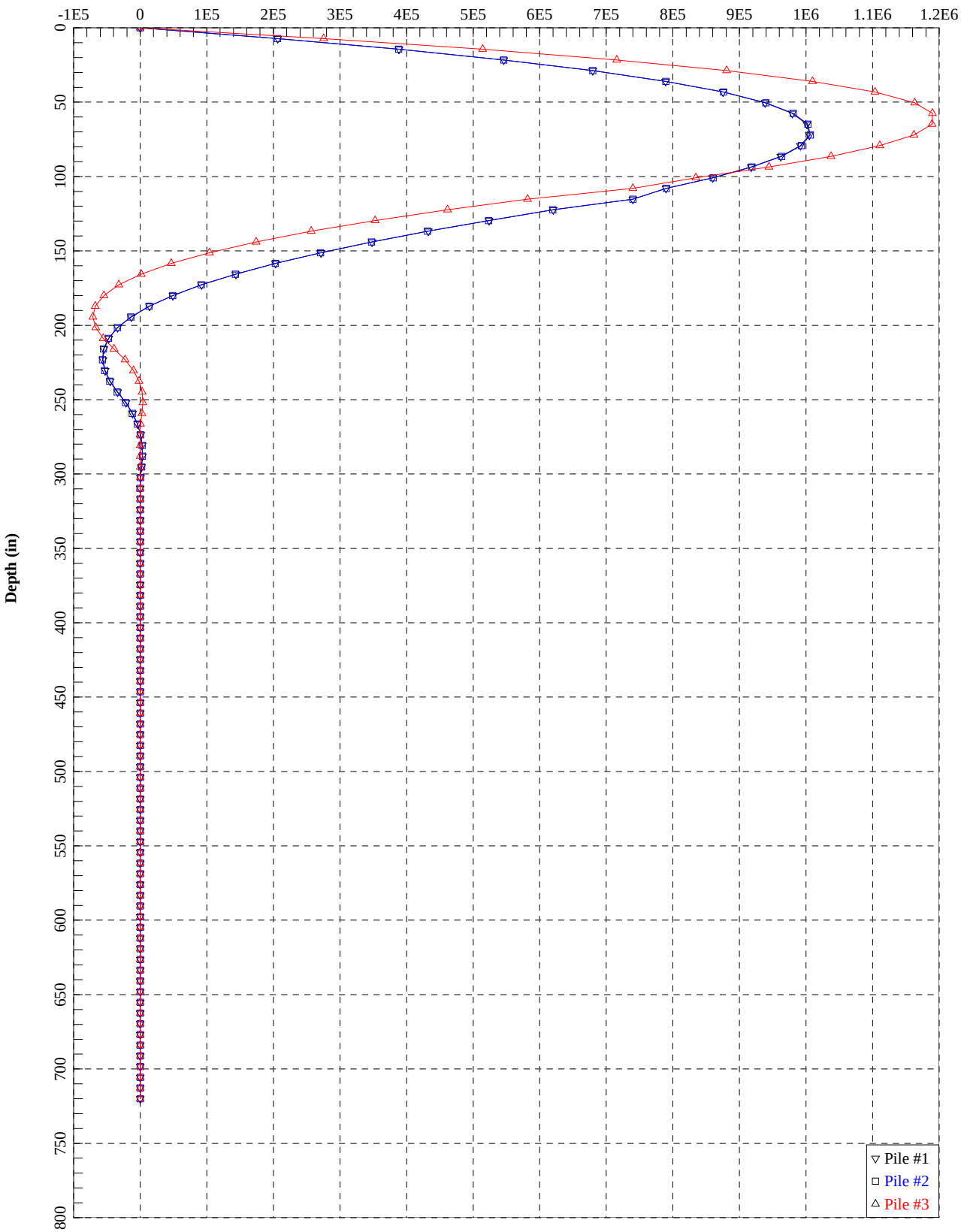


29th Ave OC Bent 4 - Seismic Load



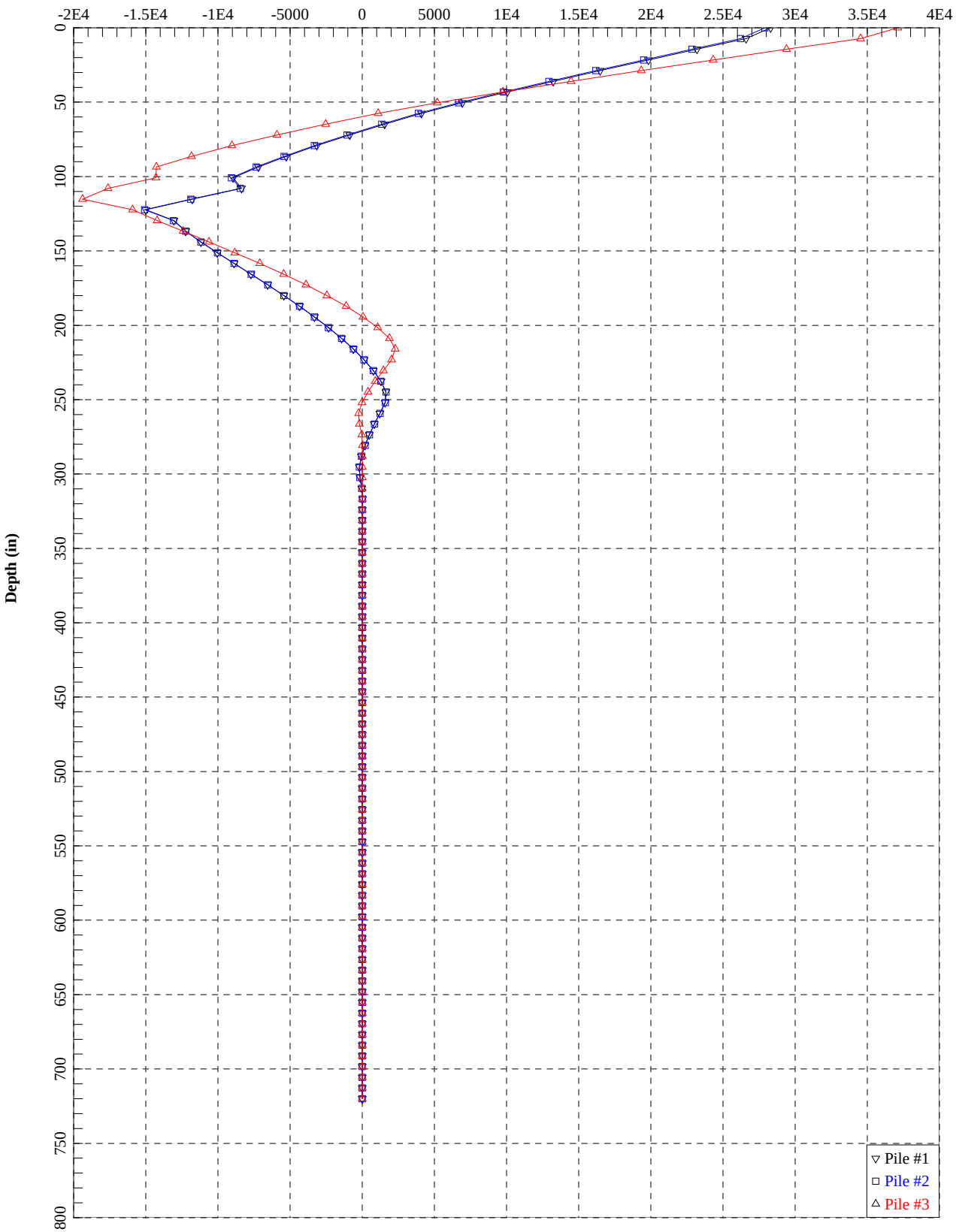
29th Ave OC Bent 4 - Seismic Load

Moment (lbs-in)



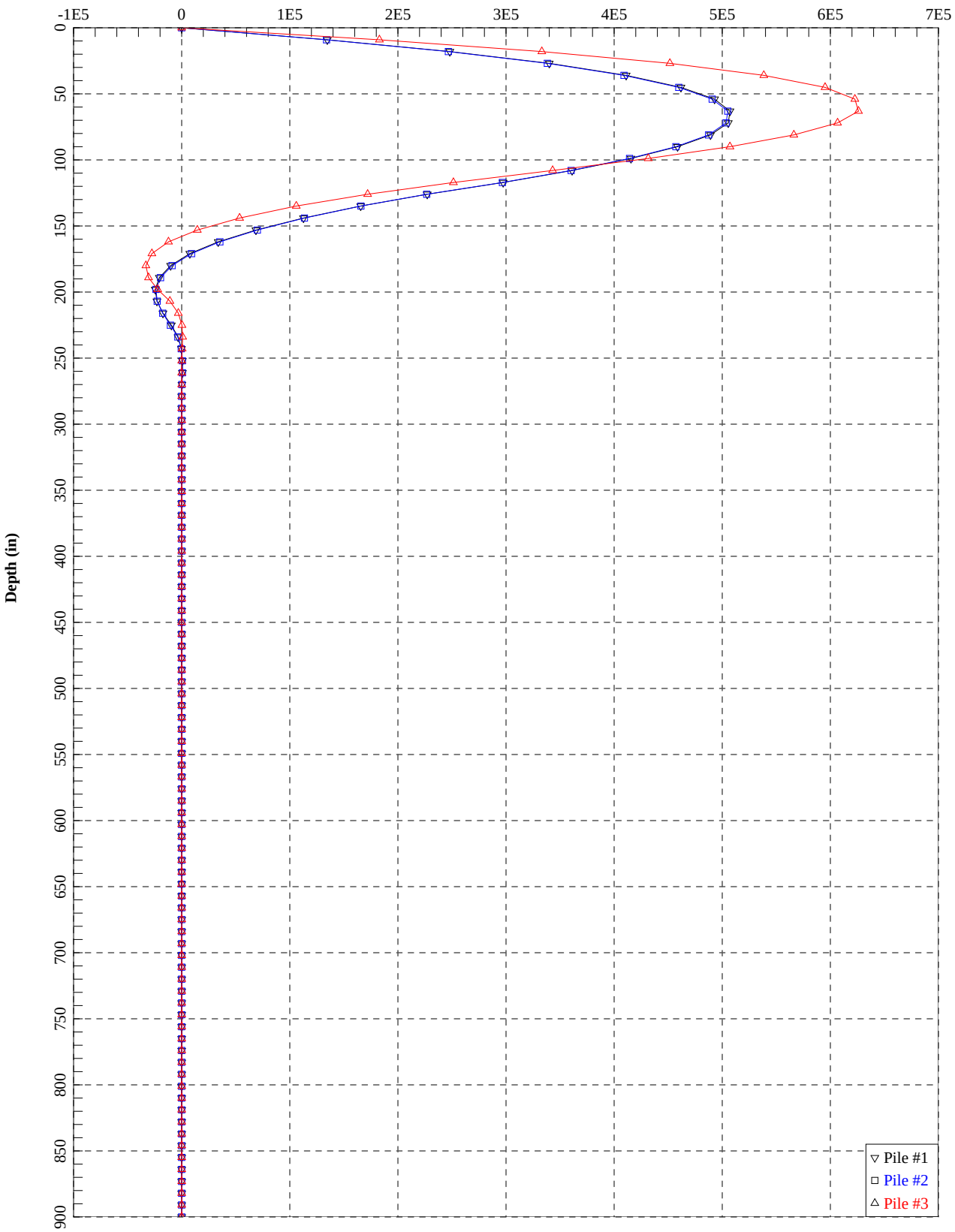
29th Ave OC Bent 4 - Seismic Load

Shear (lbs)



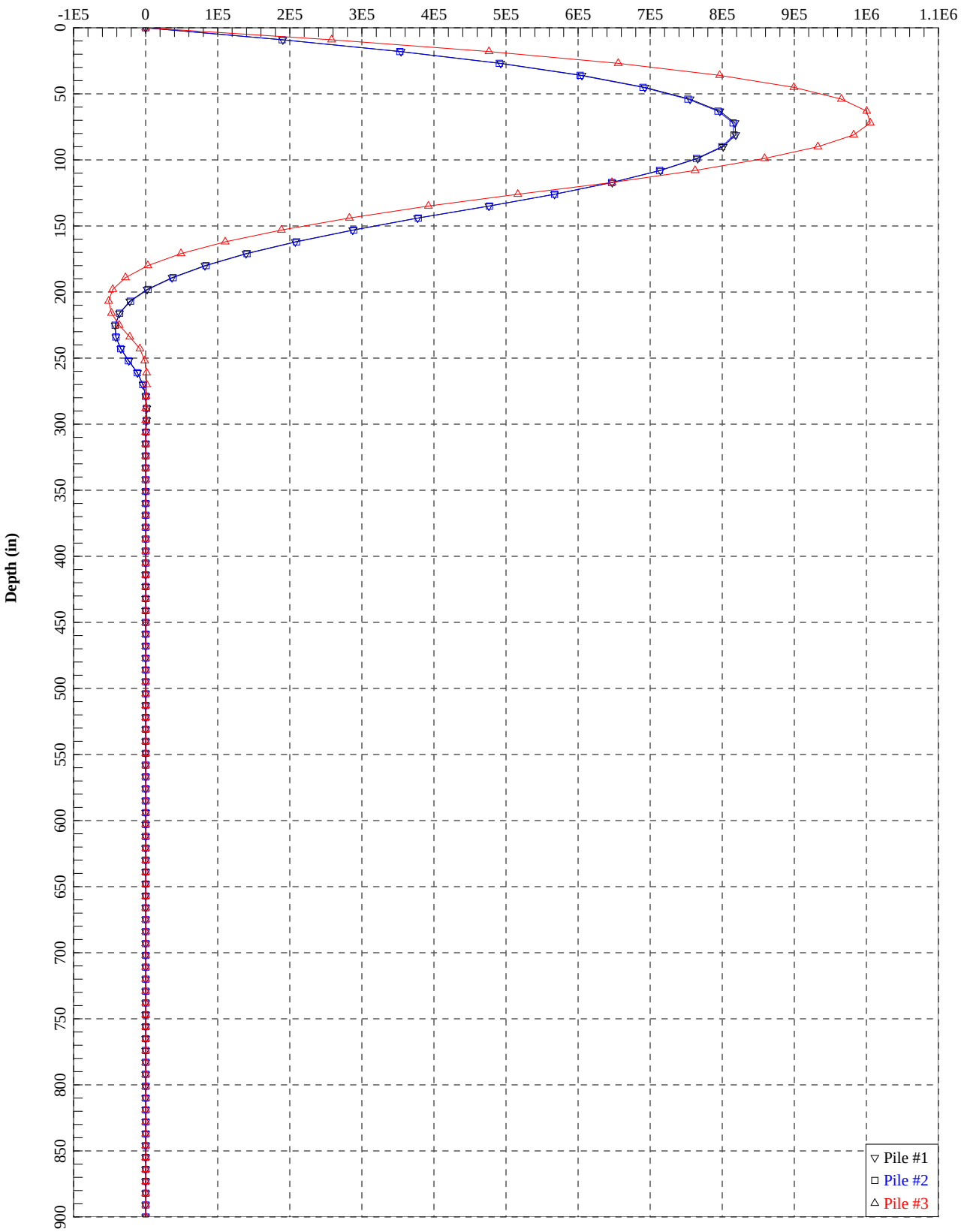
29th Ave OC Bent 5 - Service Load

Moment (lbs-in)



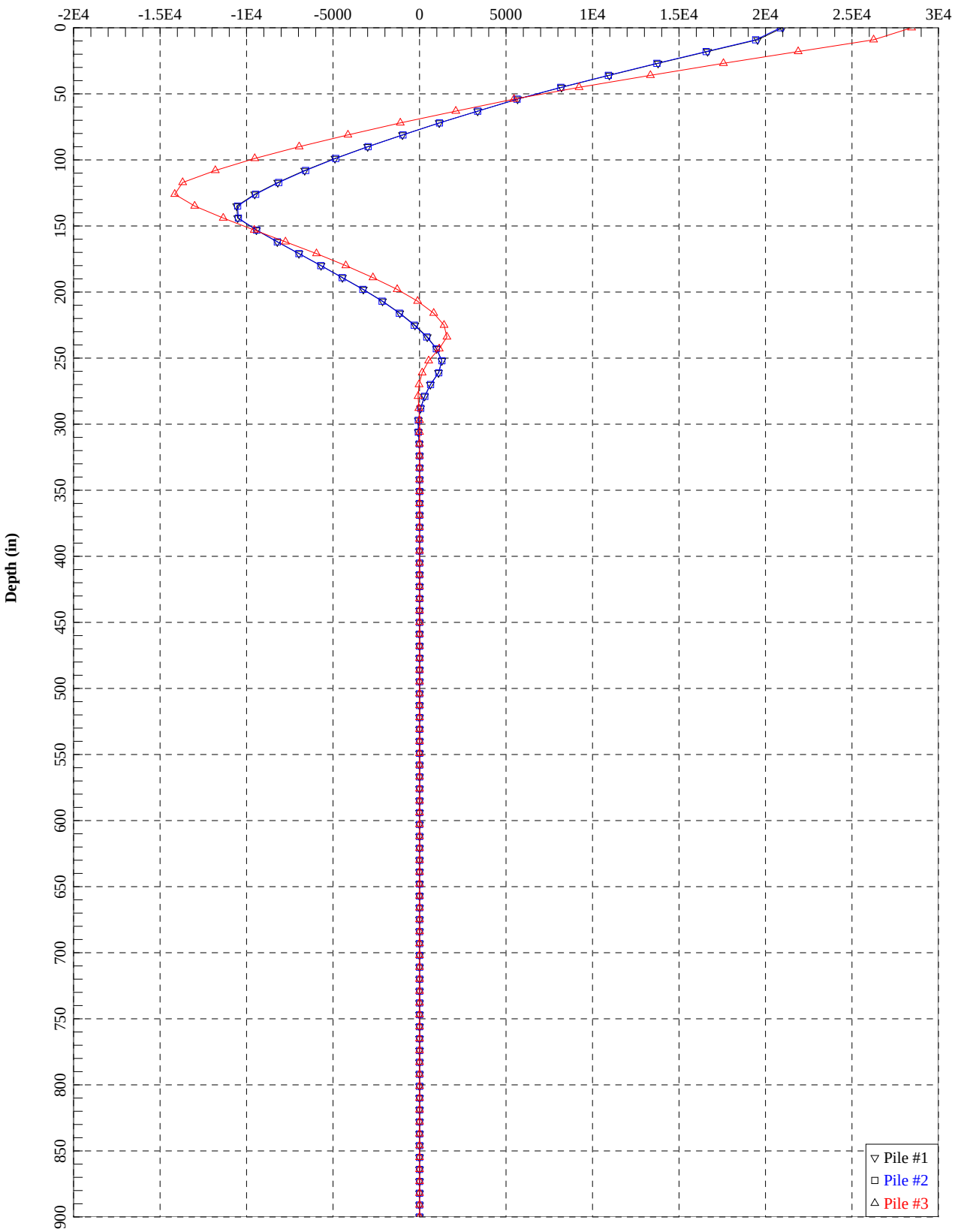
29th Ave OC Bent 5 - Strength Load

Moment (lbs-in)

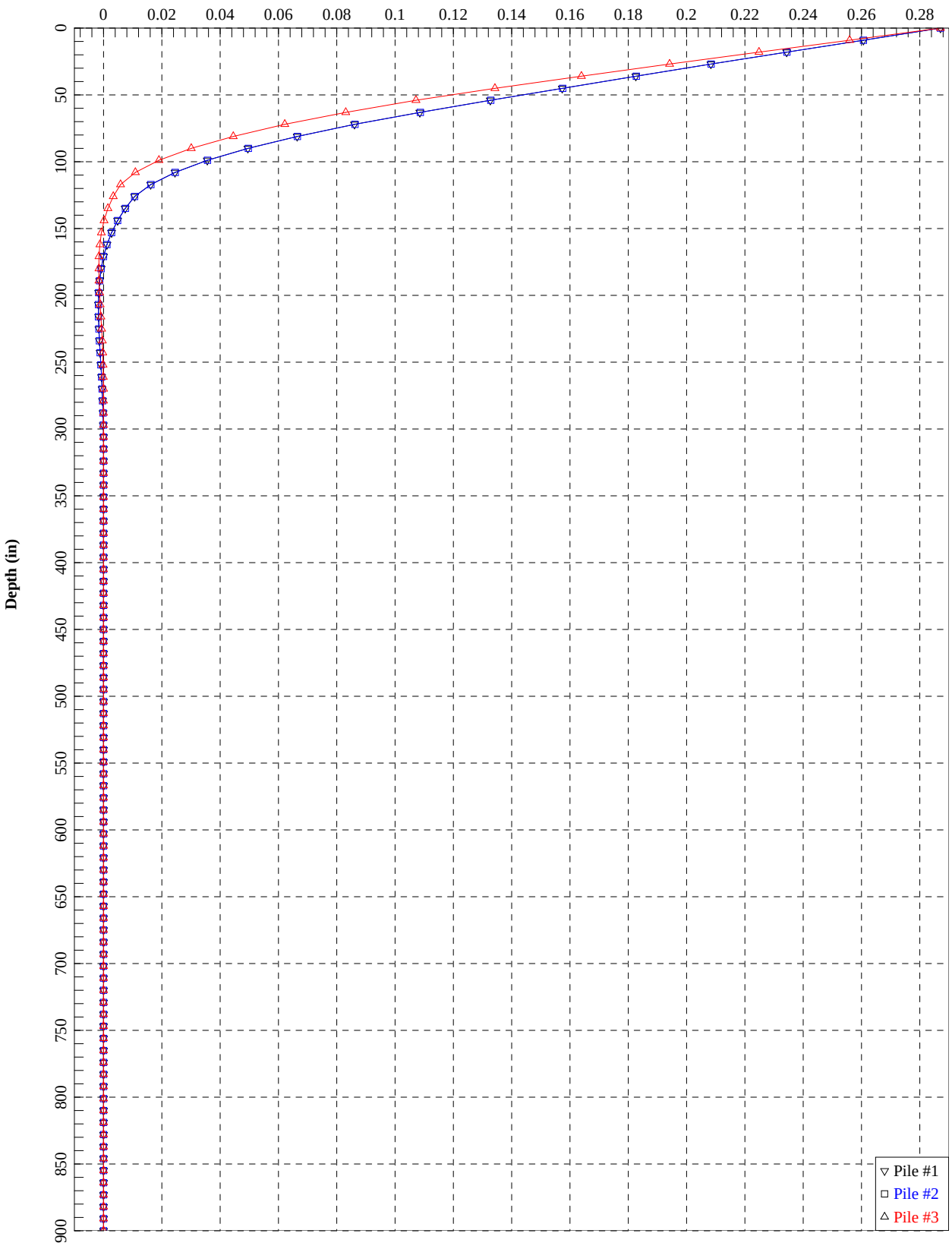


29th Ave OC Bent 5 - Strength Load

Shear (lbs)

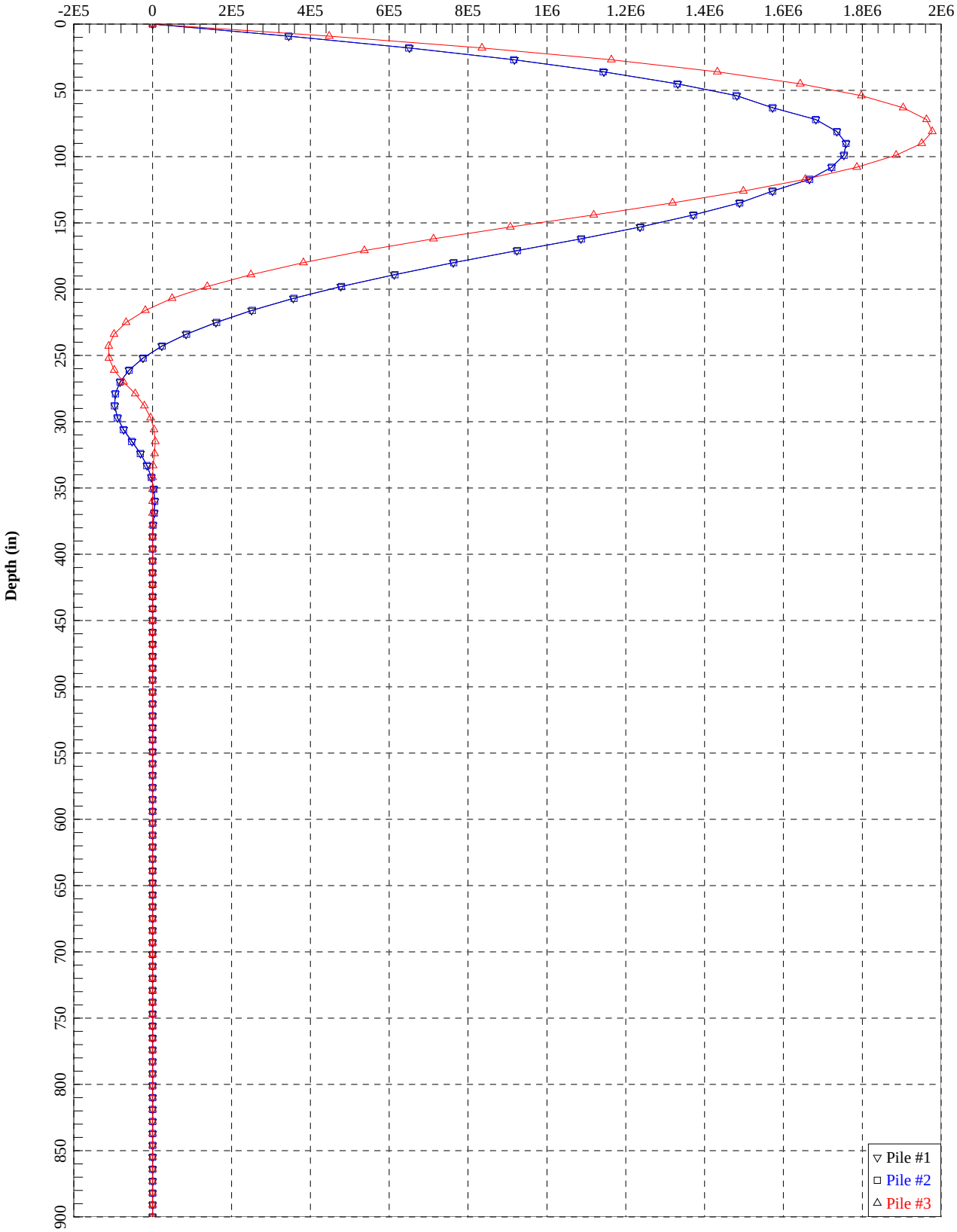


29th Ave OC Bent 5 - Seismic Load



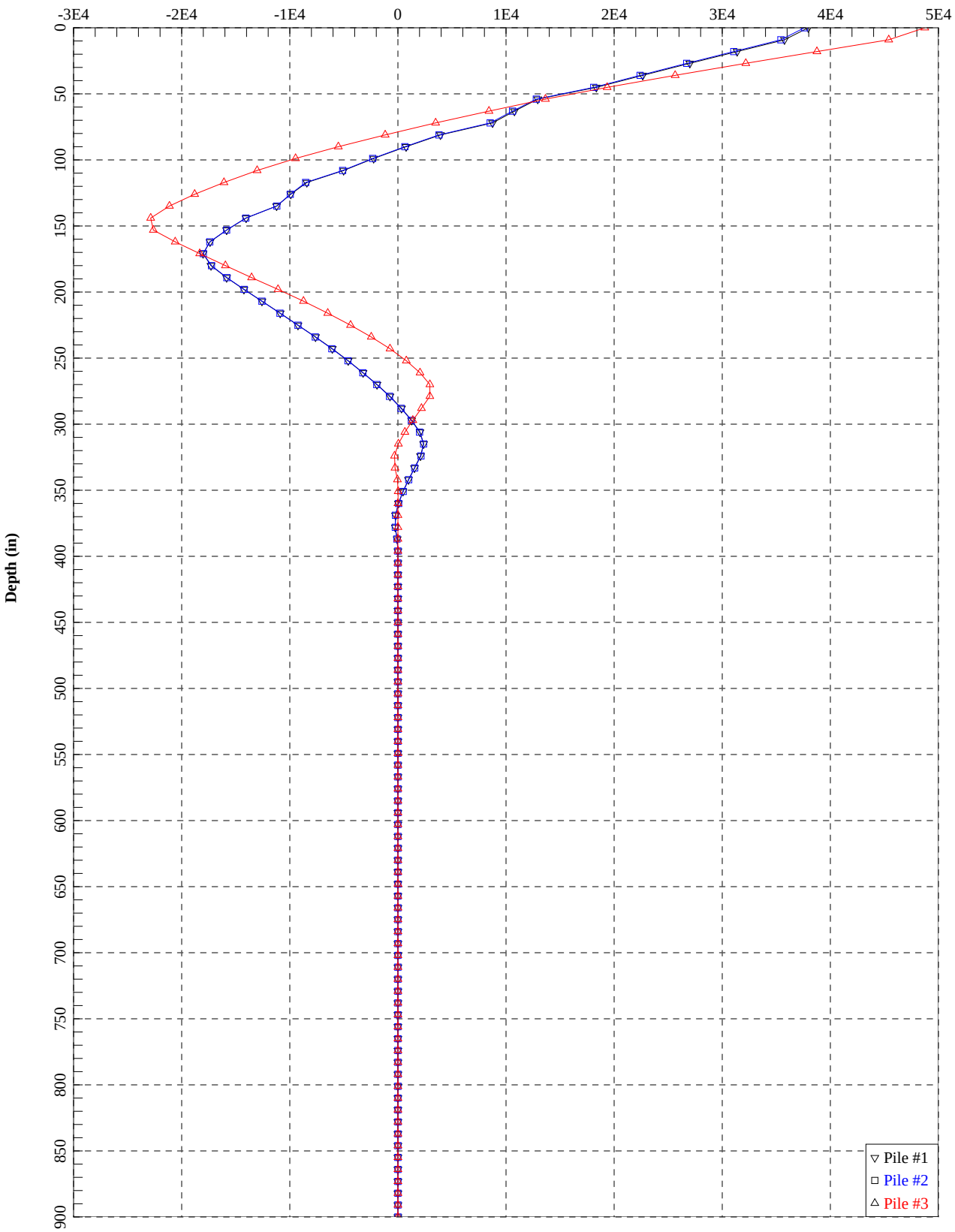
29th Ave OC Bent 5 - Seismic Load

Moment (lbs-in)



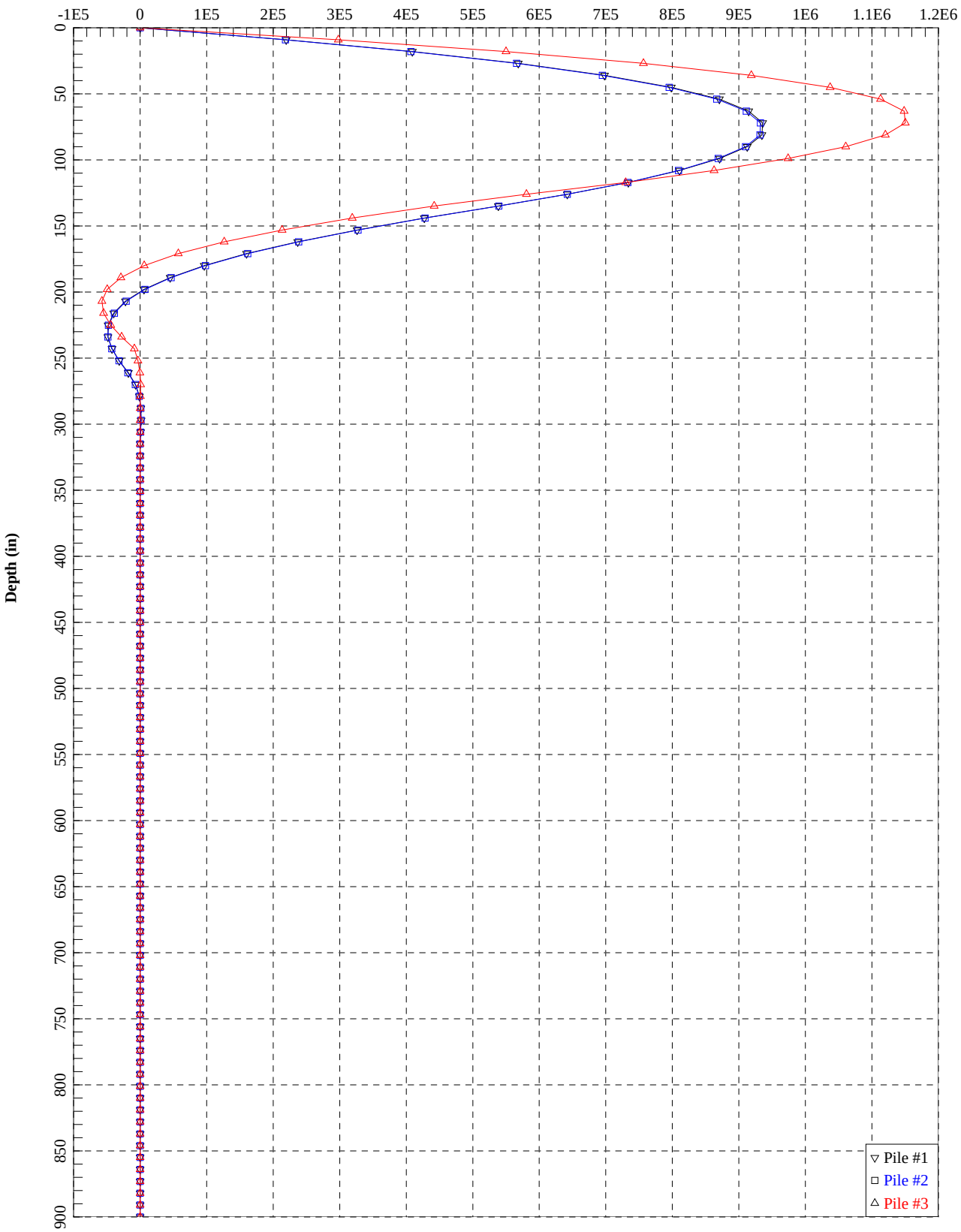
29th Ave OC Bent 5 - Seismic Load

Shear (lbs)



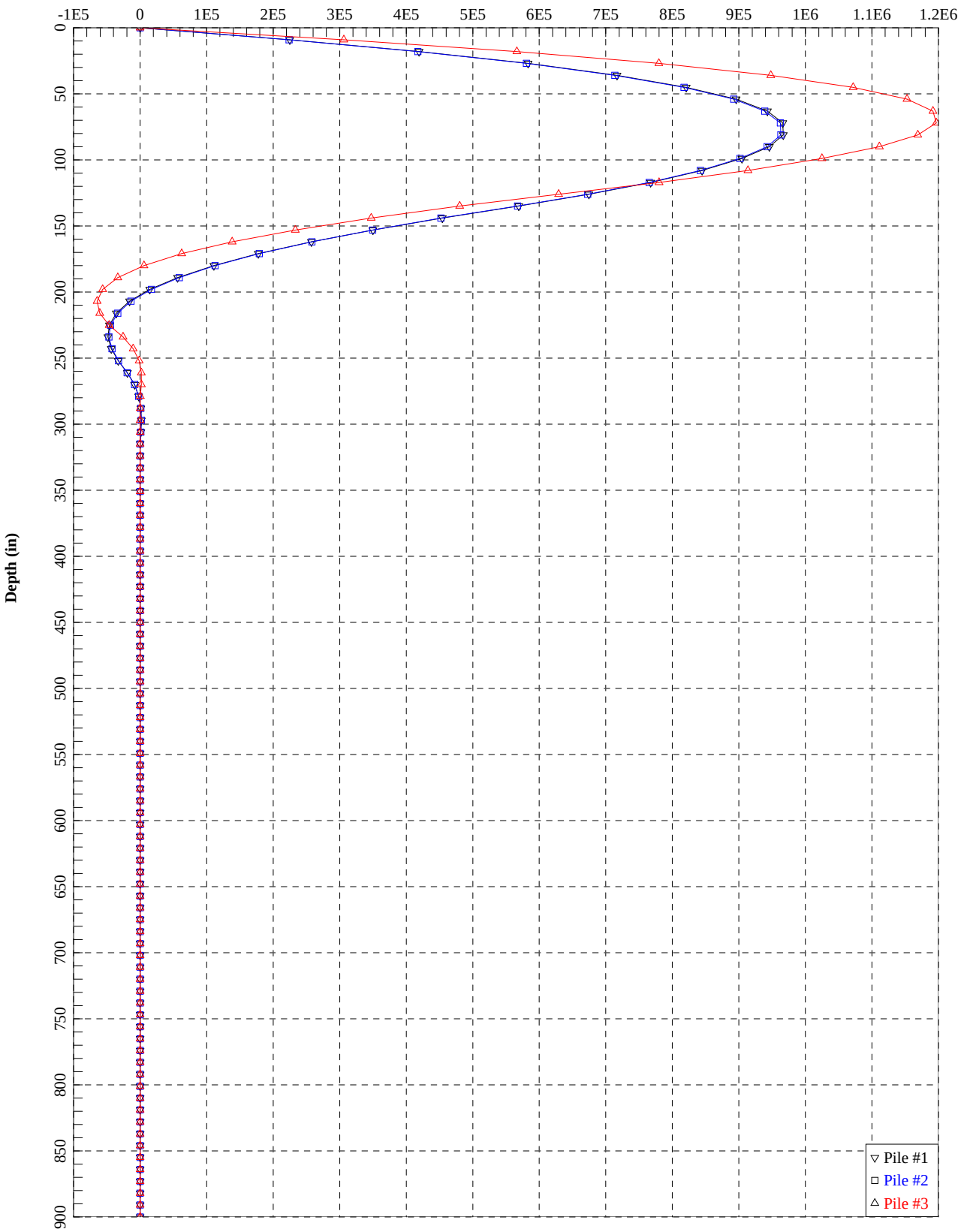
29th Ave OC Bent 6 - Service Load

Moment (lbs-in)



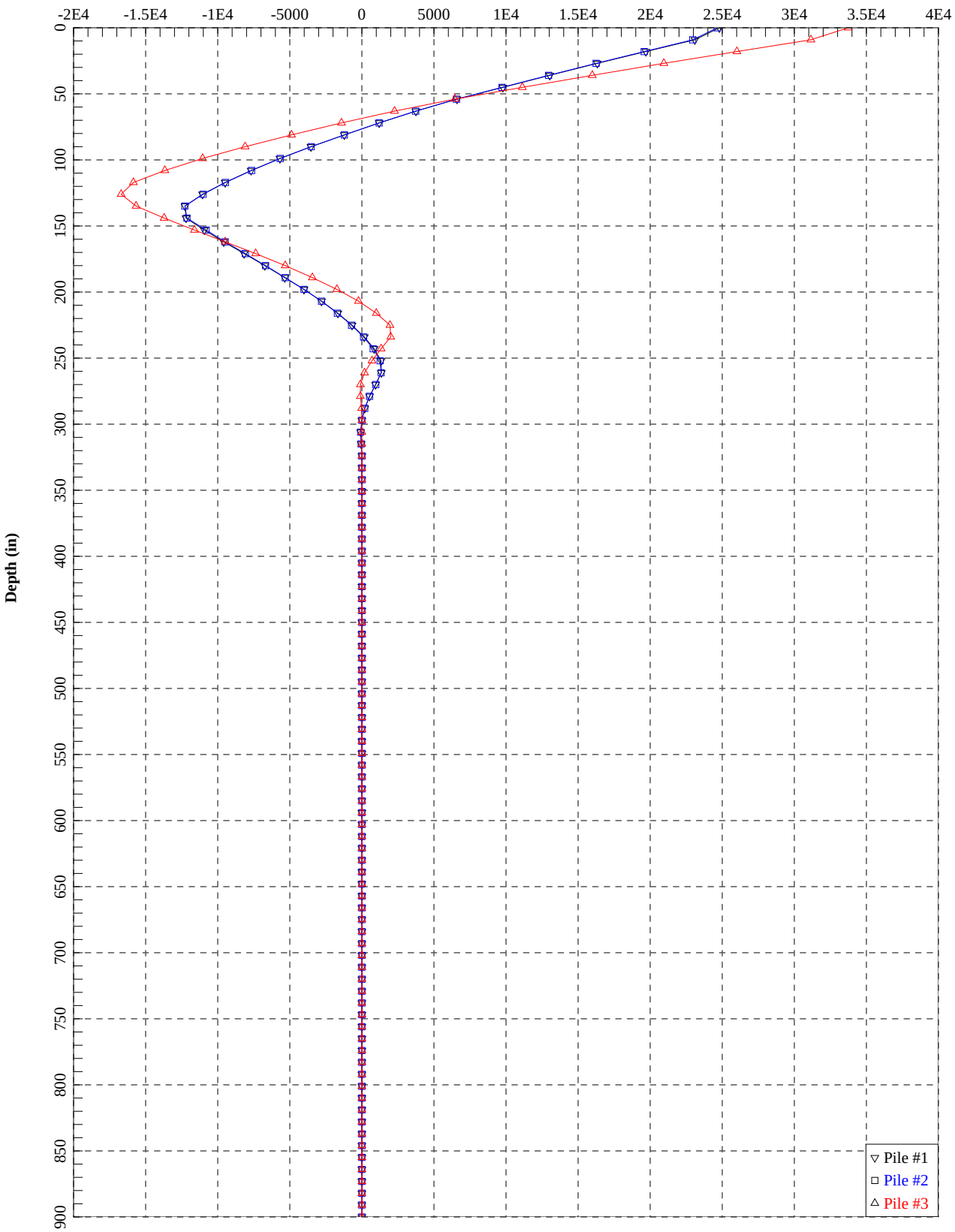
29th Ave OC Bent 6 - Strength Load

Moment (lbs-in)

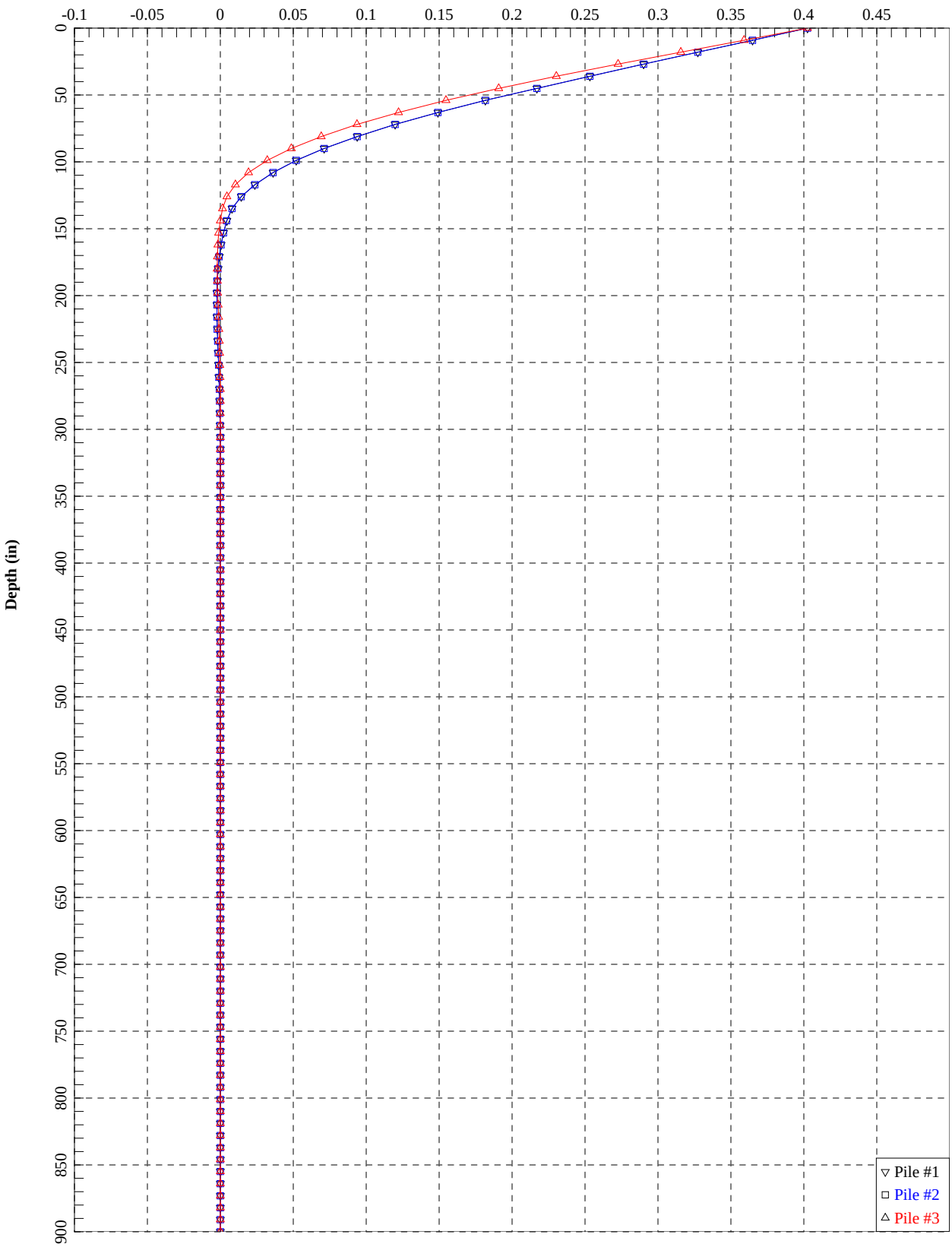


29th Ave OC Bent 6 - Strength Load

Shear (lbs)

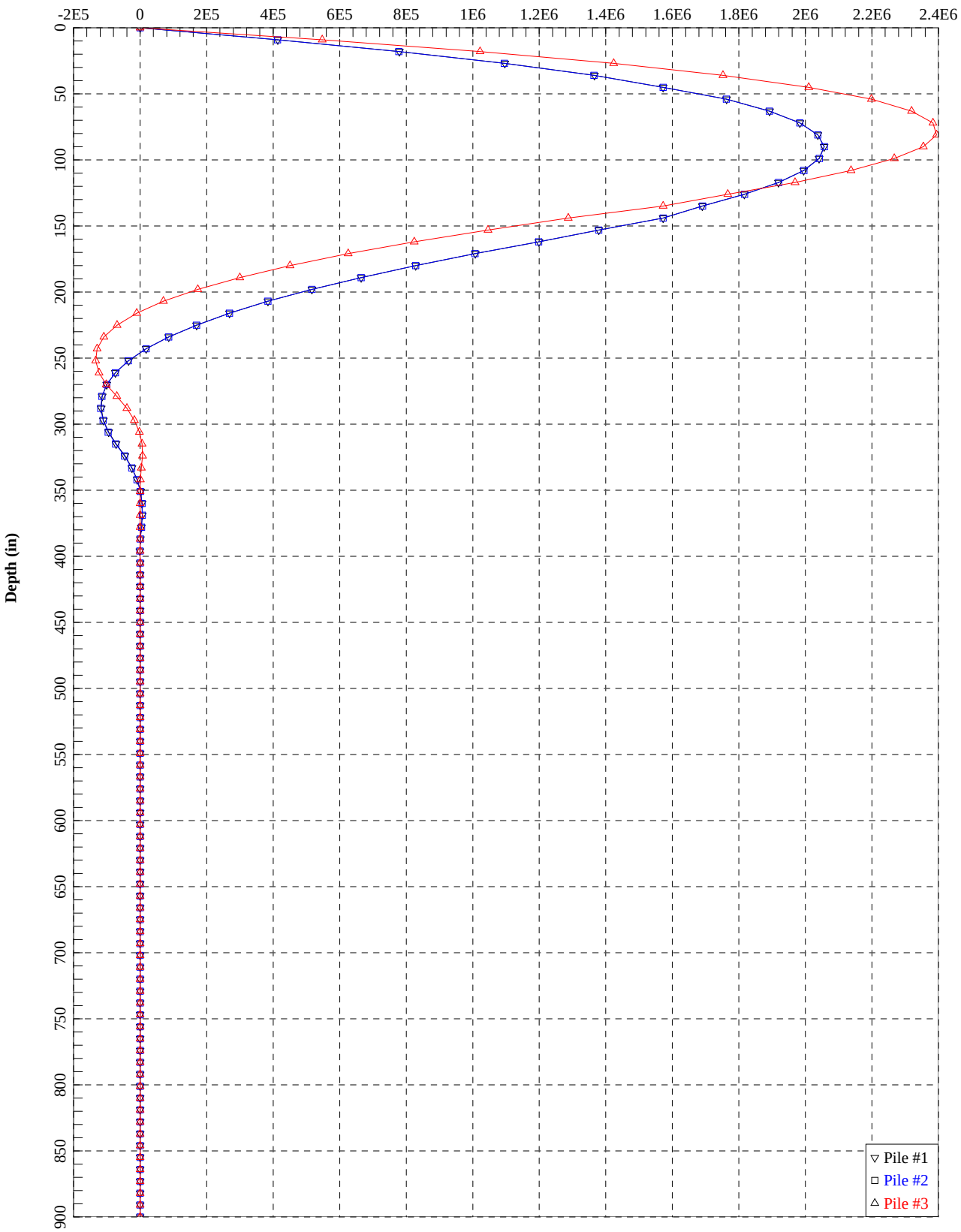


29th Ave OC Bent 6 - Seismic Load



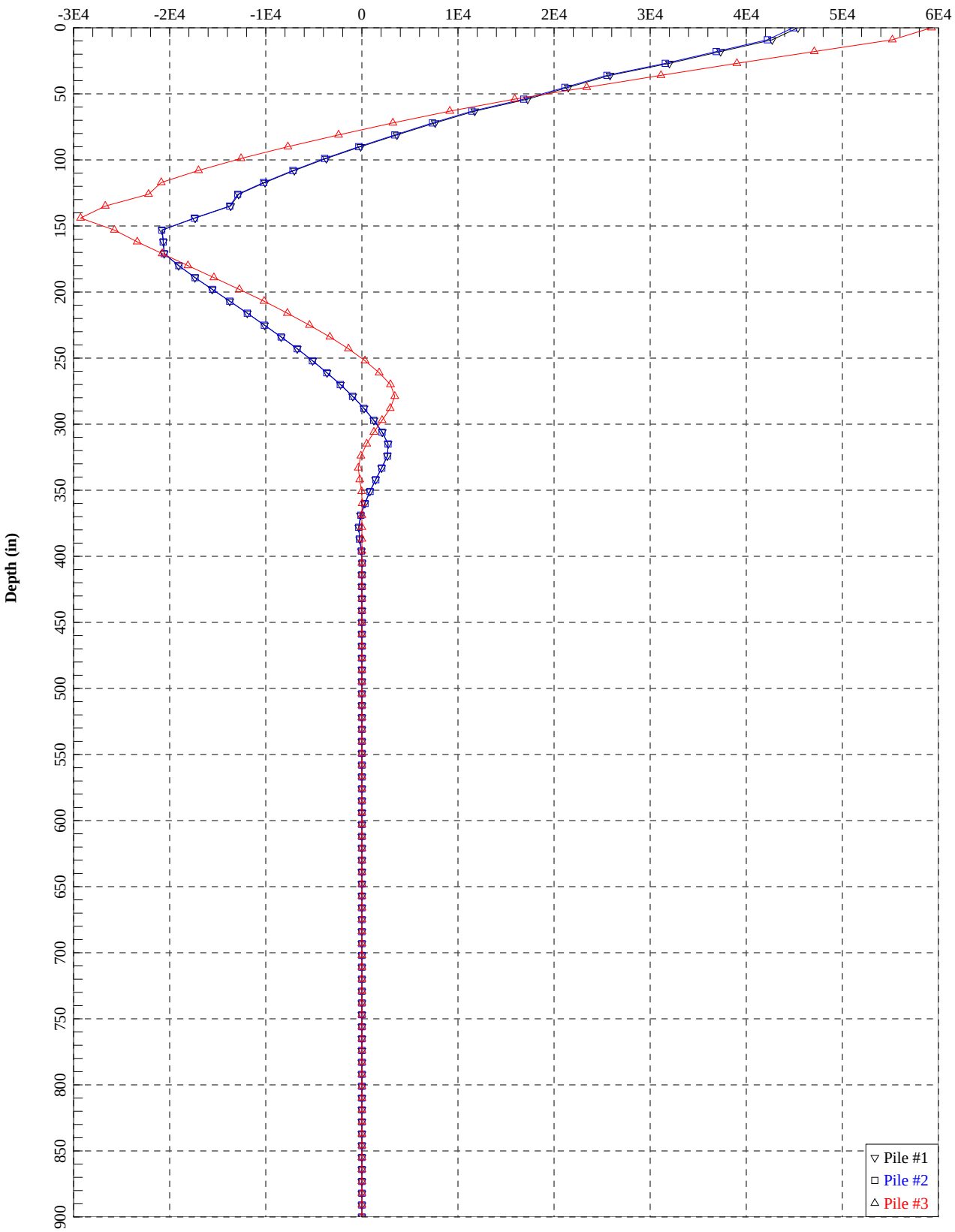
29th Ave OC Bent 6 - Seismic Load

Moment (lbs-in)



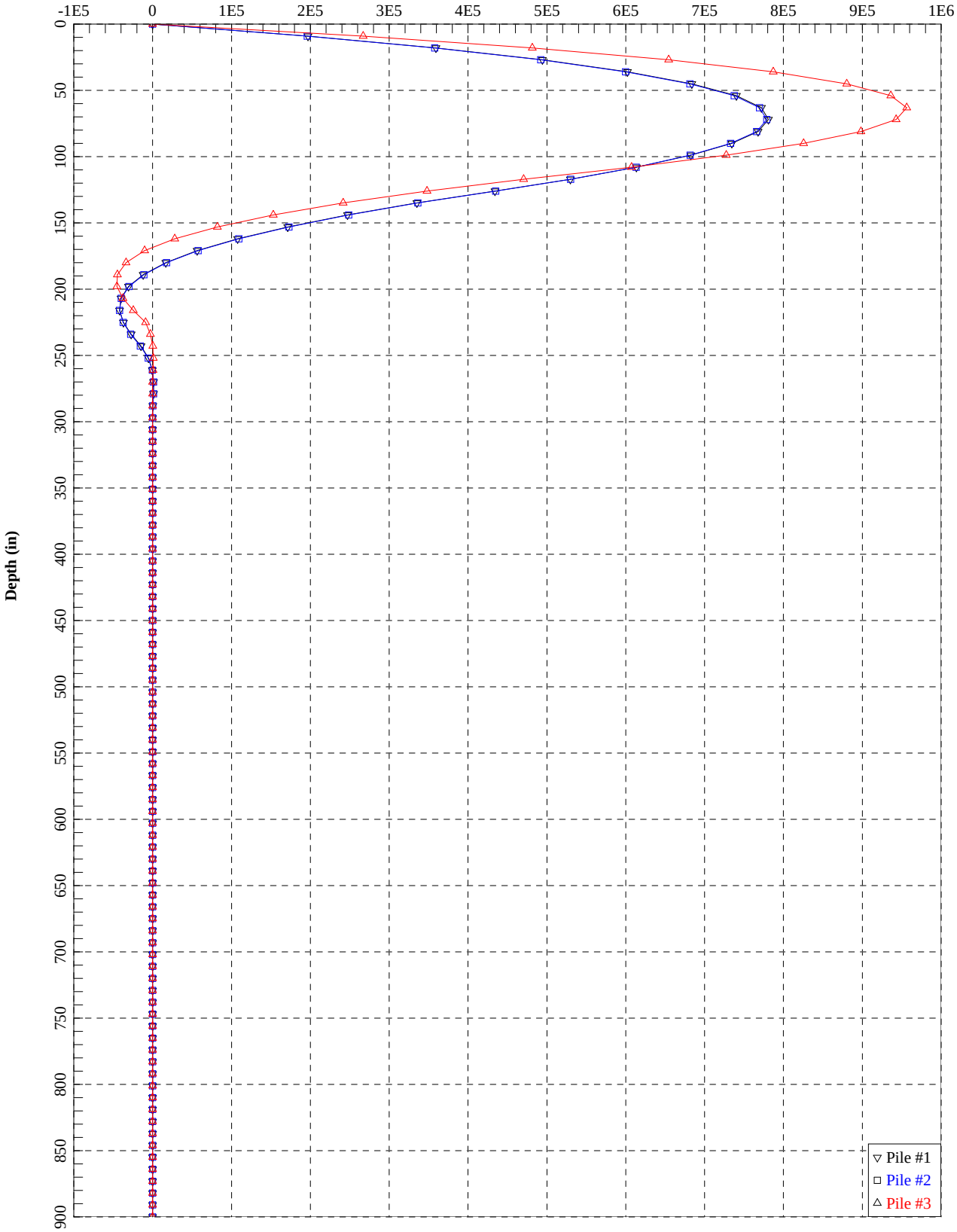
29th Ave OC Bent 6 - Seismic Load

Shear (lbs)



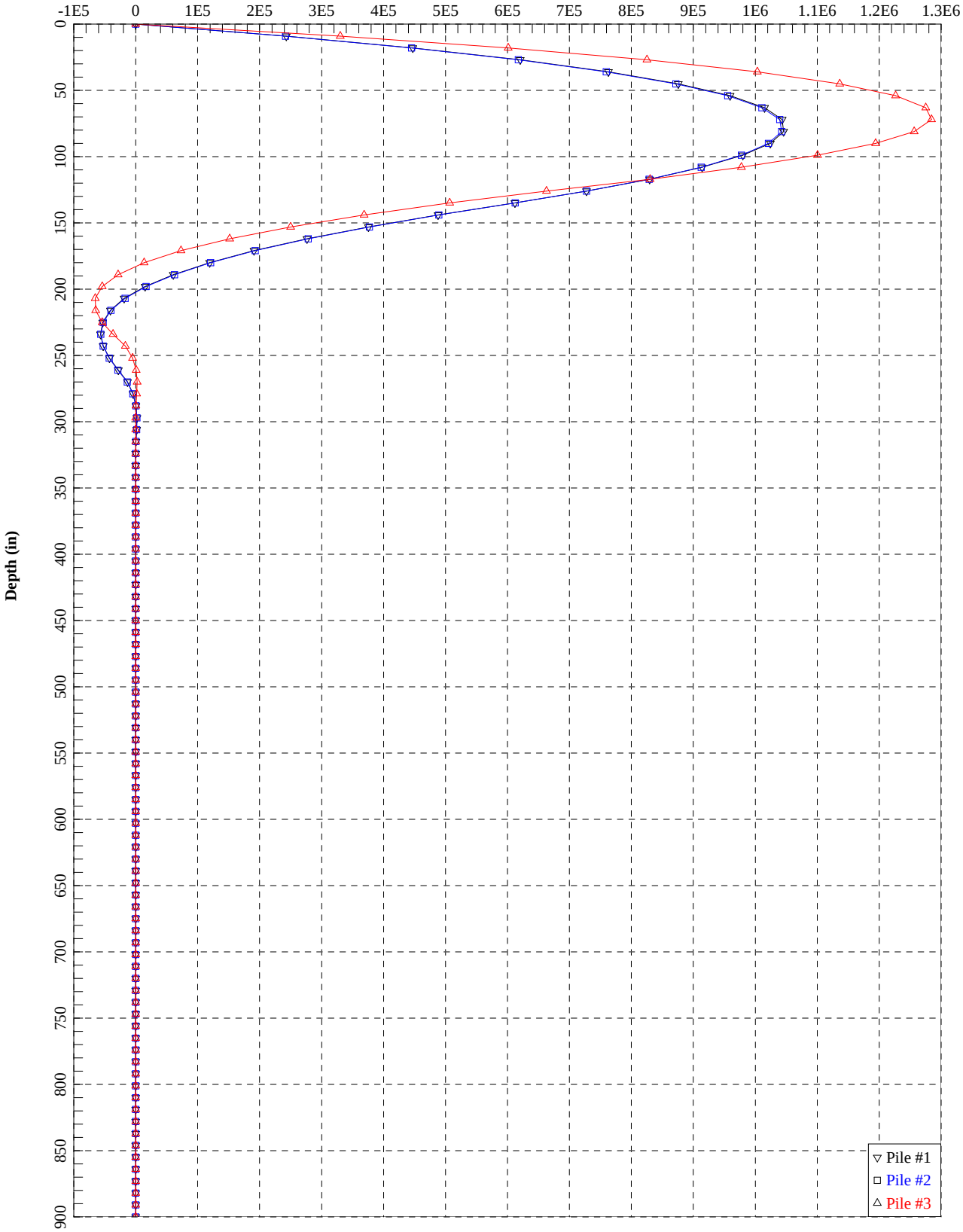
29th Ave OC Bent 7 - Strength Load

Moment (lbs-in)



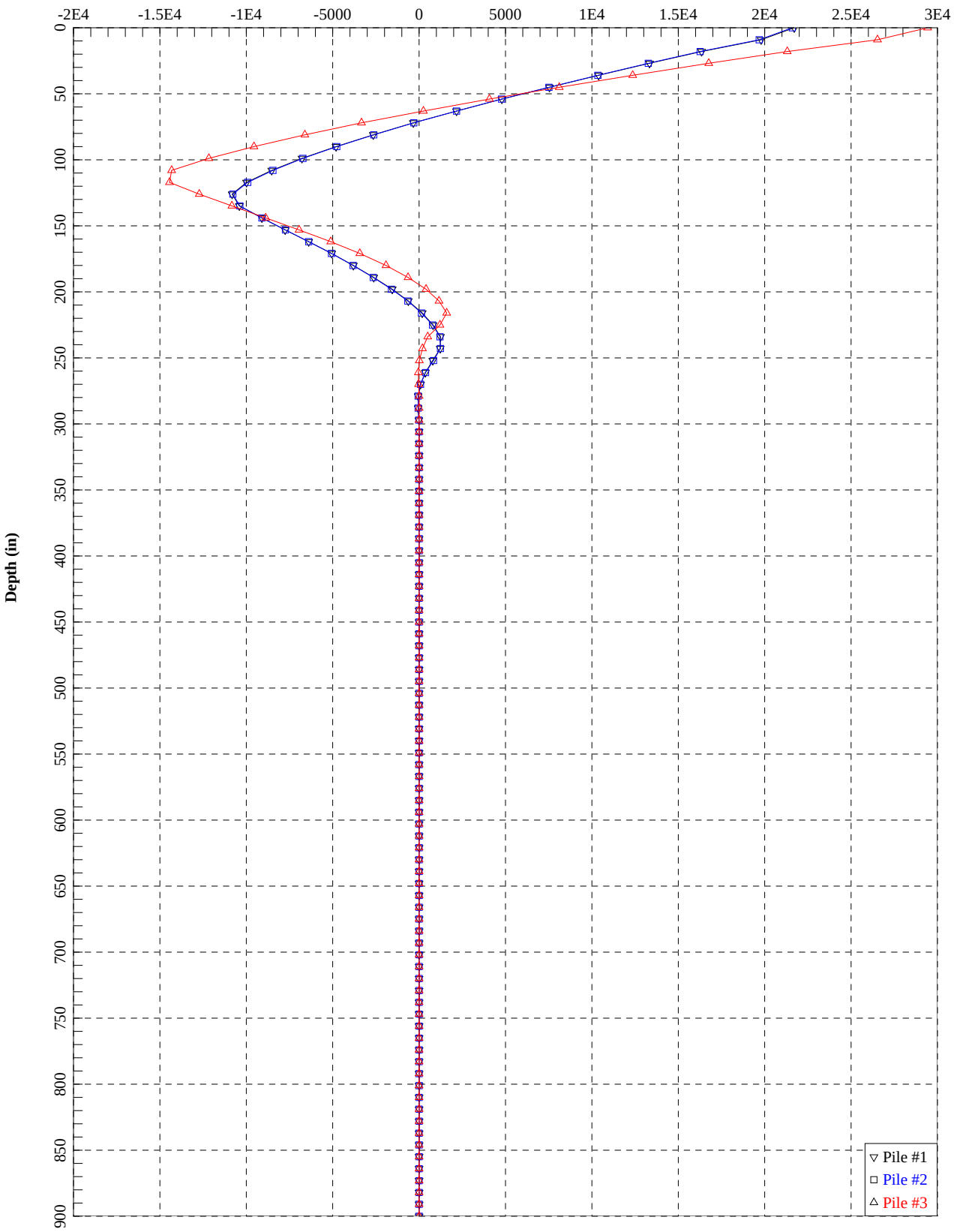
29th Ave OC Bent 7 - Service Load

Moment (lbs-in)



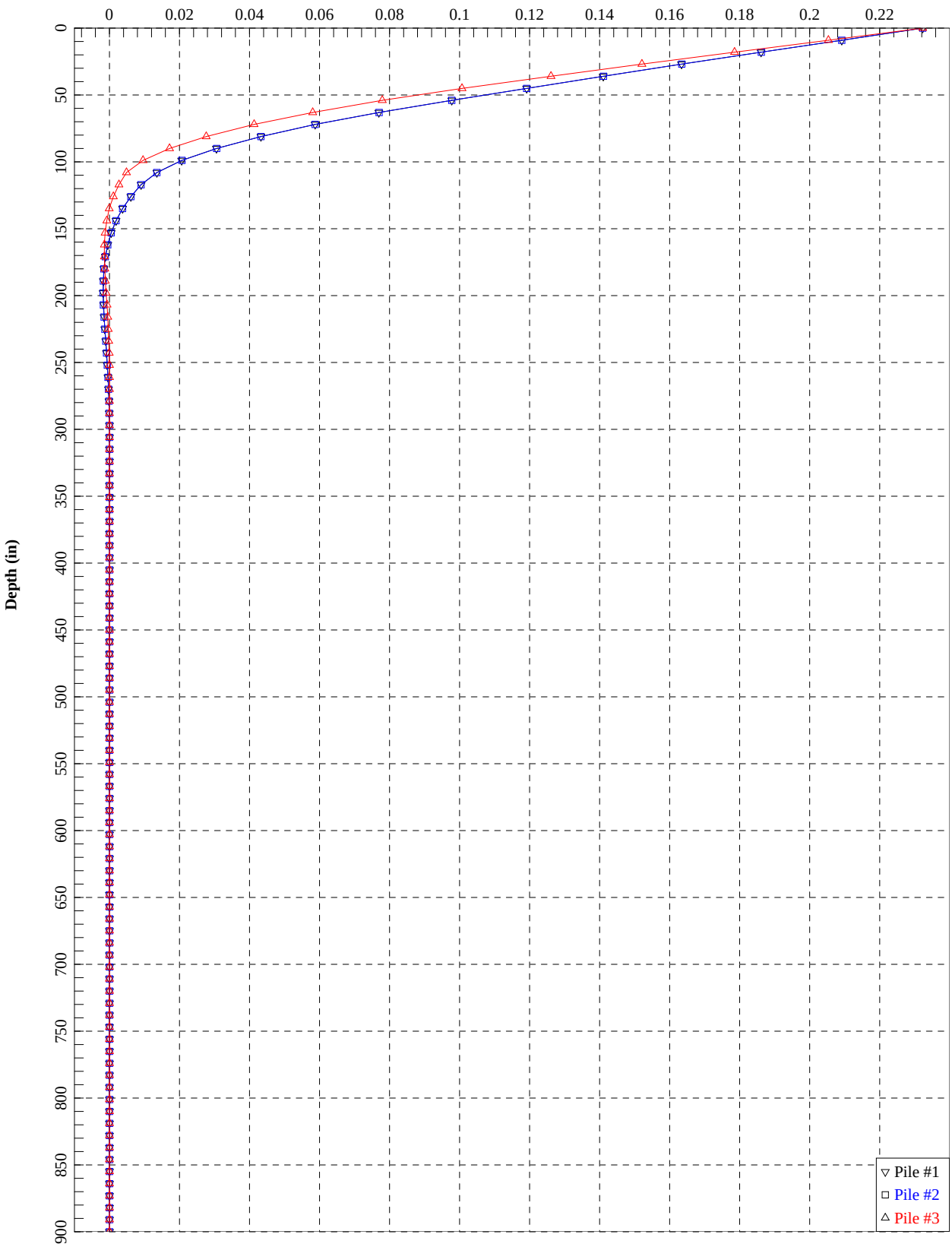
29th Ave OC Bent 7 - Strength Load

Shear (lbs)



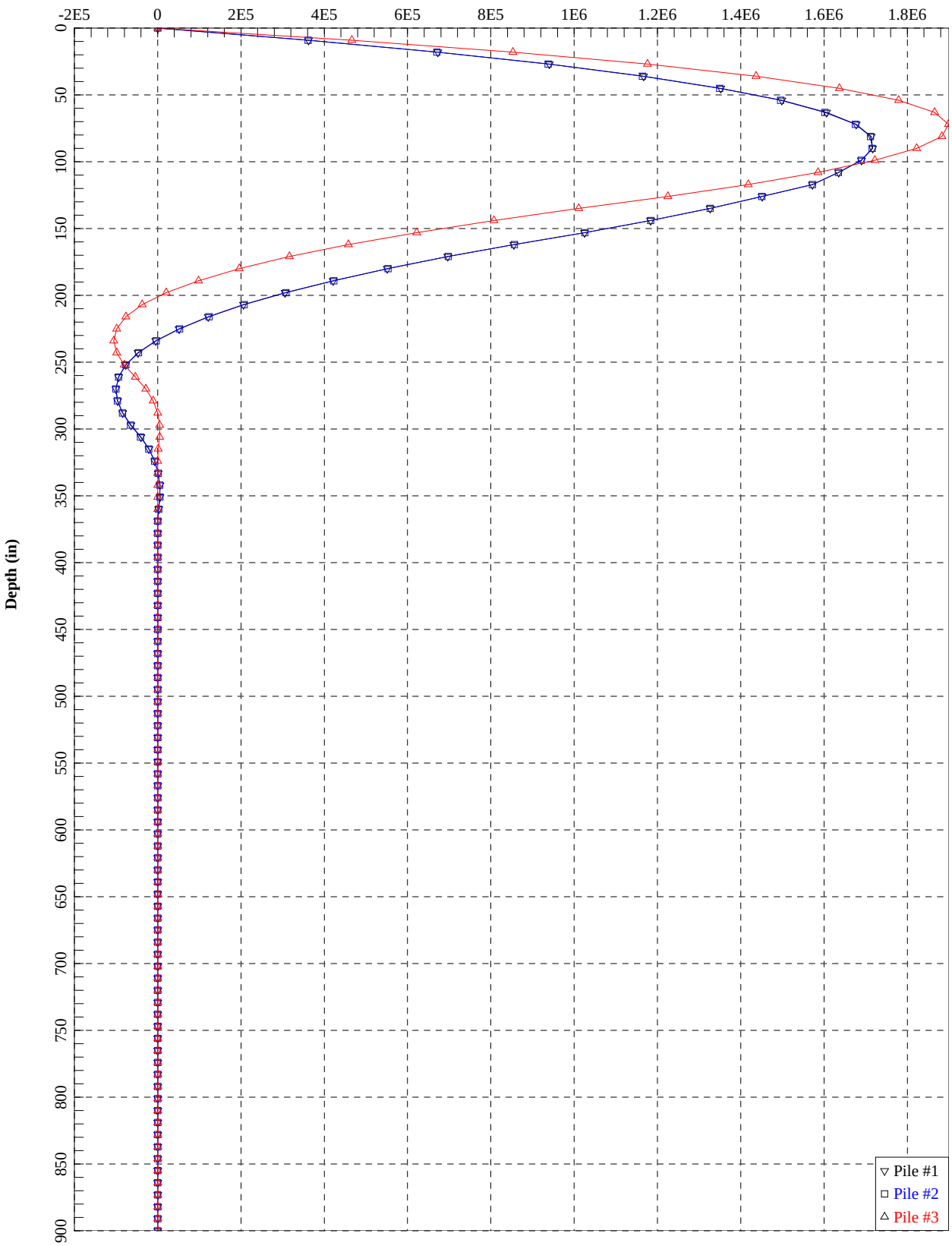
29th Ave OC Bent 7 - Seismic Load

Deflection (in)



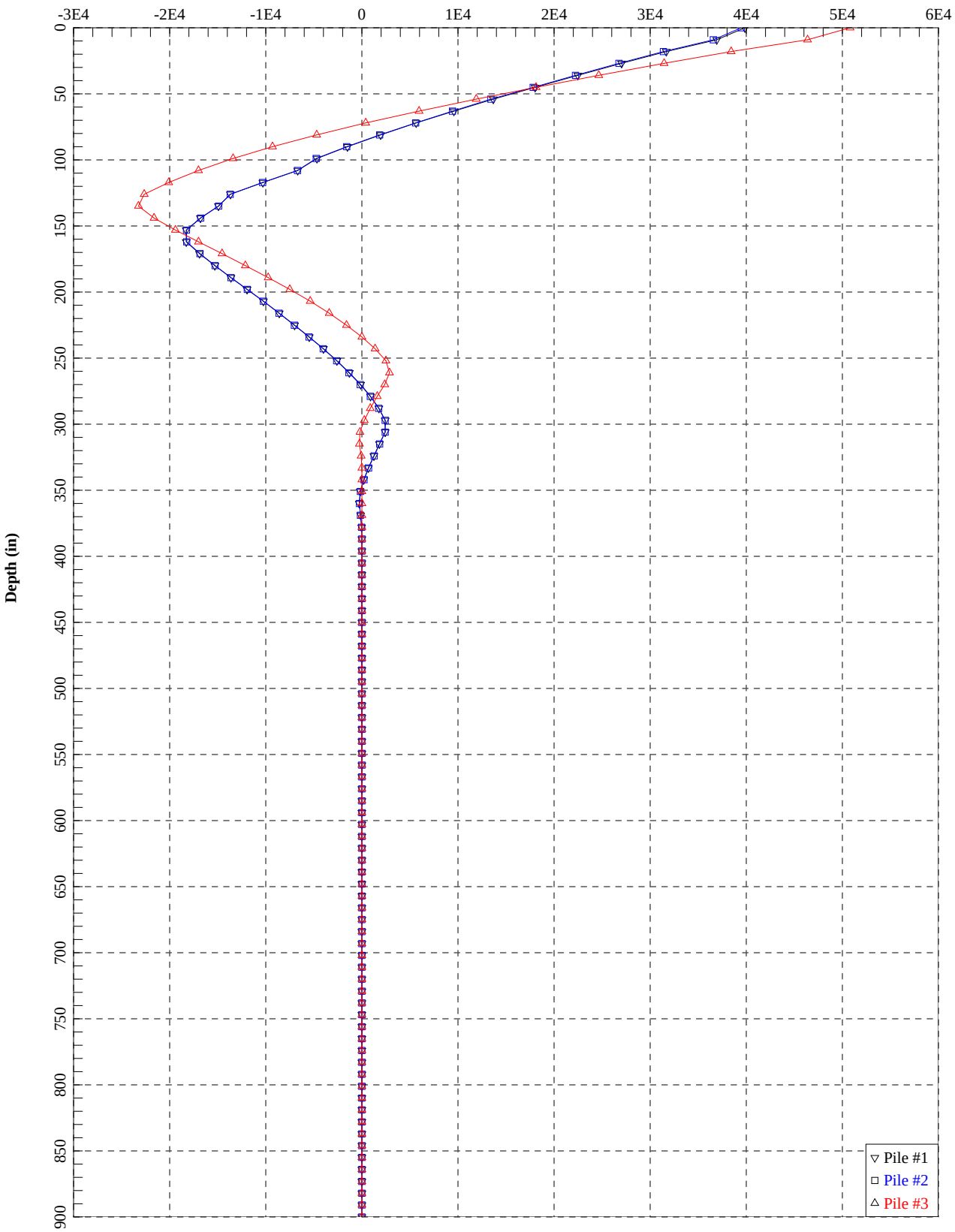
29th Ave OC Bent 7 - Seismic Load

Moment (lbs-in)



29th Ave OC Bent 7 - Seismic Load

Shear (lbs)



EMI data 1

Boring	Soil type	Depth	Δd (in)	H_{50} (in.)	t_{50} (min.)	c_v (ft^2/day)	t_{90} (min.)	c_v (ft^2/day)	sp' ksf	depth ft	sv psf	OCR
R-11-002	CL	15	0.0702	0.9298	1.50	0.28	9.00	0.20	3.5	15	1563	2.2
R-11-002	CL	25	0.084	0.9160	1.5	0.28	4	0.44	4	25	2189	1.8
R-11-010	CL	15	0.0742	0.9258	3	0.14	9	0.20	5.5	15	1563	3.5
R-11-014	CL	40	0.081	0.9190	2	0.21	6.25	0.29	5	40	3128	1.6
R-11-034	CL	20	0.0793	0.9207	4.5	0.09	9	0.20	3.5	20	1876	1.9
				Average	0.27							

Boring	Soil type	Depth	s1 ksf	e1 %	s2 ksf	e2 %	Cc
R-11-002	CL	15	4	4	10	9	0.125647
R-11-002	CL	25	5	5	15	9	0.083836
R-11-010	CL	15	10	5	15	6.5	0.085183
R-11-014	CL	40	6.5	5	15	9	0.110139
R-11-034	CL	20	5	5	15	12.2	0.150905
						average	0.11

Boring	Soil type	Depth	s1 ksf	e1 %	s2 ksf	e2 %	Cr
R-11-002	CL	15	10	11	0.4	8	0.02146
R-11-002	CL	25	2	7.5	0.4	6	0.02146
R-11-010	CL	15	9	6	0.6	3	0.025508
R-11-014	CL	40	5	8	0.7	6	0.023423
R-11-034	CL	20	5	11	2	10	0.025129
						average	0.02

URS Lab Consolidation Tests

Boring	Soil type	LL	PI	sp' ksf	depth ft	sv psf	OCR	Cv of recompression range ft/day			
B-2	CL	44	27	7	32	2627.2	2.7	0.68	1.25		
B-4	CL	40	20	5	21	1938.6	2.6	0.496302	0.255747	3.16317	
B-5	CL	48	24	7	50	3754	1.9	0.209155	0.050357	1.348924	
B-8	CL	49	24	7	10	1250	5.6	0.109361	2.323357	0.468885	1.349241
B-11	CH	65	35	7	27	2314.2	3.0	0.212382	4.87707		
										Average	1.20

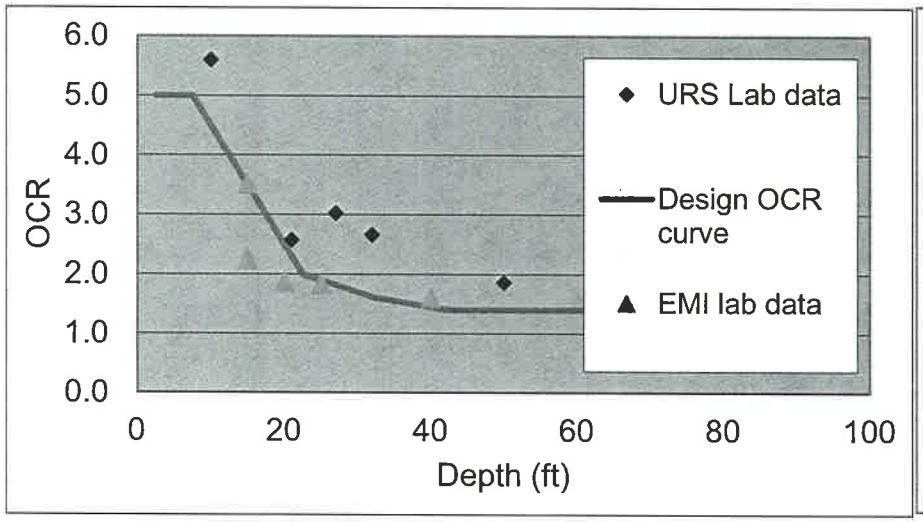
Boring	Soil type	LL	PI	s1 ksf	e1 %	s2 ksf	e2 %	Cc	
B-2	CL	44	27	80	17	10	6.5	0.116267	} Average.
B-4	CL	40	20	90	20	10	7	0.136234	
B-5	CL	48	24	100	21.5	20	11	0.150221	
B-8	CL	49	24	100	20	20	10	0.143068	
B-11	CH	65	35	40	24	10	7	0.282364	
							average	0.14	

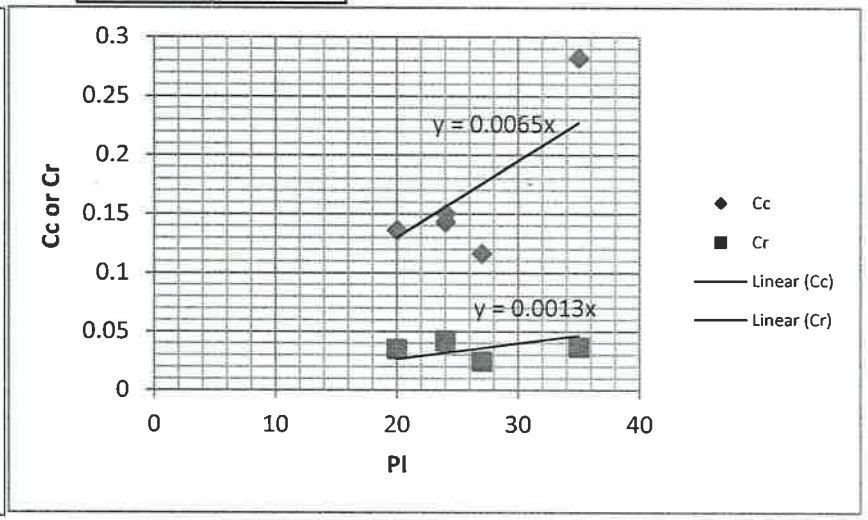
Boring	Soil type	LL	PI	s1 ksf	e1 %	s2 ksf	e2 %	Cr
B-2	CL	44	27	5	15	0.3	12	0.024553
B-4	CL	40	20	10	19.5	1	16	0.035
B-5	CL	48	24	30	22.3	0.9	16	0.041369
B-8	CL	49	24	20	20	1	14.5	0.042274
B-11	CH	65	35	30	26	0.7	20	0.036764
							average	0.04

Boring	Sample No.	Sample depth	USGS	LL	PI
URS-1	4	15	CL	34	15
URS-3	4	15	CL	33	17
URS-3	12	60	CL	45	20
URS-4	5	20	CL	44	20
URS-9	14	80	CL	41	20
URS-5	11	85	CL	48	24
URS-8	3	10	CL	49	24
URS-2	5	30	CL	44	27
URS-11	7	27	CL	65	35
URS-4	8	35	CH	77	44
URS-9	11	50	CH	75	44
URS-8	8	35	CH	80	52
			Average	52.9	28.5

Design parameter				
	Cc=	0.19	to	0.12
	Cr=	0.04	to	0.03
	Cv=	1.20 ft2/day		
	OCR=	See left		

Depth (ft)	OCR	
2.5	5	
7.5	5	
12.5	4	
17.5	3	
22.5	2	
27.5	1.8	
32.5	1.6	
37.5	1.5	
42.5	1.4	*given Su/σv'=0.3, OCR~1.4
47.5	1.4	
52.5	1.4	
57.5	1.4	
62.5	1.4	
67.5	1.4	
72.5	1.4	
77.5	1.4	
82.5	1.4	
87.5	1.4	
92.5	1.4	
97.5	1.4	





29 west (upperbound)

Fill Height	17.5	ft	**Settlement**	**3.30**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	65	ft			
Length of fill	142.8	ft			
Design Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	2275	psf			

Based on B-6 (old boring)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	2153	2465.55	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1938	2875.38	5	-	-	-
CL	12.5	5	125	0.04	0.19	1562.5	156	1406.5	1754	3160.99	4	5626	N	0.84
CL	17.5	5	125	0.04	0.19	2187.5	468	1719.5	1597	3316.24	3	5158.5	N	0.68
CL	22.5	5	125	0.04	0.19	2812.5	780	2032.5	1460	3492.46	2	4065	N	0.56
CL	27.5	5	125	0.04	0.19	3437.5	1092	2345.5	1340	3686.00	1.8	4221.9	N	0.47
CL	32.5	5	125	0.04	0.19	4062.5	1404	2658.5	1235	3893.98	1.6	4253.6	N	0.40
CL	37.5	5	125	0.04	0.19	4687.5	1716	2971.5	1143	4114.12	1.5	4457.25	N	0.34
SC	42.5	5	125	0.04	0.19	5312.5	2028	3284.5	1060	4344.58	1.4	4598.3	N	0.00
SM	47.5	5	125	0.04	0.19	5937.5	2340	3597.5	986	4583.85	1.4	5036.5	N	0.00
SM	52.5	5	125	0.04	0.19	6562.5	2652	3910.5	920	4830.70	1.4	5474.7	N	0.00
SM	57.5	5	125	0.04	0.19	7187.5	2964	4223.5	861	5084.11	1.4	5912.9	N	0.00
SC	62.5	5	125	0.04	0.19	7812.5	3276	4536.5	807	5343.22	1.4	6351.1	N	0.00
SC	67.5	5	125	0.04	0.19	8437.5	3588	4849.5	758	5607.32	1.4	6789.3	N	0.00
SC	72.5	5	125	0.04	0.19	9062.5	3900	5162.5	713	5875.81	1.4	7227.5	N	0.00
SC	77.5	5	125	0.04	0.19	9687.5	4212	5475.5	673	6148.16	1.4	7665.7	N	0.00
SC	82.5	5	125	0.04	0.19	10312.5	4524	5788.5	635	6423.93	1.4	8103.9	N	0.00
SC	87.5	5	125	0.04	0.19	10937.5	4836	6101.5	601	6702.76	1.4	8542.1	N	0.00
SC	92.5	5	125	0.04	0.19	11562.5	5148	6414.5	570	6984.30	1.4	8980.3	N	0.00
SC	97.5	5	125	0.04	0.19	12187.5	5460	6727.5	541	7268.27	1.4	9418.5	N	0.00
														3.30

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	12.5	ft	(25ft compression, 2 sides drain)		
t50	2.57E+01	day			
t90	1.10E+02	day			

29 west (lower bound)

Fill Height	17.5	ft	**Settlement**	**2.48**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	65	ft			
Length of fill	142.8	ft			
Design Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	2275	psf			

Based on B-6 (old boring)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	2153	2465.55	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1938	2875.38	5	-	-	-
CL	12.5	5	125	0.03	0.12	1562.5	156	1406.5	1754	3160.99	4	5626	N	0.63
CL	17.5	5	125	0.03	0.12	2187.5	468	1719.5	1597	3316.24	3	5158.5	N	0.51
CL	22.5	5	125	0.03	0.12	2812.5	780	2032.5	1460	3492.46	2	4065	N	0.42
CL	27.5	5	125	0.03	0.12	3437.5	1092	2345.5	1340	3686.00	1.8	4221.9	N	0.35
CL	32.5	5	125	0.03	0.12	4062.5	1404	2658.5	1235	3893.98	1.6	4253.6	N	0.30
CL	37.5	5	125	0.03	0.12	4687.5	1716	2971.5	1143	4114.12	1.5	4457.25	N	0.25
SC	42.5	5	125	0.03	0.12	5312.5	2028	3284.5	1060	4344.58	1.4	4598.3	N	0.00
SM	47.5	5	125	0.03	0.12	5937.5	2340	3597.5	986	4583.85	1.4	5036.5	N	0.00
SM	52.5	5	125	0.03	0.12	6562.5	2652	3910.5	920	4830.70	1.4	5474.7	N	0.00
SM	57.5	5	125	0.03	0.12	7187.5	2964	4223.5	861	5084.11	1.4	5912.9	N	0.00
SC	62.5	5	125	0.03	0.12	7812.5	3276	4536.5	807	5343.22	1.4	6351.1	N	0.00
SC	67.5	5	125	0.03	0.12	8437.5	3588	4849.5	758	5607.32	1.4	6789.3	N	0.00
SC	72.5	5	125	0.03	0.12	9062.5	3900	5162.5	713	5875.81	1.4	7227.5	N	0.00
SC	77.5	5	125	0.03	0.12	9687.5	4212	5475.5	673	6148.16	1.4	7665.7	N	0.00
SC	82.5	5	125	0.03	0.12	10312.5	4524	5788.5	635	6423.93	1.4	8103.9	N	0.00
SC	87.5	5	125	0.03	0.12	10937.5	4836	6101.5	601	6702.76	1.4	8542.1	N	0.00
SC	92.5	5	125	0.03	0.12	11562.5	5148	6414.5	570	6984.30	1.4	8980.3	N	0.00
SC	97.5	5	125	0.03	0.12	12187.5	5460	6727.5	541	7268.27	1.4	9418.5	N	0.00
														2.48

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	12.5	ft	(25ft compression, 2 sides drain)		
t50	2.57E+01	day			
t90	1.10E+02	day			

29 east (upperbound)

Fill Height	11	ft	**Settlement**	**3.17**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	60	ft			
Length of fill	95.24	ft			
Design Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	1430	psf			

Based on B-5 (old boring) and R-11-008 (EMI)

Layer	Depth	Thickness	Unit Wt.	Cr/(1+eo)	Cc/(1+eo)*	σvo	Water Pressure	σ'vo	Δσ	σ'vf	OCR	σ'p	Comp.	$S_{@EOP}$
	(ft)	(ft)	(pcf)	-	-	(psf)	(psf)	(psf)	(psf)	(psf)	-	(psf)	Range ?	(in)
CL	2.5	5	125	-	-	312.5	0	312.5	1338	1650.19	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1178	2115.82	5	-	-	-
CL	12.5	5	125	0.04	0.19	1562.5	156	1406.5	1046	2452.64	4	5626	N	0.58
CL	17.5	5	125	0.04	0.19	2187.5	468	1719.5	935	2654.75	3	5158.5	N	0.45
CL	22.5	5	125	0.04	0.19	2812.5	780	2032.5	841	2873.76	2	4065	N	0.36
CL	27.5	5	125	0.04	0.19	3437.5	1092	2345.5	761	3106.37	1.8	4221.9	N	0.29
CL	32.5	5	125	0.04	0.19	4062.5	1404	2658.5	692	3350.07	1.6	4253.6	N	0.24
CL	37.5	5	125	0.04	0.19	4687.5	1716	2971.5	631	3602.89	1.5	4457.25	N	0.20
CL/SC	42.5	5	125	0.04	0.19	5312.5	2028	3284.5	579	3863.29	1.4	4598.3	N	0.17
CL/SC	47.5	5	125	0.04	0.19	5937.5	2340	3597.5	533	4130.04	1.4	5036.5	N	0.14
CL	52.5	5	125	0.04	0.19	6562.5	2652	3910.5	492	4402.15	1.4	5474.7	N	0.12
CL	57.5	5	125	0.04	0.19	7187.5	2964	4223.5	455	4678.82	1.4	5912.9	N	0.11
CL	62.5	5	125	0.04	0.19	7812.5	3276	4536.5	423	4959.39	1.4	6351.1	N	0.09
CL	67.5	5	125	0.04	0.19	8437.5	3588	4849.5	394	5243.32	1.4	6789.3	N	0.08
CL	72.5	5	125	0.04	0.19	9062.5	3900	5162.5	368	5530.17	1.4	7227.5	N	0.07
CL	77.5	5	125	0.04	0.19	9687.5	4212	5475.5	344	5819.54	1.4	7665.7	N	0.06
CL	82.5	5	125	0.04	0.19	10312.5	4524	5788.5	323	6111.13	1.4	8103.9	N	0.06
CL	87.5	5	125	0.04	0.19	10937.5	4836	6101.5	303	6404.67	1.4	8542.1	N	0.05
CL	92.5	5	125	0.04	0.19	11562.5	5148	6414.5	285	6699.92	1.4	8980.3	N	0.05
CL	97.5	5	125	0.04	0.19	12187.5	5460	6727.5	269	6996.69	1.4	9418.5	N	0.04
														3.17

Given LL=50%					
Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	15	ft	(30ft compression 2 direction drain)		
t50	3.69E+01	day			
t90	1.59E+02	day			

29 east (lower bound)

Fill Height	11	ft	**Settlement**	**2.38**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	60	ft			
Length of fill	95.24	ft			
Design Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	1430	psf			

Based on B-5 (old boring) and R-11-008 (EMI)

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	1338	1650.19	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1178	2115.82	5	-	-	-
CL	12.5	5	125	0.03	0.12	1562.5	156	1406.5	1046	2452.64	4	5626	N	0.43
CL	17.5	5	125	0.03	0.12	2187.5	468	1719.5	935	2654.75	3	5158.5	N	0.34
CL	22.5	5	125	0.03	0.12	2812.5	780	2032.5	841	2873.76	2	4065	N	0.27
CL	27.5	5	125	0.03	0.12	3437.5	1092	2345.5	761	3106.37	1.8	4221.9	N	0.22
CL	32.5	5	125	0.03	0.12	4062.5	1404	2658.5	692	3350.07	1.6	4253.6	N	0.18
CL	37.5	5	125	0.03	0.12	4687.5	1716	2971.5	631	3602.89	1.5	4457.25	N	0.15
CL/SC	42.5	5	125	0.03	0.12	5312.5	2028	3284.5	579	3863.29	1.4	4598.3	N	0.13
CL/SC	47.5	5	125	0.03	0.12	5937.5	2340	3597.5	533	4130.04	1.4	5036.5	N	0.11
CL	52.5	5	125	0.03	0.12	6562.5	2652	3910.5	492	4402.15	1.4	5474.7	N	0.09
CL	57.5	5	125	0.03	0.12	7187.5	2964	4223.5	455	4678.82	1.4	5912.9	N	0.08
CL	62.5	5	125	0.03	0.12	7812.5	3276	4536.5	423	4959.39	1.4	6351.1	N	0.07
CL	67.5	5	125	0.03	0.12	8437.5	3588	4849.5	394	5243.32	1.4	6789.3	N	0.06
CL	72.5	5	125	0.03	0.12	9062.5	3900	5162.5	368	5530.17	1.4	7227.5	N	0.05
CL	77.5	5	125	0.03	0.12	9687.5	4212	5475.5	344	5819.54	1.4	7665.7	N	0.05
CL	82.5	5	125	0.03	0.12	10312.5	4524	5788.5	323	6111.13	1.4	8103.9	N	0.04
CL	87.5	5	125	0.03	0.12	10937.5	4836	6101.5	303	6404.67	1.4	8542.1	N	0.04
CL	92.5	5	125	0.03	0.12	11562.5	5148	6414.5	285	6699.92	1.4	8980.3	N	0.03
CL	97.5	5	125	0.03	0.12	12187.5	5460	6727.5	269	6996.69	1.4	9418.5	N	0.03
														2.38

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	15	ft	(30ft compression 2 direction drain)		
t50	3.69E+01	day			
t90	1.59E+02	day			

Appendix E
Responses to Comments

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Paul Cotter** **Phone: (916)227-5671** **e-mail: paul.cotter@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.___) __ APS/PR (Review No.___) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.___) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 05/09/2012** **Structure Name*: 29th Ave OC (Replace) Br No*:33-0751** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 3/30/2012, responses to Caltrans last review comments dated 2/17/2012, and Plans prepared by URS dated 3/30/2012.		
2	FR	Section 7.4	1) Cut-off elevations shown on Table 5 are not consistent with those presented on Tables 7 and 8. 2) Report states the CIDH piles are expected to encounter groundwater at approximate El +10 ft, which is about 4 ft lower than the highest groundwater encountered during field investigation. 3) Note 3 under Tables 7 and 8 do not apply. 4) Table 7: Total load per pile is no consistent with the values presented on Table 6. The nominal resistance should be rounded up to the nearest 10 kips. 5) Table 8: required factored nominal resistance under Strength Limit for Bent 5 is not consistent with what shown on Table 6. 6) Page 7.6: Table numbers (Table 5 and 6) referenced on this page is wrong.	1) Cut-off elevations shown on Tables 7 and 8 are corrected. 2) The text was revised as "CIDH piles are expected to encounter groundwater approximately between Elevation +8 to +14 ft MSL" 3) Note 3 under Tables 7 and 8 were deleted. 4) Table 7: Total load per pile was corrected. The nominal resistance was rounded up to the nearest 10 kips. 5) Table 8: required factored nominal resistance under Strength Limit for	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer:_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

				Bent 5 was corrected. 6) Page 7.6: Table numbers were corrected.	
3	FR	Section 7.5 Page 7-8	Light-weight fill is recommended behind the abutment wall. 1. Please address the impact of the light-weight fill on the passive resistance for seismic design of the abutment backwall. 2. Please also specify the limit of the EPS. 3. Please address buoyancy issue associated with use of EPS, if any, and provide remediation if needed.	1. The passive resistance of light weight fill was not accounted for seismic design of the abutment backwall. 2. Limitation of EPS was added in the text. 3. There is no buoyancy issue associated with use of EPS since EPS will be placed above the ground water table.	
4	FR,P	LOTBs	Please include LOTBs originally intended for other structures, including those done by different geotechnical consultant, into the plans for each structure if the borings are close enough and are being referenced/used for the analysis for that particular structure. It is noted that several structures significantly rely on the borings conducted for adjacent structures for the GW information, or the borings intended for adjacent structure show much higher GWT than those intended for this particular one.	We agree that it is useful to include LOTBs originally intended for other structures done by different geotechnical consultant into the plans for our design structure. However, since Caltrans have a standard way to name boring ID, it's possible to have identical IDs on a plan if using LOTB from different geotechnical consultants. To avoid confusion, we clearly stated which borings in addition to our explorations were used instead of including them in our LOTBs.	
5	FR		Artesian condition was encountered in the High Street Project during construction at the site about 4000 ft southeast to 29th Ave OC. It may be necessary to probe the possibility of artesian conditions at this site due to the proximity and similarity of the subsurface conditions, at least for the support locations that needs deeper excavation for pile cap installation.	Our field explorations do not show any artesian condition at the project sites and neither do the field explorations by EMI (2012). There is no issue of artesian for the construction.	

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: yiwei.hu@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 2/17/2012** **Structure Name*: 29th Ave OC (Replace) Br No*:33-0751** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 1/6/2012, responses to Caltrans last review comments dated 10/3/2011, and Plans prepared by URS dated 1/10/2012.		
2	FR	Page 3-1,2 Section 3.2.1	The drilling methods indicated in this section for the top 5 ft is not reflected in the LOTBs.	The boring was hand augered to check for the existence of underground utilities, but then re-drilled through using Rotary Wash method. A note "The borings were hand augered in the top 5 ft to check for the existence of underground utilities" was added on LOTB	
3	FR	Page 4-1,2 Section 4.2	Please add a note to reflect how the soil strength changes with depth.	Text was revised to reflect how the soil strength changes with depth, in an overconsolidated strength profile.	
4	FR	Page 4-2 Section 4.3	How far away is it from the job site to the EMI borings? Is GW elevation encountered in those borings considered preventative for this site as well? If so, why is the design elevation assumed to be at about El +10.0 ft, which is much lower than what was	The design ground water elevation was selected to be EL+10.0 feet at the 29th Avenue Overcrossing based on several data sources. We reviewed groundwater elevations in the 2011 EMI borings R-	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
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RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer**:**_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

			actually encountered in EMI's boring?	11-008, R-11-034, and R-11-035, which are at the site. Our design water table is much higher than the investigations conducted in 1993 (elevation -1.5 feet and elevation -1.7 feet), slightly higher than our CPT interpretation (elevation +8.6 feet), and is consistent with the range encountered by EMI (between elevation +9.3 feet and +14.0 feet). Therefore, the design ground water elevation was reasonably assumed to be EL+10.0 feet at the 23rd Avenue Overcrossing.	
5	FR	Page 7-2 Section 7.4	1) Please include foundation data provided by structure designer and present foundation design data and resistance factor for each limit state in the main body of the report, not in the appendix. 2) The values of required factored nominal resistance are not correct.	1. We have included foundation data provided by structure designer and presented foundation design data and resistance factors for each limit state in the main body of the report 2. The values of required factored nominal resistance have been corrected	
6	FR		Please show bridge number on the cover page of the report since it is now available. Please indicate both old and new bridge numbers in the beginning of the report.	1. New Bridge numbers have been added to the cover page of the report. 2. Old and new Bridge numbers have been added in the beginning of the report.	
7	LOTBs		Boreholes are not identified correctly. Please refer to the current Caltrans logging manual. Please revise accordingly, including the LOTBs, report, and all pertinent information such as lab test results included in the appendices. Please examine the entire LOTB set to make sure it follows Caltrans current logging manual.	Changed names of the borings in LOTB, text and lab test appendices	
8	Plans	Sheet 6	Tip controlled by lateral demand for Bent 5 is not consistent with recommendation provided in the FR.	Tip controlled by lateral demand for Bent 5 is revised in the plan to be consistent with the FR	

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: yiwei.hu@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 10/03/2011** **Structure Name*: 29th Ave OC (Replace) Br No*:33-xxxx** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 9/6/2011 and Plans prepared by URS dated 9/6/2011.		
2	FR	Page 3-1,2 Section 3.2.1	1) LOTB for B-4 is missing. 2) Borehole diameters indicated in this section and on LOTBs are inconsistent. 3) The drilling methods indicated in this section are not reflected in the LOTBs. 4) The SPT sampler size indicated in the report is 1.5 inch (I.D.), but LOTBs shows 1.4 inch.	1) B-4 was added to LOTBs. 2) Borehole diameters of 8" indicated in LOTBs are correct. The text in Section 3.2.1 was revised. 3) The drilling methods indicated in LOTBs were revised to reflect rotary wash method. 4) The SPT sampler size of 1.4 inch indicated LOTBs is correct. The text in Section 3.2.1 was revised.	
3	FR	Page 4-1,2 Section 4.2	1) Figure 7 shows soil layer elevation up to 20 ft. No information is shown for zone between Elevations 20 and 25. 2) Cohesion of the first soil layer is shown to range from 2500 psf to 1500psf. Please use a single value or indicate how such a wide range of value is used in analyses.	1) Figure 7 was revised to include the information between Elevations +20 feet and +25 feet. 2) As shown in figure 7, the field testing, lab testing, and CPT interpretation exhibits a classic overconsolidated stress history at the	

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RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

				site, in which the shear strength is higher near ground surface and decreases with depth until reaching normally consolidated conditions. Based on a review of all geotechnical data, generalized soil engineering parameters were developed as shown in the solid gray line in Figure 7, indicating soil strength ranges from 2500 psf to 1500 psf with the depth.	
4	FR	Page 4-2 Section 4.3	1) Groundwater (GW) encountered in one of the borings conducted in 1993 is at El -1.5 ft, not 1.5 ft. 2) Show the GW table indicated by the CPTs on the LOTBs. 3) How far away is it from the job site to the EMI borings? Is GW elevation encountered in those borings considered preventative for this site as well? If so, why is the design elevation assumed to be at about El +10.0 ft, which is much lower than what was actually encountered in EMI's boring?	1) Corrected. 2) GW table indicated by the CPTs was added to the LOTBs. 3) The CPT data obtained in this study indicate that the water table was at an elevation of +8.6 feet in boring B6. Groundwater encountered in the borings by Earth Mechanics Inc. (EMI, 2011) was in a similar range, between elevation +7.7 feet and elevation +14.3 feet. Therefore, a design ground water elevation of EL+10.0 feet was selected for the 29th Avenue Overcrossing.	
5	FR	Page 5-2 Section 5.4	Be specific that the ARS curve mentioned and generated based on the parameters mentioned in the first paragraph is the ARS curve obtained by deterministic method, not the design curve. The design curve is the envelope as mentioned in the second paragraph.	Text revised to clarify the difference.	
6	FR	Page 7-1 Section 7.3	Report states spread footing foundations are expected to be suitable for support of the bridge bents. Why are they not recommended/proposed?	Adequate soil bearing capacity exists for spread footing foundations, however, excessive settlements are computed under the design loading. Therefore deep foundations are recommended. Additional explanation was provided in the text.	
7	FR	Page 7-2 Section 7.4	1) Please make recommendations following LRFD method. Include foundation data provided by structure designer. Present foundation design data and resistance factor for each limit state. Refer to AASHTO Bridge Design Specifications, Caltrans amendments, and Caltrans Memo To Designer for information.	1) Foundation data provided by structure designer was included in Appendix D. Foundation design data and resistance factor for each limit state were also presented in Appendix D per AASHTO Bridge Design Specifications, Caltrans amendments, and Caltrans Memo To	

			2) Nominal resistance should be rounded up to the nearest 10 kips. 3) Put "0" instead of "NA" if there is no tension demand. 4) Pile length at several supports exceeds the limit. The length of CIDH piles is limited to 30 diameter of the piles due to constructability. 5) It appears relatively deep excavation is needed to install the pile caps due to the pile cap bottom elevation being much lower than the existing grade. Please address the pertinent issues.	Designers. 2) Pile data table has been updated. 3) "0"is entered instead of "NA" if there is no tension demand. 4) Pile length at all supports is now limited to 30 pile diameters 5) The pile cap elevation was updated and appears to be shallower.	
8	FR	Page 7-3 Section 7.4	What type of connection between pile and pile cap is assumed in the lateral analyses? Please provide summary of lateral displacement at pile head.	Pinned head connections between pile and cap were assumed. A summary table of lateral displacement at pile head has been added.	
9	LOTBs		Please prepare LOTBs in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition). There are many items need to be corrected or added. Following are some items noted: 1) Borehole is not identified correctly. 1) Legend sheets are missing. 2) All the laboratory and field testing performed are not presented, such as UU test, UC test, etc.. 3) All laboratory and field testing data are not presented, such Pocket Penetration test. 4) GW encountered is not shown. A note should be added accordingly if GW is not encountered or not measured. 5) Indicate Hammer energy ration. 6) Consistency or density of soil layers is not described. 7) Description of consistency of several clay layers is not supported by the field test or lab test results. 8) Graphics are not following legends in the Logging Manual 9) Why does the conversion table on the as-built LOTBs refer to Rte 101? The above list shows only some of the many issues needed to be corrected. Consultant should examine the entire LOTB set to make sure it follows Caltrans current logging manual referenced above.	LOTBs are revised according to the comment and in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition). 1) Borehole is identified as rotary drilling 2) Legend sheets have been added. 3) All laboratory and field test results are now presented. 4) All laboratory and field test data is now presented. 5) GW encountered in CPT is now shown. A note "Ground water table was not measured in the borings due to rotary wash drilling "was added. 6) A note "Hammer energy ratio calibration not performed" was added. 7) Consistency or density of soil layers was added. 8) Description of consistency was checked against the field test or lab test results. 9) Graphics were revised following legends in the Logging Manual 10) "Rte 101" was removed.	

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer**:**_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

10	FR	Lab test report	What are the values shown on the Particle Size report and Liquid and Plastic Limit Test report, elevation or depth?	It was clarified as depth.	

FOUNDATION REPORT

I-880 29TH AVE OFF RAMP
OAKLAND, CA
BRIDGE NO. 33-0752S

Prepared for
RBF Consulting, Alameda County Transportation Commission and California Department of Transportation

June 22, 2012

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27560836

I-880 Operational and Safety Improvements at 23rd/29th Ave OCs
04-Ala-880

Foundation Report
I-880 29th Avenue Off Ramp
Bridge No. 33-0752S

Submitted to
RBF Consulting, Alameda County Transportation Commission, and California Department of Transportation

This report has been prepared by or under the supervision of the following Registered Geotechnical Engineer. The Registered Geotechnical Engineer attests to the technical information contained herein and has judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

URS CORPORATION

Philip Meymand, Ph.D., G.E.
Registered Geotechnical Engineer

June 22, 2012
Date

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The proposed project is sponsored by Alameda County Congestion Management Agency (ACCMA) and will replace the 29th Avenue overcrossing and the two 23rd Avenue overcrossings of Interstate I-880 (I-880) located at Post Miles 28.69 and 28.95, respectively. In addition to the replacement of the overcrossings, the existing northbound 29th Avenue and 23rd Avenue off ramps and on ramps will be reconstructed to improve operations and safety. A soundwall will be constructed along East 8th Street, between 29th and 23rd Avenues to reduce noise impacts associated with the I-880 freeway within the Jingletown residential community. A project Vicinity Map is presented in Figure 1.

The new overcrossings will provide standard vertical clearances over mainline I-880. Replacement of the overcrossings will also provide room to widen the existing I-880 mainline lanes. In addition, the proposed project will widen the mainline outside shoulders and lengthen existing northbound auxiliary lane between the 29th Avenue on ramp and 23rd Avenue off ramp. These improvements, especially lengthening the auxiliary lane, will increase the flow of vehicles along the mainline and help reduce the rate of congestion related accidents in the area.

1.1 PURPOSE AND SCOPE OF THIS STUDY

The purpose of this Foundation Report (FR) is to document previous field investigations and existing foundation conditions, perform geotechnical and geological investigations or studies, and make foundation recommendations for the 29th Avenue Off Ramp (Bridge No. 33-0752S). This Foundation Report supersedes the Foundation Report for I-880 29th Avenue Off Ramp dated March 30, 2012.

1.2 PROJECT SCOPE OF WORK

The scope of work for this study includes:

- Review of logs of test borings (LOTBs), geologic maps, foundation reports, and other existing information
- Preparation of this FR, which includes:
  - Conduction of field exploration and laboratory tests
  - Preparation of LOTBs
  - Development of seismic design criteria and earthquake ground motions;
  - Description of site geology and evaluation of geologic hazards;
  - Assessment of subsurface conditions;
  - Foundation recommendations for proposed structures; and
  - Discussion of construction considerations

2.1 REGIONAL GEOLOGY

The 29th Avenue Off Ramp is located near the east side of the structural and topographic basin that contains San Francisco Bay. Elevations on site range between approximately 10 and 20 feet above Mean Sea Level (MSL). The bay trough has formed through processes of faulting, folding, and erosion that have been ongoing for millions of years. The project site lies in a region of very gently sloping to flat lying, unconsolidated, sandy to clayey, Holocene-age (less than 10,000 years old), alluvial fan deposits (Graymer, 2000) as shown in Figure 2. These deposits are derived from sediments that have been eroded from the uplifted East Bay hills and transported to the San Francisco Bay margins by local streams. These and older alluvial and basin fill deposits mantle bedrock of the Franciscan Complex at great depth. Previously drilled exploratory borings extended to depths of 80 feet and did not encounter bedrock. Subsurface information from available LOTB sheets is summarized in Section 3

2.2 SEISMIC SETTING

The I-880 corridor in Oakland is located along the eastern margin of San Francisco Bay in one of the most seismically active regions in California. The majority of earthquakes are associated with the strike-slip faults of the San Andreas system. The trend of most of the faults in this portion of the California Coast Ranges is northwest-southeast, as shown on Figure 3. The major active faults near the 29th Avenue Off Ramp, the Hayward, Calaveras, and San Andreas faults, are capable of generating earthquakes of Maximum Moment (M_{max}) 7.3, 7.4, and 7.9, respectively (Caltrans Caltrans Seismic Design Criteria, 2010).. The Hayward and Calaveras faults are located about 4.6 km and 17.6 km northeast of the site; the San Andreas fault is about 24 km to the southwest. As well as these local faults, earthquakes on more distant seismic sources, including the Greenville - Marsh Creek, Concord - Green Valley, Rodgers Creek, and the Mount Diablo blind thrust may also result in significant levels of seismic shaking in the project vicinity.

The last major earthquake on the Hayward fault occurred in 1868 and caused widespread damage throughout much of the East Bay. This earthquake caused surface rupture from Fremont to as far north as Berkeley. Although the fault rupture was poorly documented, the recorded lateral displacements were at least 1 meter. Smaller vertical displacements were also recorded. Based on empirical relationships among earthquake magnitude, fault rupture length, and displacement (Wells and Coppersmith, 1994), a large event on the Hayward fault is capable of generating displacements of several meters. In addition to coseismic rupture, the Hayward fault is undergoing creep, i.e., it is undergoing continuous aseismic slip. This amounts to about 4 to 6 mm/yr on the Hayward fault in Fremont (Lienkaemper and others, 1997).

3.1 PREVIOUS FIELD EXPLORATIONS

A total of two exploratory test borings were drilled as part of previous studies in 1993 for a seismic retrofit of the 29th Avenue Overcrossings. A list of these borings and the maximum depth of exploration for each boring are provided in Table 1. The LOTBs obtained from these subsurface investigations are provided in Appendix A.

Table 1
Existing Logs of Test Borings Reviewed

Boring No.	Location	Depth of Boring (feet)
B-5	29th Avenue	80
B-6	29th Avenue	80

Other LOTB sheets available for nearby structures are summarized below.

- **23rd Avenue Overcrossing** (Bridge No. 30-149) – Four test borings were performed in 1993 for a seismic retrofit of the 29th Avenue Overcrossings. The depths of these boring are approximately 75 to 90 feet below ground surface (bgs).
- **16th Avenue Overcrossing** (Bridge No. 33-137) – Nine test borings were performed between 1944 and 1946 in the vicinity of the former 16th Avenue Overcrossing alignment to depths of approximately 22 to 51 feet below ground surface.
- **Fruitvale Overhead** (Bridge No. 33-41) – Subsurface exploration was performed around 1959 in conjunction with the widening of the Fruitvale Avenue Overhead. This exploration consisted of twelve penetration borings and eight mud rotary borings. The borings were pushed or drilled to depths of about 40 to 60 feet below ground surface.

3.2 NEW FIELD EXPLORATIONS

The geotechnical investigation program for the project site at 29th Avenue consisted of drilling five exploratory soil borings and advancing one cone penetrometer test (CPT) sounding. Well permits were obtained from the Alameda County Public Works Agency. Underground Services Alert was notified 48-hours prior to the scheduled drilling date to clear the boring/CPT locations of underground utility lines. In addition, the services of a private utility locator (Cruz Brothers of Scotts Valley, California) were utilized by URS to clear the boring/CPT locations of underground utilities.

The approximate locations of these borings and CPT soundings are shown in Appendix B and Figure 4. The borings and CPTs were located in the field by measuring from existing structures and landmarks in the vicinity and surveyed using a hand-held GPS.

3.2.1 EXPLORATORY SOIL BORINGS

At 29th Avenue, the three soil borings, designated as R-11-001, R-11-003 and R-11-004, were drilled to depths about 100 feet bgs and the other two soil borings, designated as R-11-002 and R-11-005, were drilled to depths of about 50 feet bgs. In particular, Boring R-11-003 and R-11-004 are located at 29th Avenue Off Ramp. These soil borings were drilled at the project site from

April, 25, 2011 through April, 29, 2011. An additional boring, designated as R-12-012, was drilled to depth about 130 feet bgs on March 21, 2012.

Pitcher Drilling Co., of East Palo Alto, California, drilled the soil borings with a truck-mounted CME-55 TMR drill rig. The exploratory borings were advanced by hand auger in top 5 feet. The borings were then advanced using the rotary wash drilling method with a 5-inch diameter drag bit. Soil samples were generally retrieved at approximately 5-foot intervals from the surface to a depth of 50 feet bgs, and at 10-foot intervals below the depth of 50 feet bgs by advancing the sampler into the soils at the bottom of the boring. Sheri Janowski, a geologist with our firm, supervised the drilling, logged and visually classified the soils encountered during drilling in accordance with the Unified Soil Classification System.

Three types of samplers were used for this study as follows:

- Modified California (MC) Sampler – 2.0-inch I.D., 2.5-inch O.D., split-barrel equipped with brass tube liners.
- Shelby Tube Sampler – 3-inch O.D., 36-inch long, thin-walled steel sampler tube.
- Standard Penetration Test Sampler (SPT) – 1.5-inch I.D., 2-inch O.D., 24-inch long, split barrel, with a 1.4-in I.D. cutting shoe.

After the borehole was drilled to the specified depth, the sampler mounted on the drill rods was lowered to the bottom, seated, and then either driven into the soil with a hammer to retrieve a MC or SPT sample, or was pushed into the soil in one continuous motion by the drill rig to retrieve a Shelby tube sample. The samplers were driven 18 inches into the material at the bottom of the borehole using a 140-pound automatic hammer with a free fall of 30 inches for each blow. The number of hammer blows required to advance the sampler each of the three successive 6-inch increments was counted in the field. The number of blows required to advance the sampler the last 12 inches was recorded as the penetration resistance (blows-per-foot). These blowcounts were used to determine density and consistency of the soils and to evaluate the liquefaction hazard at the site as discussed in Section 4. The MC sampler was generally used to obtain drive samples in clayey material. The split-barrel SPT drive sampler was generally used to sample granular materials.

After completion of the drilling and sampling, borings were tremie backfilled with neat cement grout and inspected in accordance with the Alameda County Public Works Agency regulations and patched with a concrete cap. Soil cuttings and drilling fluid were collected in 55-gallon drums that were temporarily stored on-site.

The MC samples were collected and sealed on both ends with plastic caps. The SPT samples were placed in 1-gallon plastic bags and sealed. All samples were carefully sealed, labeled, and transported to the Signet Testing Laboratory in Hayward, California for further examination and testing. Logs of the test borings were prepared based on the soil classification made in the field and on the laboratory test results, and are presented in Appendix B of this report.

3.2.2 CONE PENETRATION TESTS

One cone penetrometer test (CPT) sounding, designated as CPT-11-006, were performed as part this study at the 29th Avenue project site on April 29, 2011. The CPT sounding was about 100 feet in depth, and was performed under the general direction of our site geologist. The sounding

was performed using an integrated electronic piezo-cone system with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone has a tip end area ratio of 0.85. Pore pressures were monitored from a position immediately behind the probe tip during the advancement of the cone. The CPT probe was advanced using a hydraulic push system mounted in a mobile truck with 20-ton capacity. Lankelma, Inc of Richmond, California owns and operates the CPT rig. Tip resistance, sleeve friction, pore pressure and inclination data were obtained electronically at 0.05 m intervals as the sounding was advanced. The CPT testing was performed in general conformance with the requirements of ASTM D3441 and D5778 test methods.

The CPT sounding included Pore Pressure Dissipation Tests (PPDTs). The PPDTs were conducted in the sandy soil layers identified by the exploratory soil borings and CPT sounding to measure hydrostatic water pressures in the soil layers. A PPDT was conducted when the cone was halted at specific intervals determined by our geologist in the field. The pore pressure was monitored until such time as there was no variation in pore pressure with time. This time is commonly referred to as t100, the point at which 100 percent of the excess pore pressure due to probing activity has dissipated.

The CPT soundings also included Seismic Cone Penetrometer Testing (SCPT) performed at 5-foot increments. The SCPT uses a modified CPT cone that contains a built-in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters. The shear waves were generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig. Compression waves were generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements were taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods. Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface. At least two waves are recorded for each test depth for a consistency check of the waveforms. Shear wave data is sampled at a frequency of 20 kHz and compression wave data is sampled at 50 kHz. The input sensitivity (gain) is increased with depth to maintain a desired signal resolution.

3.3 SOIL TESTING

Representative soil samples obtained from the exploratory borings were tested at Signet Testing Laboratory in Hayward, California to evaluate their engineering properties. The tests were performed in accordance with the ASTM Standards for Testing. The following tests were performed:

- Moisture Content (ASTM D2216)
- Dry Density (ASTM D2937)
- Particle-size (sieve) Analysis (ASTM D-422 and D-1140)
- Unconfined Compressive Strength (ASTM D2166)
- Unconsolidated Undrained Triaxial Test (ASTM D2850)
- Atterberg Limits (ASTM D4318)
- One-dimensional Consolidation (ASTM Test Method D2435)

The results of the laboratory testing are summarized on the logs of borings at the corresponding sample depths along with the sample blow counts. Detailed results of the laboratory tests are presented in Appendix C of this report.

3.4 CORROSION TESTING

Soil samples for corrosion tests were obtained from Borings B-1 and B-5 at depths of 1 foot and 10 feet. The samples were submitted to Cerco Testing Laboratory of Concord, California, to test for pH, resistivity, chloride and sulfate in accordance with Caltrans standards. The test results are shown in the following table:

Table 2
Corrosion Test Results

Parameter	R-11-001	R-11-005
Soil Description	Sandy Clay	Lean Clay
Depth (ft)	10	1
pH	7.9	7.5
Resistivity (Ohm-cm)	1600**	2400
Chloride (mg/kg)	N.D.	N.D.
Sulfate (mg/kg)	55	38

N.D.: None-detected

** Smaller box used as limited amount of soil

4.1 SITE AND SURFACE CONDITONS

The site is located on the Oakland alluvial plain that generally slopes gently to the west towards the San Francisco Bay. The site, with the exception of the existing approach embankments, is relatively flat. Elevations on site range between approximately 15 and 30 feet above mean sea level (MSL) (USGS, 1997). Approach embankment side slopes are up to about 15 feet high with gradients on the order of 1½:1 (horizontal to vertical) to 2½:1 (horizontal to vertical). Retaining walls support portions of the approach embankments.

4.2 SUBSURFACE CONDITIONS

Our review of the geologic mapping and all available geotechnical data indicates the subsurface soil conditions at the project site consist of primarily unconsolidated Holocene alluvial fan deposits. The LOTBs indicate that the borings at the 29th Avenue Off Ramp encountered alluvial deposits that primary consisted of stiff to hard clay with varying amounts of silt and sand, alternating with compact to very dense gravel and sand layers.

We developed a generalized subsurface profile at the 29th Avenue Off Ramp based on all available geotechnical data for the purposes of foundation evaluations. In-situ and laboratory tests (including pocket penetrometer, torvane, moisture content, Atterberg limit, unit weight, unconfined compressive strength, unconsolidated–undrained triaxial compression test, grain size distribution) have been performed on samples recovered from previous explorations and new explorations by this study. The unit weights versus elevation for fine-grained soils are presented in Figure 5, indicating that the unit weights are in the range between 110 pcf to 140 pcf. The liquid limits, as shown in Figure 6, are generally in the range between 30%-50%, except a few fat clay samples showing higher liquid limits about 80%. The water contents are typically close to the plastic limit, indicating that the soils have been overconsolidated with high strengths. The undrained shear strengths along with CPT data versus elevation for fine-grained soils are presented in Figure 7. The CPT data correlate well with field and laboratory test results, which also exhibits a classic overconsolidated stress history. The SPT blowcount versus elevation is presented in Figure 8. This data was interpreted to represent shear wave velocity profile.

Based on a review of all geotechnical data, generalized soil engineering parameters were developed for the 29th Ave Off Ramp for the purposes of this foundation evaluation and are tabulated below. The shear strength parameters were selected taking a reasonable value of the range of available geotechnical data. In an overconsolidated strength profile, soil strengths first decrease with depth, reach a minimum, and then increase with depth as shown in Figure 7.

Table 3
Soil Parameters

Soil Type	Layer Elev. (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Stiff/V. Stiff Clay	25~5	125	2500~1500*	0
Stiff Clay	5~-5	125	1500	0
Stiff/V. Stiff Clay	<-5	125	$Su/\sigma_v'=0.45$	0

* Strength decreases with depth from 2500 psf to 1500 psf

4.3 GROUNDWATER CONDITIONS

During the investigations conducted in 1993, groundwater was encountered between elevation 1.5 feet and elevation -1.7 feet at 23rd Avenue The CPT data obtained by this study indicate that the water table was at elevation of 8.6 feet at boring CPT-11-006. Groundwater encountered in the nearby boring by Earth Mechanics Inc. also presented in the similar range, between elevation +9.3 feet and elevation +14.0 feet. Therefore, for the purposes of this foundation evaluation, the groundwater level was assumed to be at about EL+10.0 feet at the 29th Avenue Off Ramp.

5.1 SEISMIC DESIGN METHODOLOGY

The seismic design methodology adopted for this project is based on the following current Caltrans standards:

1) Seismic Design Criteria (SDC), v 1.6, December 2010
2) Caltrans Guidelines for Structures Foundation Reports, v 2.0, updated March 2009
3) California Seismic Hazard Map (2007)
4) Caltrans ARS online (v1.0.4)

The new Caltrans procedures for developing the ARS curve uses the envelope of the deterministic and probabilistic spectra, in contrast to the old procedure that used only the deterministic spectrum. The new deterministic spectrum is now adopting two next generation attenuation (NGA) models: an average of Campbell and Bozorgnia (CB) and Chiou and Youngs (CY) attenuation models. The probabilistic spectrum is based on the 5% in 50 year USGS2008 Hazard map. In addition, the new procedure also updates the site factor, the near fault factor and includes the deep basin effect.

5.2 SITE SOIL PROFILE

Boring logs and CPT soundings from the field explorations at the project site were reviewed. The representative blowcounts as shown in Figure 7 were used to estimate shear wave velocity using an empirical correlation proposed by Pitilakis (1999) for clayey type material. The weighted average of the shear wave velocity over the depth of exploration (to a maximum depth of approximately 100 feet) was used to determine $Vs_{,30}$, which was found to be 249 m/s. In addition, 3 S-CPTs (CPT-11-006, CPT-11-007 and CPT-11-010) at both sites directly measured Vs profile to a maximum depth of approximately 100 feet and $Vs_{,30}$ were found to be 251, 255, and 236 m/sec, respectively The average shear wave velocity of 250 m/sec was used to classify the soil profile based on the guidelines given in SDC Table B.12. Accordingly, this site is classified as a stiff soil site or Soil Profile Type D.

5.3 FAULT TYPE AND NEAR-FIELD SPECTRAL ACCELERATIONS

The technical report that accompanies the California Seismic Hazard Map (2007) indicates that the controlling fault is the Hayward fault, which is 4.6 km away from the site. Since the project site is less than 15 km from the nearest active fault, design spectral accelerations should be modified to account for near-fault effects as follows:

Period (sec)	Increase in Spectral Acceleration (%)
< 0.5	0
0.5 – 1.0	0 – 20 (determined by linear interpolation)
≥1	20

This does not include adjustments for bridges with fundamental periods of vibration greater than 1.5 seconds. As the design proceeds, we will verify the fundamental period of vibration of the planned structures for this project with the Structural Engineer.

5.4 DESIGN ACCELERATION RESPONSE SPECTRUM

Based on Caltrans SDC (Version 1.6), the deterministic seismic response spectrum can be estimated with spectral acceleration values generated by:

- Soil Profile Type D with Vs, $_{30}$ = 250m/sec
- Hayward fault zone (ID = 353) with Maximum Moment (M_{max}) 7.3 and site to fault distance (Rrup) = 4.6km
- No deep basin effect
- ARS increase for near-field effect

The Deterministic Acceleration Response Spectrum corresponding to Vs, $_{30}$ = 250m/sec, magnitude of controlling event 7.3, was obtained from ARS online and modified to account for near field effects as described above. The Probabilistic Acceleration Response Spectrum of corresponding to Vs, $_{30}$ = 250m/sec, 975 yr return period, was also obtained from ARS online and modified to account for near field effects. Since the representative Vs, $_{30}$ is less than 300m/s, additional USGS PSHA deaggregation analysis was performed to obtain 5%-50yr spectrum and compared with those by ARS online. Design Acceleration Response Spectrum (ARS) curve is the envelope of ARS online deterministic curve (M_{max} = 7.3, R = 4.6 km), the ARS online probabilistic curves (975 yr return period), and the USGS probabilistic curves (975 yr return period) and is dominated by the USGS probabilistic curve. The Design Acceleration Response Spectra are attached as Figure 9, and the spectral values are provided in Table 3.

Table 4
Spectral Acceleration Values

T (sec)	Sa (g)
0	0.719
0.1	1.196
0.2	1.531
0.3	1.568
0.5	1.481
1	1.271
2	0.737
3	0.470
4	0.335
5	0.268

6.1 LIQUEFACTION

Strong ground shaking caused by large earthquakes can induce ground displacement and/or failure such as liquefaction, compaction settlement, and slope movement. A site's susceptibility to these hazards relates to the site topography, soil conditions, and/or depth to groundwater.

Liquefaction is a soil behavior phenomenon whereby saturated sediments temporarily lose shear strength and undergo volume change. This condition is caused by cyclic loading during earthquake shaking that generates high pore water pressures within the sediments. The soil most susceptible to liquefaction is loose, cohesionless, granular soil below the water table. Low plasticity fine-grained soils are also potentially liquefiable. Liquefaction can result in loss of foundation support and settlement of overlying structures, ground subsidence, and translation due to lateral spreading, and differential settlement of affected deposits. The unconsolidated alluvial deposits at the 29th Avenue Off Ramp site have been mapped as moderately susceptible to liquefaction by the USGS (2006) as shown in Figure 10 and in a zone or required liquefaction investigation by the California Geological Survey.

The liquefaction potential for this site was evaluated using the procedure proposed by Seed *et al*. (2003) that is based on SPT blowcounts and soil characteristics. The recorded blow counts were corrected for various factors including hammer efficiency, fines contents, overburden pressure, borehole diameter, rod length, and sampling technique. The liquefaction analysis was also performed using the CPT data and correlations with the soil properties from the direct push sampling and borings. The analysis was performed in accordance with the methods proposed by Moss *et al.* (2006). As described in Section 5, the Hayward Fault (Mw=7.3) controls the seismic hazard at this site and could induce strong shaking up to 0.72g. Liquefaction potential was predicted at depths where the earthquake loading exceeded the soil resistance, or when the factor of safety against liquefaction, expressed as:

FS_L = *(cyclic shear stress required to cause liquefaction) / (equivalent cyclic shear stress induced by earthquake)*

is less than 1.

As mentioned earlier, the subsurface soil at 29th Avenue generally consisted of stiff to hard clay that is not susceptible to liquefaction. The few layers of silt and sand encountered as the project site, which are medium dense to dense with high fines content, could potentially liquefy given the design earthquake. However, because these cohesionless soils are covered with a thick cohesive clay stratum and only encountered at localized spots, they are not expected to liquefy extensively. Therefore, liquefaction hazard is judged to be low or will not cause significant ground surface failures.

6.2 FAULT RUPTURE

The nearest active fault is the Hayward fault located approximately 4.6km northeast of the site. The structure does not fall within a CGS Fault-Rupture Hazard Zone (Alquist-Priolo Earthquake Fault Zone). Caltrans (2009) considers a distance of 50 horizontal feet on either side of a field-evaluated active fault trace to have a potential for surface fault rupture displacement hazard (SFRDH). Therefore the potential for ground surface rupture is not a design consideration for the 29th Ave Off Ramp.

6.3 LANDSLIDE AND SLOPE FAILURE

Due to the relatively flat topography at the site, landsliding is not considered a hazard. The existing fill embankment slopes at the site appear stable, and no slumping or slope distress was noted during the site reconnaissance.

6.4 GROUND SUBSIDENCE/HEAVE

Expansive soils are those that shrink or swell significantly with changes in moisture content. The clay content and porosity of the soil also influence its volume change characteristics. The shrinking and swelling caused by expansive clay-rich soils, typically LI>50 or PI> 25, often result in damage to overlying structures.

The clayey soils within the effect zone of water table fluctuation encountered during drilling are of low to medium plasticity(PI~20), suggesting that the site soils may be considered marginally expansive. Therefore, expansive soil potential is not considered to be of major concern at the site.

6.5 FLOOD

FEMA flood zone maps (http://www.fema.com) indicate that the project area is located outside the 100-year flood plain. However, during periods of heavy rains and high tides the approaches to the Off Ramp may experience flooding. Tsunami, or seismically induced large waves, may be generated by rapid movements on earthquake faults. Studies have been conducted on wave attenuation within San Francisco Bay in the event of a large tsunami, and while this hazard is relatively low, there is the remote possibility that it could affect the project site and should be considered.

6.6 SCOUR

Because the existing and proposed structure supports are located outside waterways, scour is not an issue for foundation design.

6.7 CORROSION

As per California Amendments To AASHTO LRFD Bridge Design Specifications – Fourth Edition (2008b), "Corrosive" water or soil contains more than 500 parts per million (ppm) of chlorides. Sites that are considered corrosive due solely to sulfate content greater than 2,000 ppm and/or a pH of less than 5.5 shall be considered non-corrosive.

The Chloride ion concentrations are not detected from the chemical analysis and the results of low sulfate content and high PH from the chemical analysis indicate that the soil at the 29th Avenue site is non-corrosive. However, pH from the chemical analysis by EMI presents a range of 6.5 to 7.6. Based on these measured pH value and sulfate concentration, cement type should be in accordance with table 8.22.2 of Caltrans Bridge Design Specification BDS (Caltrans, 2003) for “Soil or Water pH from 5.6 to 7”. Additional corrosion protection requirements for concrete structural members are presented in Section 8.22 of the Caltrans BDS (Caltrans, 2003).

7.1 DESIGN ASSUMPTIONS

The idealized soil profile with soil stratigraphy, soil engineering parameters, and estimated groundwater level is presented in Table 3 and Section 4.3, respectively. The idealized soil profile is the basis for developing foundation recommendations for the proposed structures within the project area.

7.2 EXISTING FOUNDATIONS

The 29th Avenue Overcrossing (Bridge No. 33-0141, PM 28.69) was constructed around 1947 as a two-lane overcrossing of the East Shore Freeway (Eastshore Highway, State Route 17 now known as I-880), and the Outer Highway (East 8th Street) near the north abutment (Caltrans, 1947). The bents and abutments are supported by shallow spread footings. Each bent or abutment is generally supported on two footings, except for Bents 2 and 11 which are each supported on one combined footing. The bottom of footing elevations ranges from EL +3ft to +10.5 ft. Two typical footing sizes (12' x 9', 36' x 7') were used. Maximum soil contact pressure was indicated as 3 tons per square foot on the As-Build Drawings 2.

7.3 NEW FOUNDATION ALTERNATIVES

Spread footings – Spread footing foundations bearing on competent soils are expected to be suitable for support of the bridge bents, as were used for the original 29th Avenue bridge construction. We found that adequate soil bearing capacity exists for spread footing foundations, however, excessive settlements are computed under the design loading.

Cast-in-drilled-hole (CIDH) piles –CIDH piles have the advantages of easy penetration into dense/hard soil zones, the availability of larger diameters for increased lateral capacity, and adaptability of length to variable subsurface conditions. The presence of shallow groundwater or caving soils can complicate the use of CIDH piles. From the constructability standpoint, CIDH piling rigs are more economical to mobilize than pile driving rigs, can work in limited access conditions, and have significantly lower noise and vibration impacts during pile installation than driving operations.

Driven precast concrete piles –The use of driven piles is sometimes limited due to constructability disadvantages such as noise and vibration impacts to adjacent structures during installation, as well as difficult driving conditions in dense sands or gravels. Based on the results of the subsurface investigation, the soil layers encountered at the site consists primarily of stiff to very stiff cohesive soils which are not likely to cause any drivability problem for driven piles. Precast concrete piles offer advantages in shallow groundwater and caving soil conditions and perhaps most importantly do not produce drill spoils.

7.4 PROPOSED NEW FOUNDATIONS

CIDH piles have the flexibility of larger diameters for increased lateral capacity, which is a key factor for the design at 29th Avenue to accommodate high lateral force demands. Therefore, 6.0'and 2.0' diameter cast-in-drilled-hole (CIDH) piles are selected for the bent and abutment foundations, respectively. Based on the investigations, we expect the CIDH piles are expected to

encounter groundwater approximately between Elevation +8 to +14 ft MSL. Table 5 and 6 show the foundation design data provided by the Structural Engineer. Table 7 and 8 present the foundation design for working stress design (WSD) and load and resistance factor design (LRFD) at the bents and the abutments, respectively. The proposed CIDH Pile Data Table is provided in Table 9.

Table 5
Foundation Design Data

Support No.		Design Method	Pile Type	Finished Grade Elevation (ft)	Cut Off Elevation (ft)	Pile Cap Size (ft) B	Pile Cap Size (ft) L	Permissible Settlement Under Service Load (in)	Number of Piles per Support
Abut 1		WSD	24 inch CIDH	23	17.75	10	58	1	18
Abutment 1 RW	Left	LFRD	24 inch CIDH	23	17.75	10	41	1	11
	Right	LFRD	24 inch CIDH	24	17.75	10	32	1	8
Bent 2	Left	LFRD	72 inch CIDH	21.5	19.5	N/A	N/A	1	1
	Right	LFRD	72 inch CIDH	23	19.5	N/A	N/A	1	1
Bent 3	Left	LFRD	72 inch CIDH	20.25	18.25	N/A	N/A	1	1
	Center	LFRD	72 inch CIDH	21	18.25	N/A	N/A	1	1
	Right	LFRD	72 inch CIDH	22.5	18.25	N/A	N/A	1	1

* Note that "per support" implies per column for Bent supports with 2 columns per Bent.

Table 6
Foundation Design Loading

	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
Support No.	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut 1	2096	134	1681	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 1 RW Left	1457	142	1357	1968	185	N/A	N/A	1357	208	N/A	N/A
Abut 1 RW Right	1078	137	1000	1457	191	N/A	N/A	1000	213	N/A	N/A
Bent 2	1378	N/A	1002	2183	N/A	N/A	N/A	1002	N/A	0	N/A
Bent 3	1098	N/A	720	1365	N/A	N/A	N/A	720	N/A	0	N/A

* Note that "per support" implies per column for Bent supports with 2 columns per Bent.

Table 7
Foundation Recommendations for WSD

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support (Compression)		LRFD Service-1 Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	24" CIDH	17.75	2096	1681	134	270	-30 (a) -12 (c) -11 (d)	-30

Notes:

1. *Design tip elevations are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load, respectively.*
2. *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3. *Design tip elevation for Lateral Load is typically provided by Structural Engineer.*

Table 8
Foundation Recommendations for LRFD

Support	Pile	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (ϕ = 0.7)	Tension (ϕ = 0.7)	Comp. (ϕ = 1.0)	Tension (ϕ = 1.0)		
Abut 1 RW Left	24" CIDH	17.75	1457	1	185	N/A	208	30	-29 (a-I) N/A (b-I) -21 (a-II) N/A (b-II) -13 (c) -11 (d)	-29
Abut 1 RW Right	24" CIDH	17.75	1078	1	191	N/A	213	38	-30 (a-I) N/A (b-I) -21 (a-II) N/A (b-II) -13 (c) -17 (d)	-30
Bent 2	72" CIDH	19.5	1378	1	2183	N/A	1002	N/A	-102 (a-I) N/A (b-I) -40 (a-II) N/A (b-II) -48 (c) -57 (d)	-102
Bent 3	72" CIDH	18.25	1098	1	1865	N/A	720	N/A	-75 (a-I) N/A (b-I) -29 (a-II) N/A (b-II) -45 (c) -50 (d)	-75

Notes:

1. *Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, (d)Lateral Load..*

2. *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3. *Design tip elevation for Lateral Load is typically provided by Structural Engineer.*

Table 9
Proposed CIDH Pile Data Table

Location and B.O.F. EL (ft)	Pile Type	Nominal Capacity (kips)		Design* Tip Elevations (ft)	Specified Tip Elevations (ft)
		Compression	Tension		
Abut1 B.O.F=17.5	24-in CIDH	270	0	-30(A) -11(C)	-30
Abut1L B.O.F=17.5	24-in CIDH	270	30	-29(A) 9(B) -11 (C)	-29
Abut1R B.O.F=17.5	24-in CIDH	280	40	-30(A) 8(B) -17 (C)	-30
Bent2 Top of Pile=19.5	72-in CIDH	3120	0	-102(A) -57(C)	-102
Bent3 Top of Pile=18.25	72-in CIDH	1950	0	-75(A) -50(C)	-75

*Design tip elevation is controlled by the following demands:

(A) Compression, (B) Tension, (C) Lateral Loads

The drilled piers primarily derive their resistance through skin friction between the pier concrete and surrounding soils. Thorough cleaning of the pier bottom, which is especially difficult if drilling mud is used, is required to develop full end-bearing capacity. The end-bearing capacity was not considered in estimating the pile tip elevations presented in Table 7 and Table 8. The frictional pier resistance was calculated using the procedures recommended by AASHTO (2010). The pile data are recommended following LRFD method per Caltrans Amendments to AASHTO Bridge Design Specifications (2008b), and Caltrans Memo To Designer (2008a). Foundation data provided by structure designer, foundation design data, and resistance factor for each limit state was included in Appendix D.

The computer program LPILE plus 6.0 was utilized to analyze the individual pier response to applied lateral and axial loads with a series of nonlinear springs that are internally generated by the program as a function of user-specified soil properties. The 24 inch diameter drilled piers selected for the abutments were modeled with reinforcing steel equal to 1.5 percent of the cross-sectional area of the pier. The 72 inch drilled piers selected for the bents were modeled with E= 3834.25 ksi and I= 64.6 ft^4as specified by bridge engineer. In addition, the piers were modeled with free head conditions. The required depth to achieve lateral capacities is determined by the location of the second zero moment. The lateral displacements at pile head are summarized in Table 10.

Table 10
Lateral Displacements at Pile Head

29th Avenue Offramp	Deflection (in)		
	Service Limit State	Strength Limit State	Extreme Event State
Abut 1	0.2	N/A	N/A
Abut 1 L	0.2	0.5	2.4
Abut 1 R	0.1	0.4	1.9
Bent 2	0.5	0.8	1.8
Bent 3	0.3	0.5	1.4

For initially computing the lateral resistance of piles arrayed in groups, a P-multiplier group efficiency factor should be applied for pile lateral resistance in the direction of loading. Table 9 summarizes P-multipliers for pile center to center spacings of 3 Diameters and 5 Diameters, where row 1 is the leading edge of the pile group.

Table 11
P-Multipliers for Pile Group Efficiency

	P-Multiplier		
Spacing	**Row 1**	**Row 2**	**Row 3**
3D	**0.7**	**0.55**	**0.40**
5D	**1.0**	**0.85**	**0.70**

7.5 APPROACH EMBANKMENTS

A new embankment for the 29th Avenue Off Ramp will be constructed as an MSE wall. The planned approach embankments will be up to 20 ft high at the new abutment location.

We estimate consolidation settlement due to the proposed fill at the abutments and approach embankments will be on the order of 2.5 to 3.5 inches. Slightly larger values were obtained by the roadway geotechnical consultant (EMI, 2011). We estimate up to a 5 month settlement period would be required for 90% of predicted settlements to occur. Similar values were obtained by the roadway geotechnical consultant (EMI, 2011). However, the construction schedule cannot accommodate a 5 month period for the embankment-induced settlement to be completed prior to installing abutment foundations, and there is limited right of way available to place surcharge prior to construction at the abutment locations. Therefore, the abutment areas would not adequately settle prior to construction of the abutments. Consequently, additional settlements can induce downdrag force on abutment foundations. To accelerate the rate of settlement, we propose to use wick drains and surcharge loading. As a result, the settlement period will be sufficiently shortened and downdrag on the piles will be negligible at the time when they are installed.

Wick drains are recommended to be installed on 3 foot centers to 37.5 foot depth except for the low end of the embankment where no wick drains are required. Wick drains shall extend 10 to 12

feet outside the embankment footprint and include surface drains. A surcharge of 8 feet high shall be installed at the high end of the embankment and the height of surcharge can gradually reduce to 1 foot at the low end of the embankment. With this wick drain and surcharge loading plan, we expect that less than 1 inch of settlement would remain at the end of a 30-day embankment construction period. Instrumentation such as piezometer, settlement sensor, and survey monument are required to monitor the settlement of the embankment. The detailed design of wick drains and instrumentation layout will be provided in the plans and specification.

7.6 CONSTRUCTION CONSIDERATIONS

Potential construction considerations are expected to include:

- Physical conflicts: resolve potential conflicts with locations of new bridge supports and all existing facilities such as utilities.
- Loading conflicts: resolve potential conflicts with loading imposed on existing facilities by new bridge/retaining wall foundations or approaches.
- Groundwater: dewatering and other groundwater control measures might be required depending on construction methods.

The opinions, conclusions and recommendations presented herein are based on subsurface information developed by others. The recommendations presented in this report are based on the assumption that the soil and geologic conditions do not deviate substantially from those anticipated by the information contained in the existing logs of test borings. If any variations are encountered during construction, the Geotechnical Professional (URS) should be contacted so that supplemental recommendations can be made.

If existing facilities, utilities, soils/bedrock conditions, road/structure distress, slope distress or groundwater/seepage conditions other than those noted in this report are present on the site, then their presence was not known, or was not considered in the preparation of this report. Locating utilities and evaluating potential utility interference is outside the scope of this report. Individuals utilizing this report shall inform URS Corporation if they are aware of any additional facilities or site conditions so that their presence and impact upon the project (or vice-versa) can be properly evaluated and recommendations modified to address geotechnical issues as necessary.

The Geotechnical Professional shall be given the opportunity to review the final specifications and drawings to verify that those documents are consistent with the intent of the geotechnical recommendations.

Geotechnical issues may arise during construction that were not apparent at the time this report was prepared. The Geotechnical Professional should be retained during construction to review the soil conditions encountered and the construction procedures used. All earthwork, pile and wall installation and testing should be completed under the direct observation of the Geotechnical Professional.

Specific review and investigation for environmental issues and subsurface environmental contamination were beyond the scope of our services.

The opinions and recommendations presented in this report were developed with the standard of care commonly used by other professionals practicing at the same time, within the same locality and under the same limitations. No other warranties are included, either express or implied, as to the professional advice included in this report.

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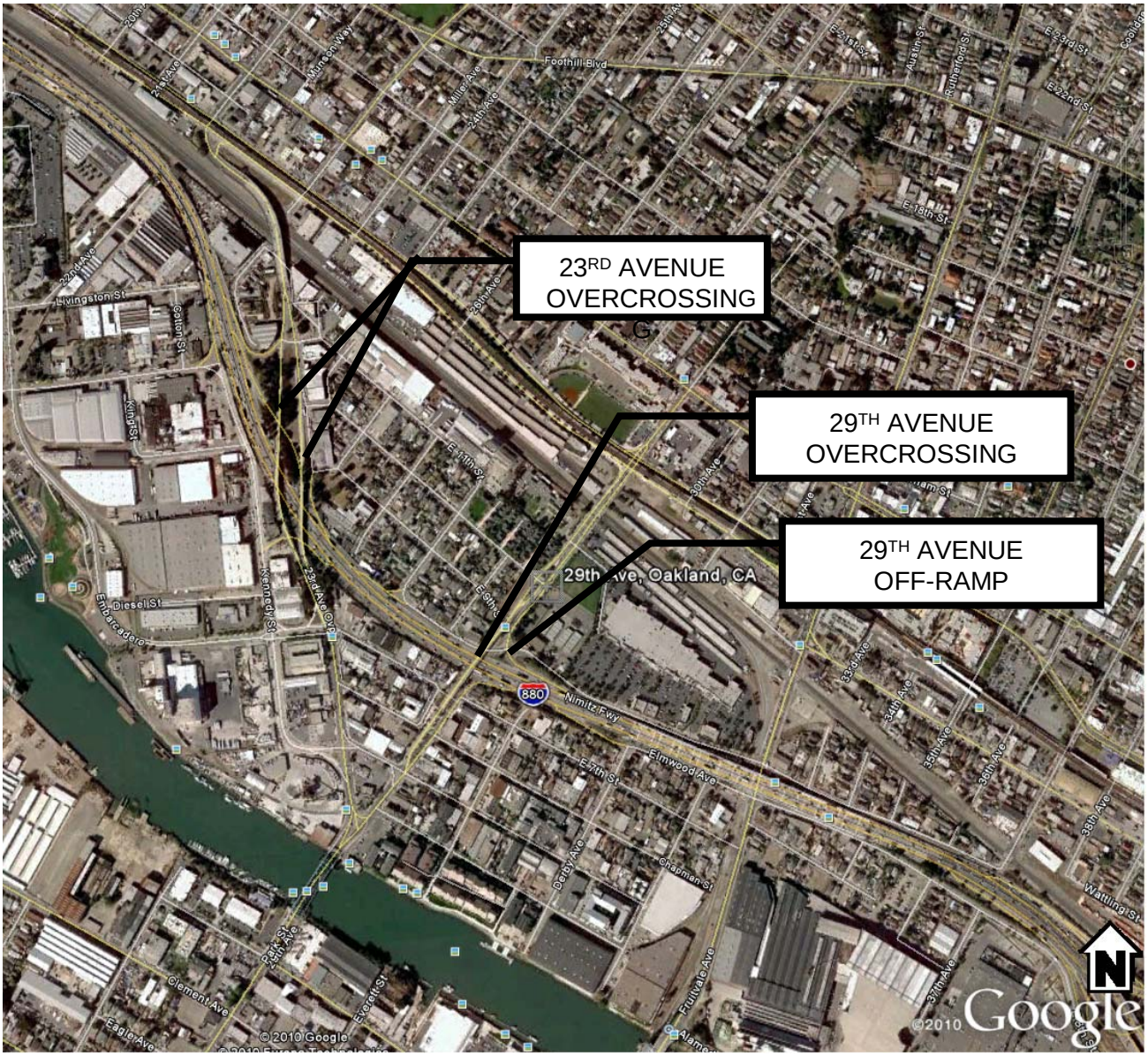
Figures



URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Site Vicinity**	Figure 1

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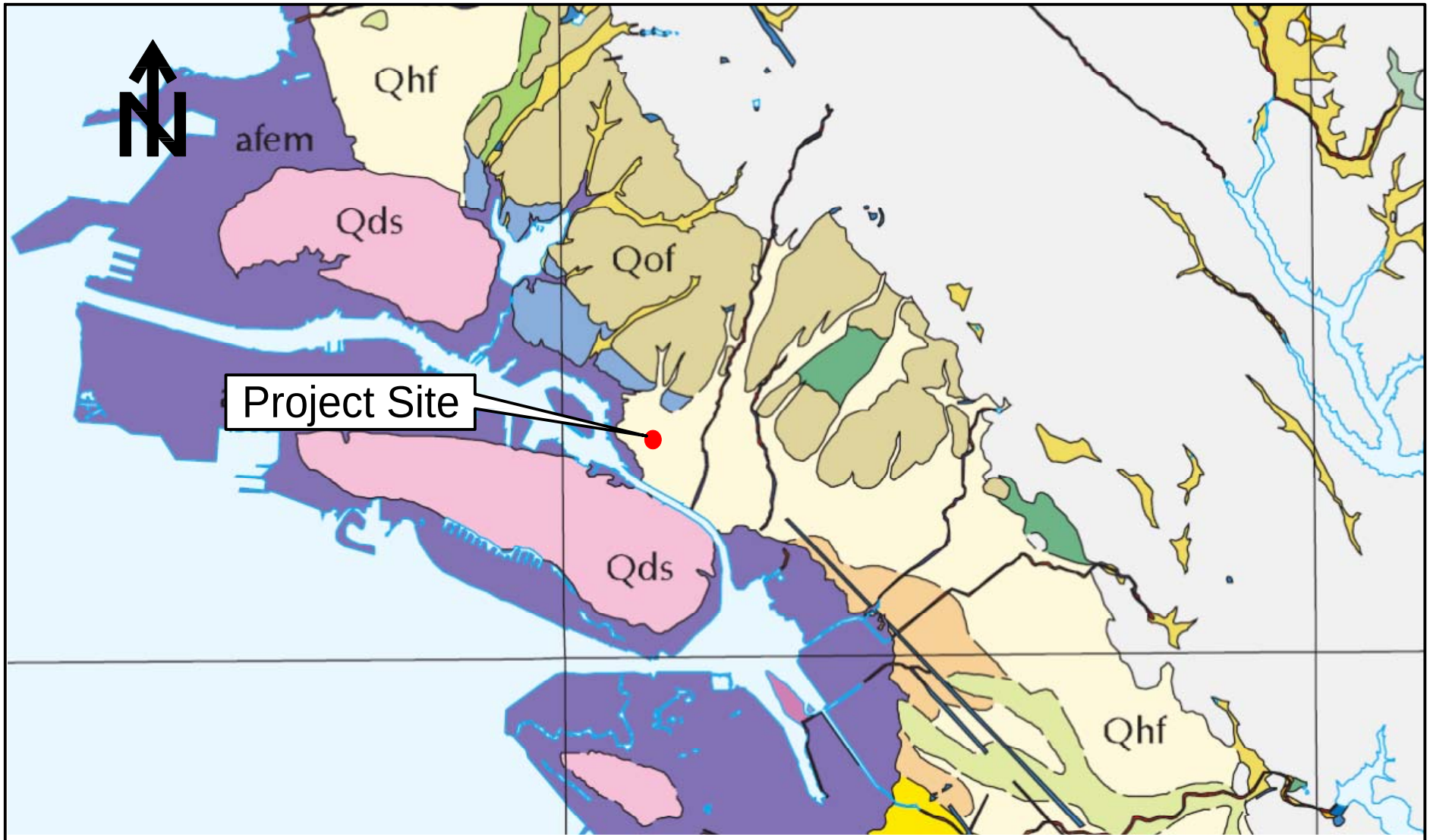

USGS Quaternary Deposits Map, Witter (2006)

afem: Artificial fill over estuarine mud

Qhf: Alluvial fan deposits (Holocene)

Qof: Alluvial fan deposits (Early to Late Pleistocene)

Qds: Dune sand (Holocene to Latest Pleistocene)

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**Regional Geology**	**Figure 2**

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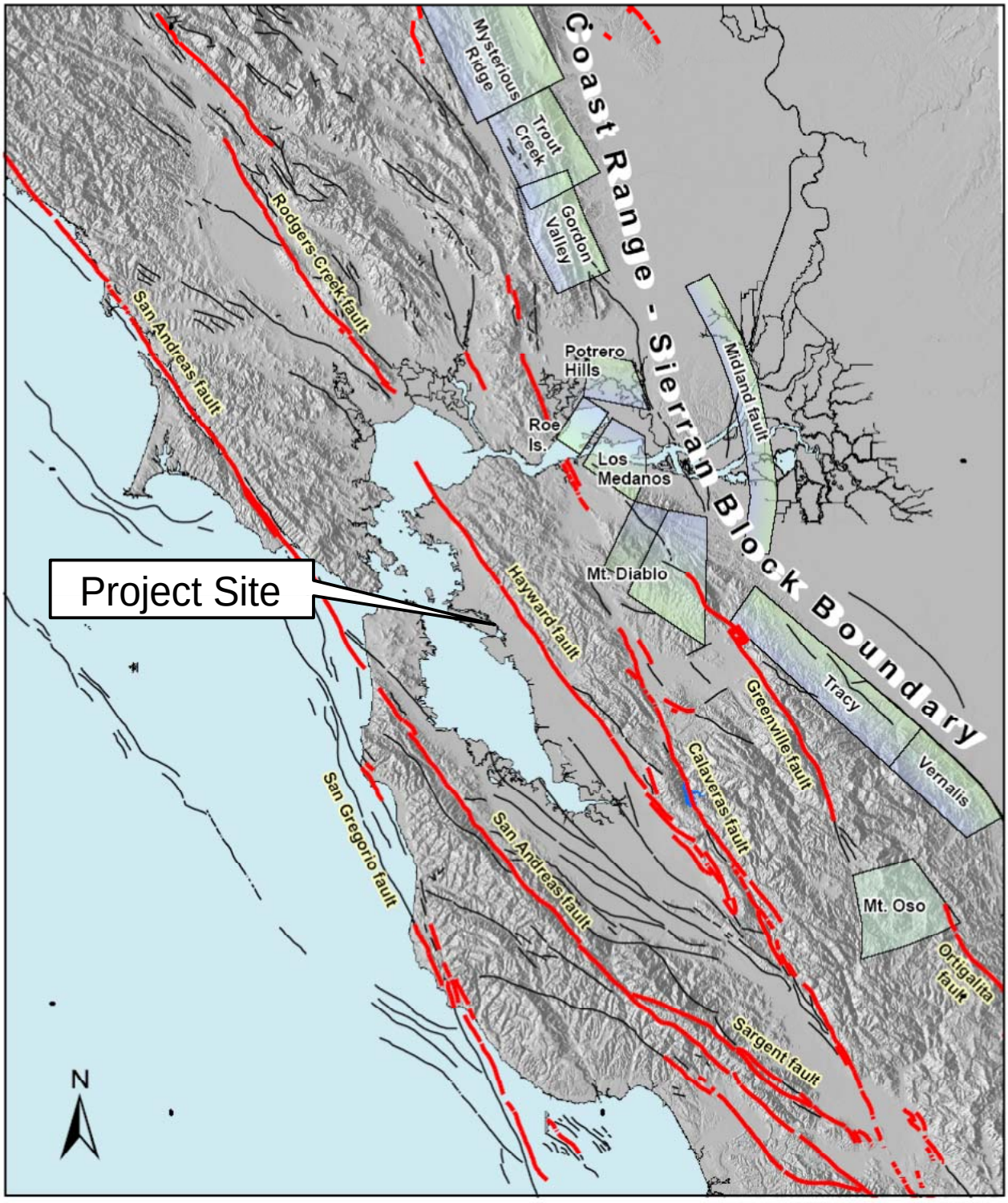

Blind Thrust Depth

Shallow

Deep

Legend

0 25 50 75 100 Kilometers

Sources:
Jennings 1994
O'Connell et al., 2001
Unruh and Hector, 1999

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Active Faults**	Figure 3

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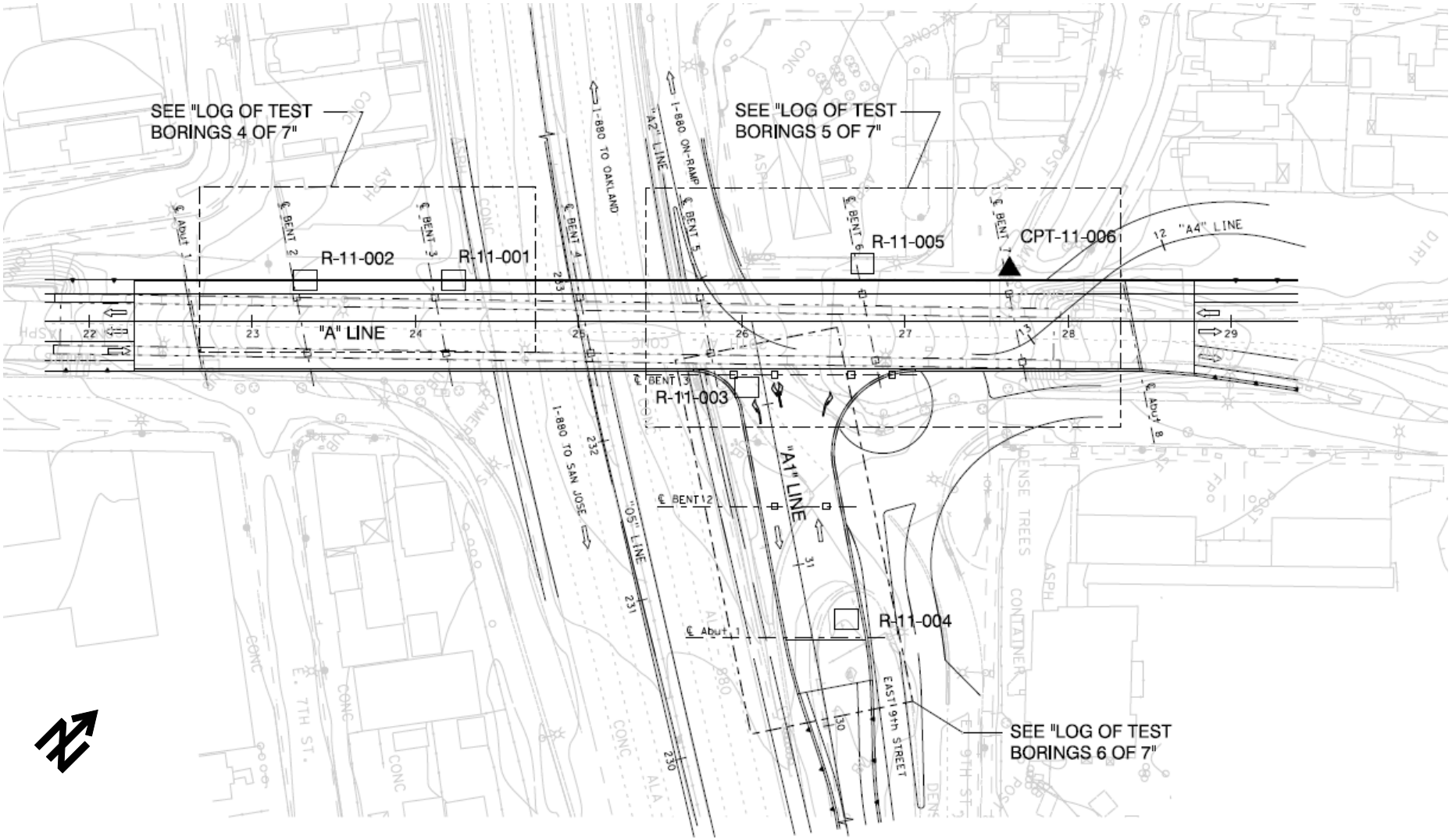

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**29th Ave Overcrossing Boring Locations**	**Figure 4**
URS			

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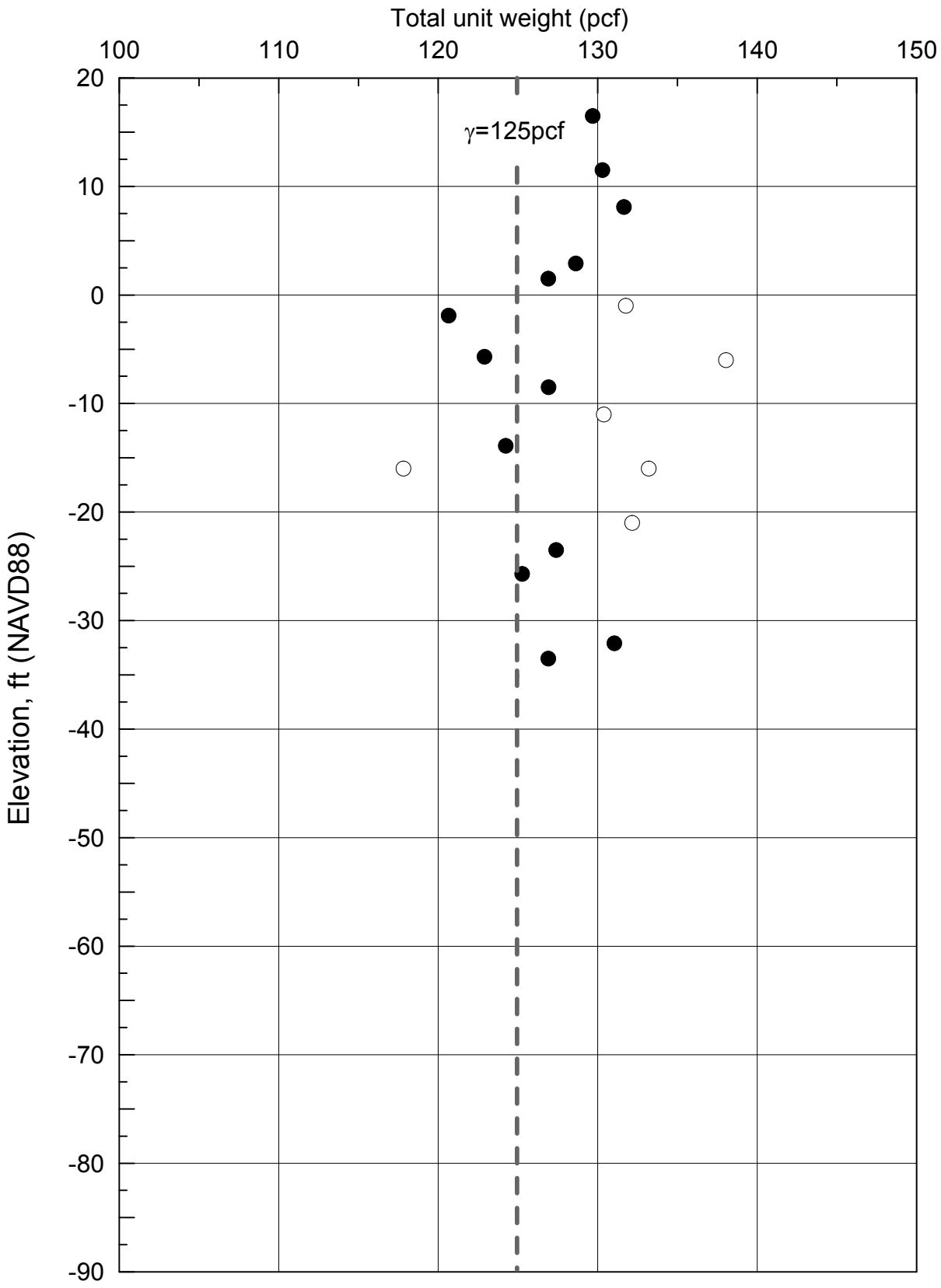

Note: Solid symbols are URS data (2011); hollow symbols are previous data

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Unit Weight**	Figure 5

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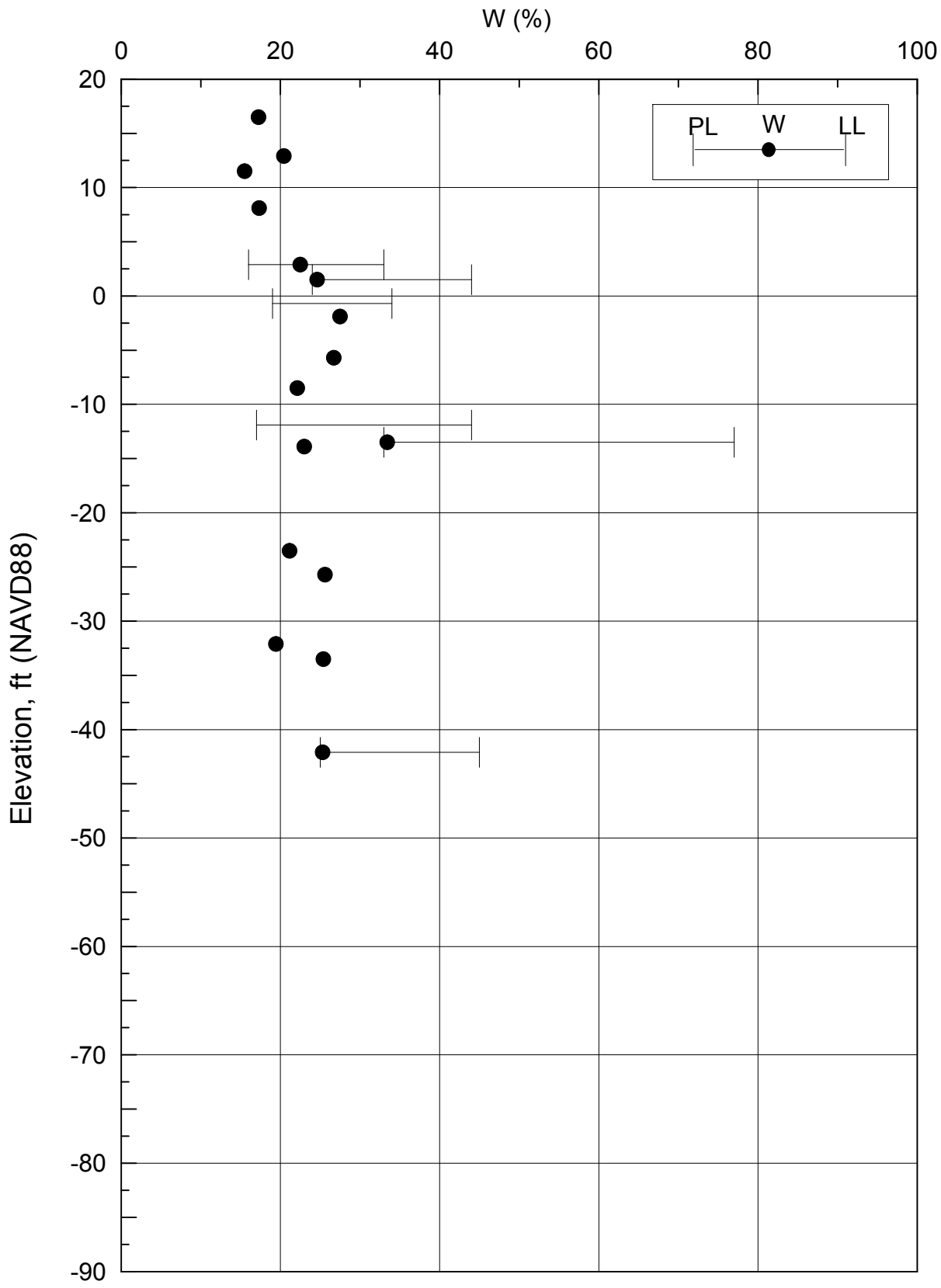
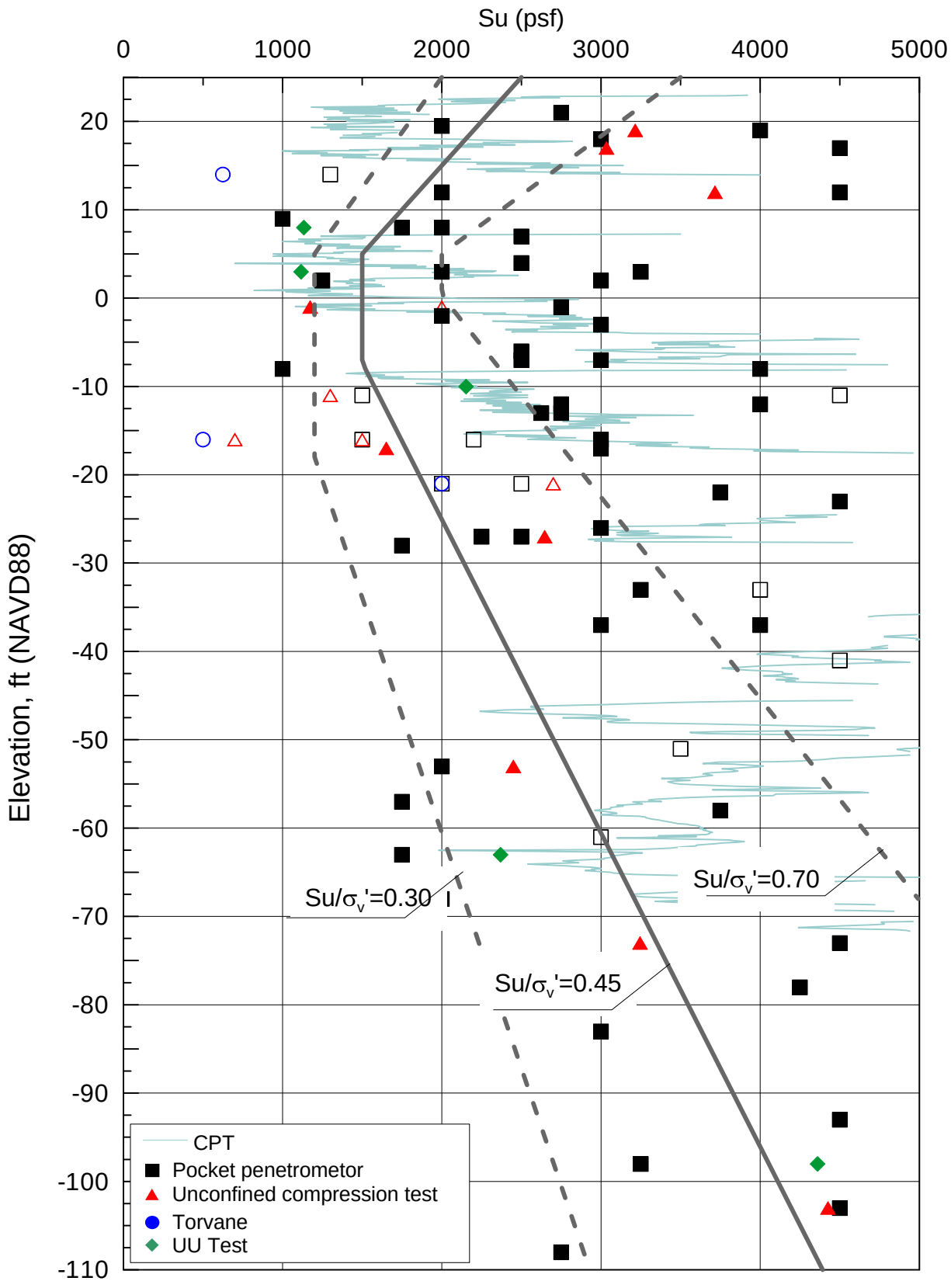


URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Water Content,Liquid Limit (LL), and Plastic Limit (PL) of Cohesive Soils**	Figure 6

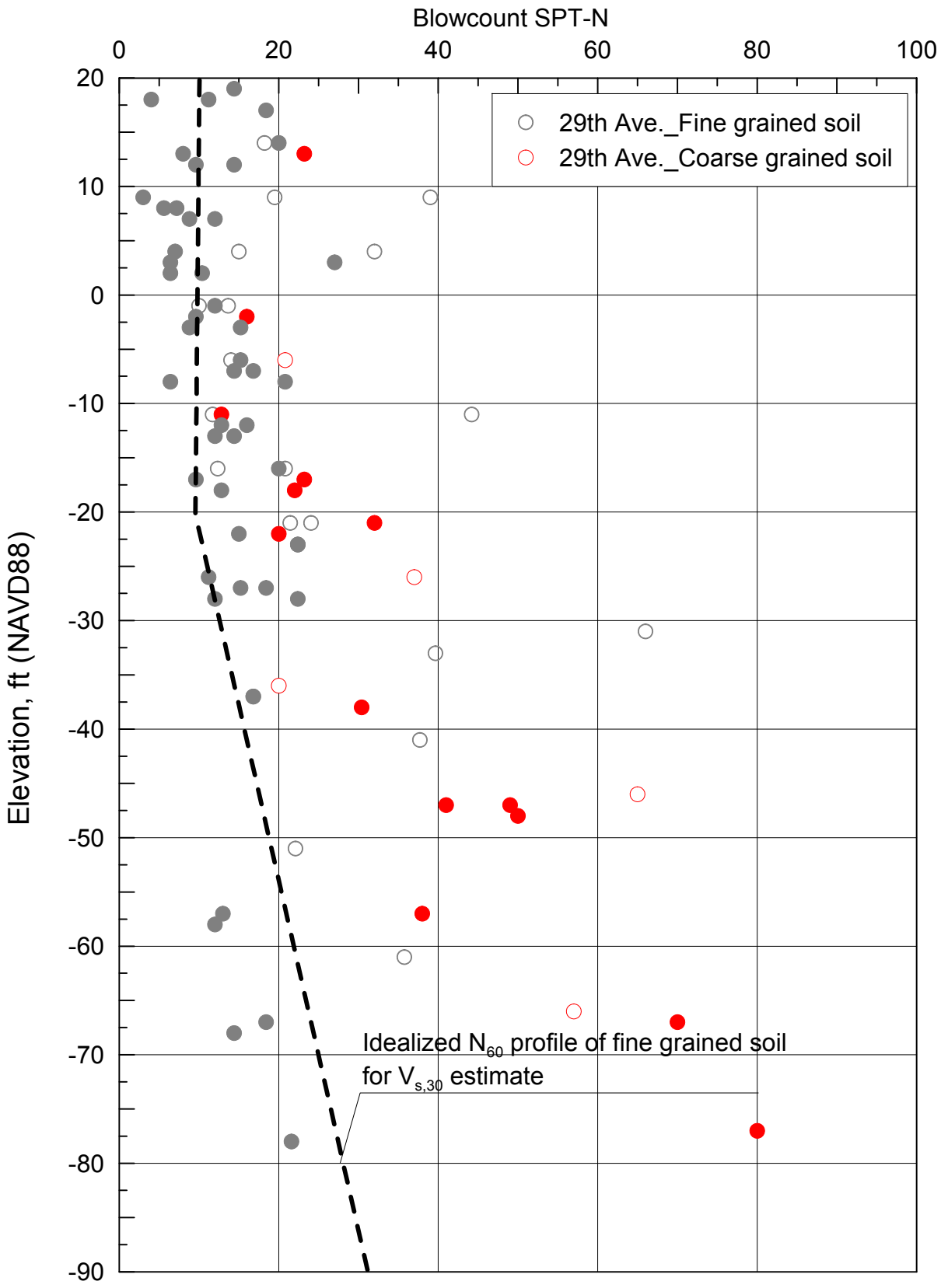
X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: 1. Solid symbols are URS data (2011); hollow symbols are previous data
2. Su estimated by CPT assuming N_{kT}=15

URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Undrained Shear Strength of Fine-grained Soils at 29th Ave.**	Figure 7

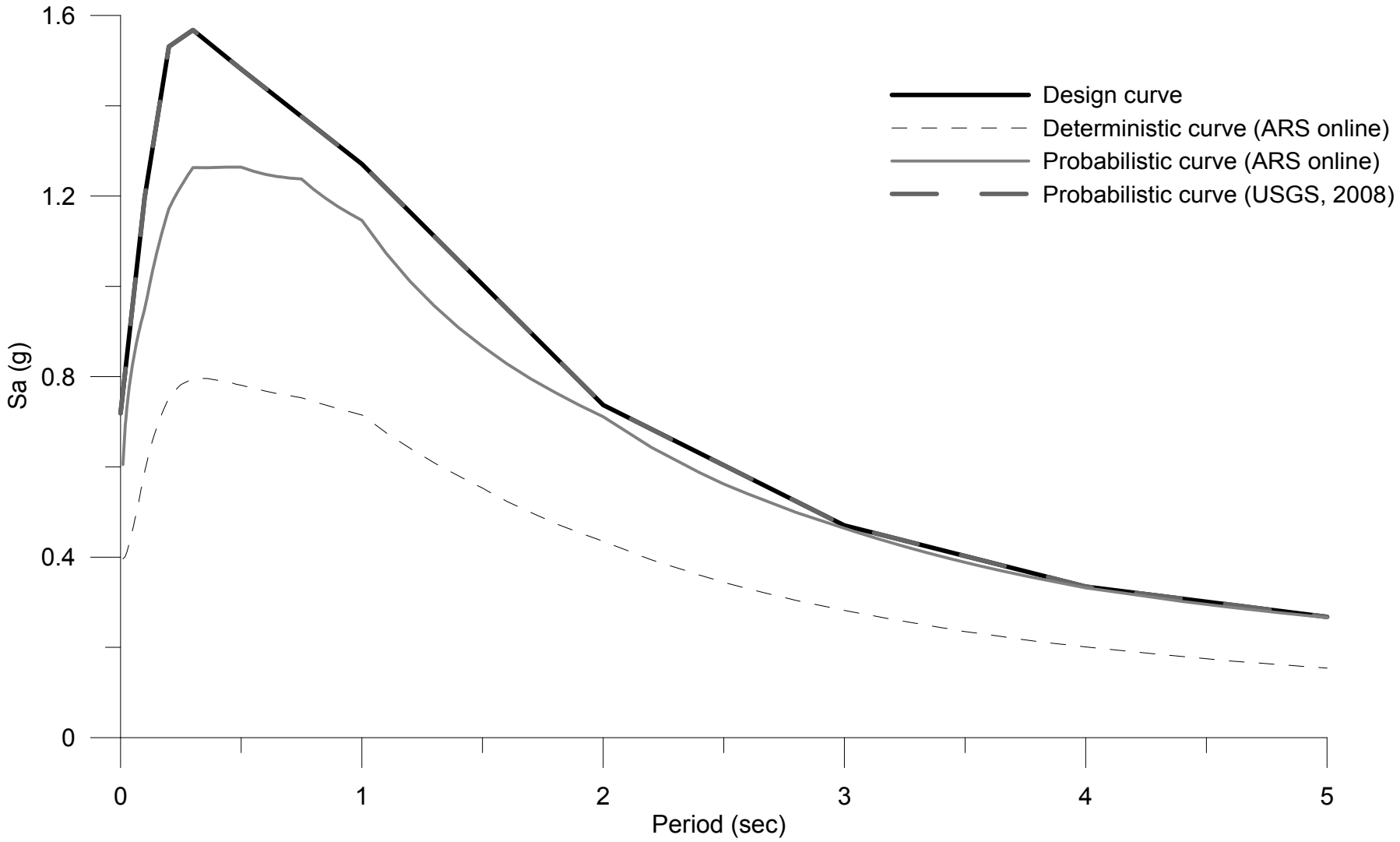
X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: Solid symbols are URS data (2011); hollow symbols are previous data

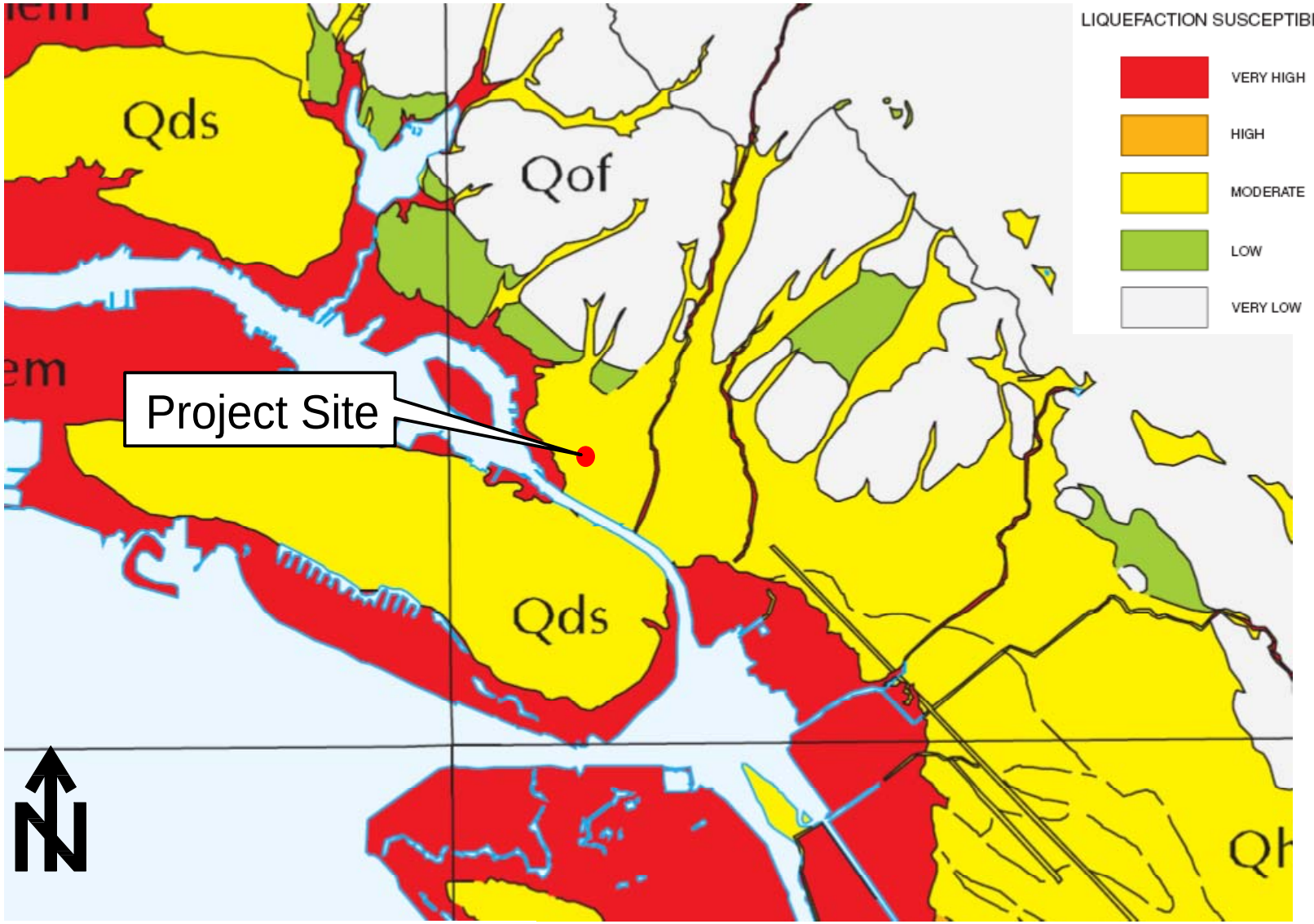
URS	Project No. 27560836 I-880 at 23rd and 29th Ave-Oakland	**Blowcount SPT-N**	Figure 8

X:\x_geo\ACCMA 23rd and 29th Ave\03 characterization



Note: 1. 5% damping spectrum
2. Near fault effects are included

URS	ACMMA I-880 23rd and 29th Project # 27560836	ARS Curve $V_{s,30}$=250 m/sec	Figure 9



USGS Liquefaction Susceptibility Map, Witter (2006)

Project No. 27560836	I-880 at 23rd and 29th Ave-Oakland	**Liquefaction Susceptibility**	**Figure 10**
URS			

X:\x_geo\ACCMA 23rd and 29th Ave\05 Report\Figure

Appendix A
Logs of Test Borings from Previous Subsurface Investigation

BENCH MARK:

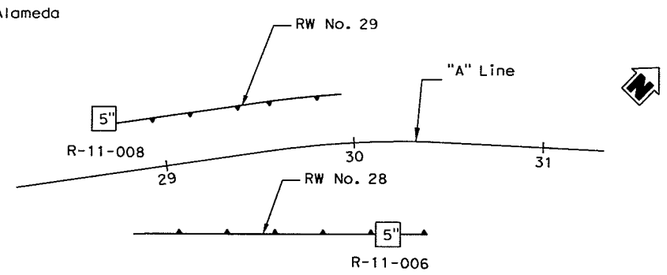
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER _____ DATE _____

L. CHEANG, No. GE 2345, EXP. 9-30-13, REGISTERED PROFESSIONAL ENGINEER, GEOTECHNICAL, STATE OF CALIFORNIA

PLANS APPROVAL DATE _____

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

CERTIFIED ENGINEERING GEOLOGIST _____ 6/12/12 DATE

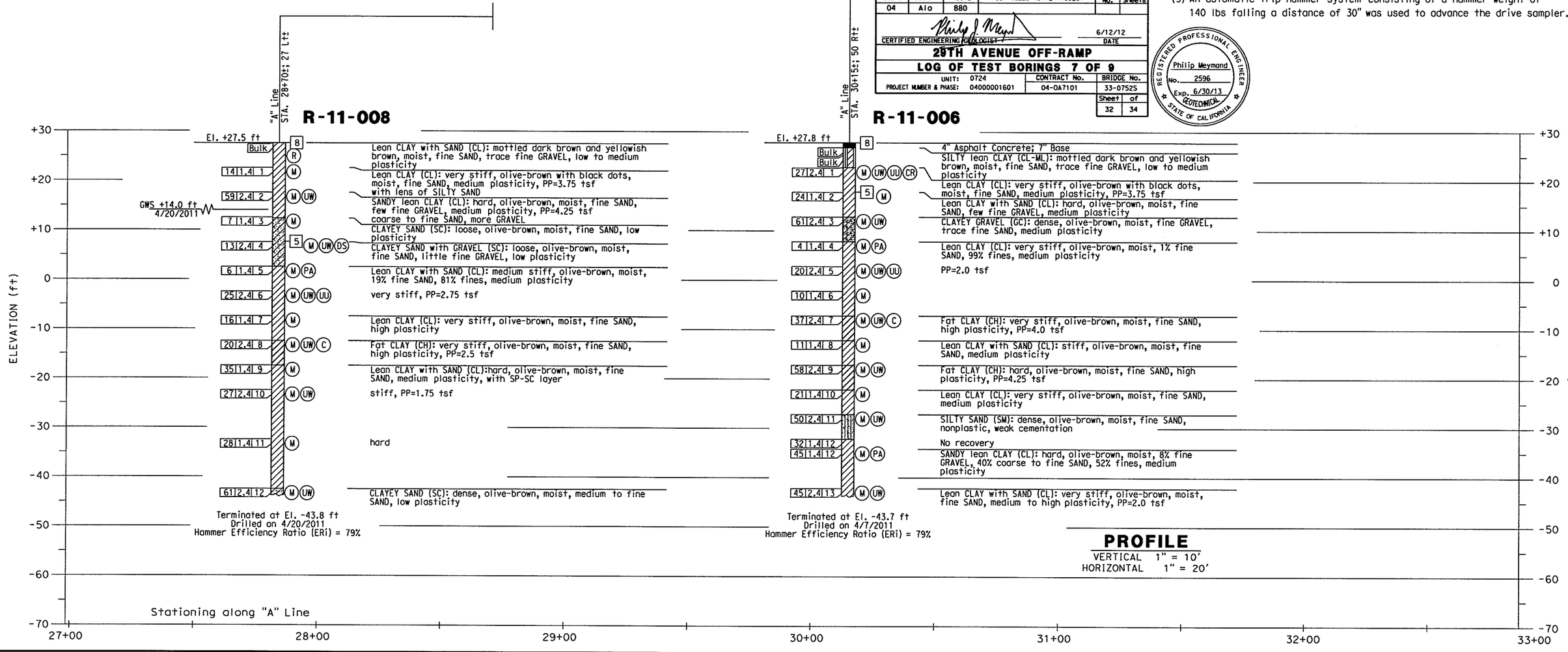
29TH AVENUE OFF-RAMP

LOG OF TEST BORINGS 7 OF 9

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7101	33-0752S
		Sheet 32 of 34

Philip Meymond, No. 2596, Exp. 6/30/13, REGISTERED PROFESSIONAL ENGINEER, GEOTECHNICAL, STATE OF CALIFORNIA

NOTES:
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).
(2) 2.4" samples were taken using a California Modified Sampler.
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 28 and 29
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247 PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => 33-0752S-z-ltb07.dgn

CONTRACT NO.:04-0A7100 PROJECT ID:

USERNAME => Lynette.Da@ARE PLOTTED => 6/20/2012 TIME PLOTTED => 7/22:36 AM

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

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FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

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FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

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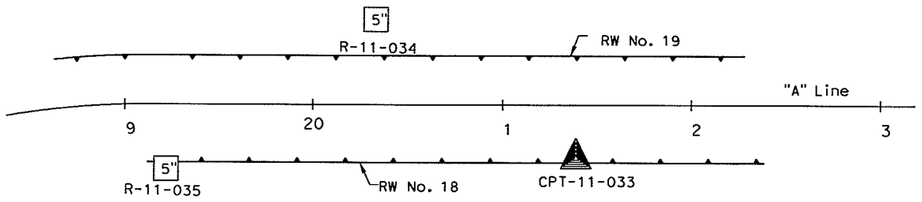

PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER _____ DATE _____

PLANS APPROVAL DATE _____

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REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
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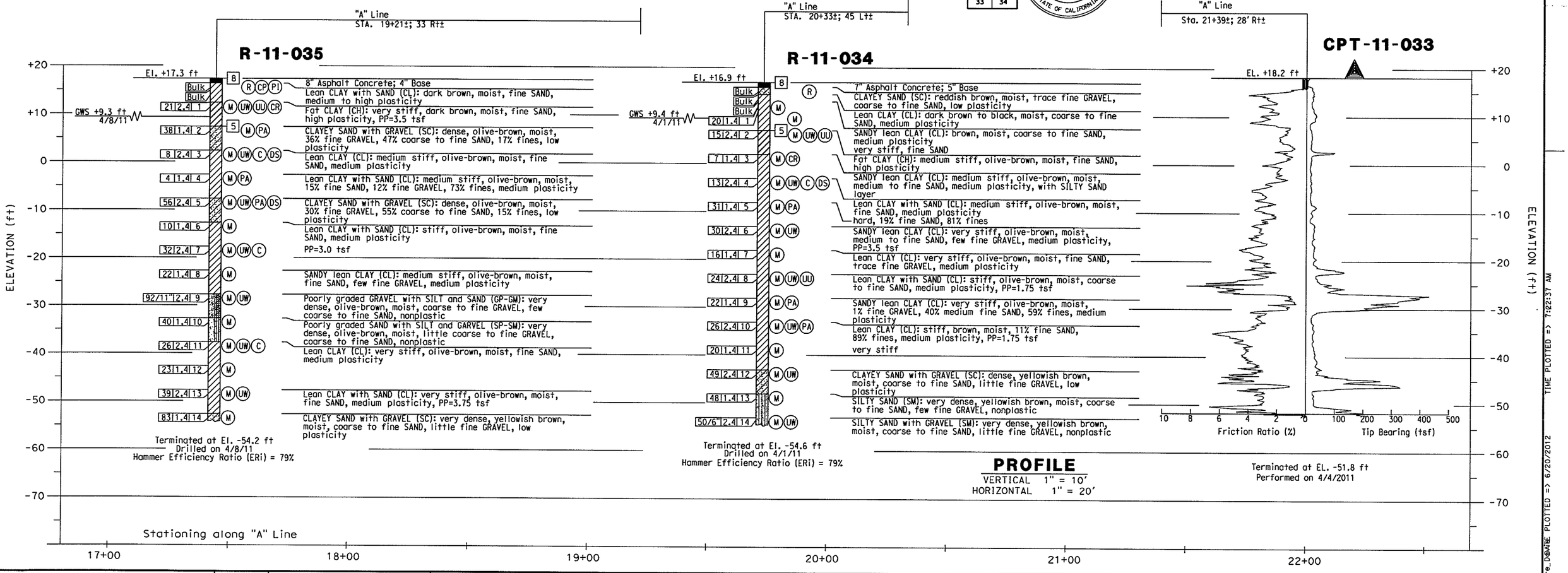
DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			
CERTIFIED ENGINEERING GEOLOGIST: Philip J. Meymand				DATE: 6/12/12	
20TH AVENUE OFF-RAMP					
LOG OF TEST BORINGS 8 OF 9					
UNIT: 0724		CONTRACT No.		BRIDGE No.	
PROJECT NUMBER & PHASE: 04000001601		04-0A7101		33-0752S	
				Sheet	of
				33	34

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

NOTES:
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).
(2) 2.4" samples were taken using a California Modified Sampler.
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			POST MILES Varies

RETAINING WALL No. 18 and 19
LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => 33-0752S-z-ltb08.dgn

CONTRACT NO.:04-0A7100 PROJECT ID:

USERNAME => Lynette_D&A TIME PLOTTED => 7:22:37 AM DATE PLOTTED => 6/20/2012

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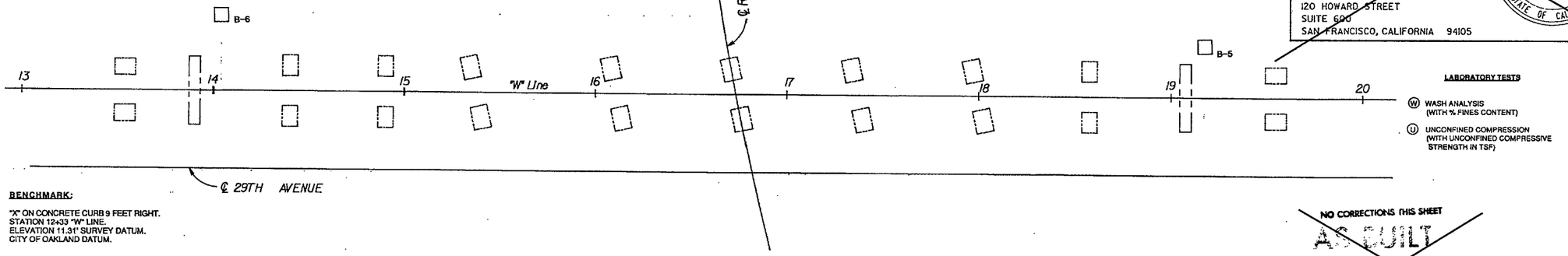
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	77,880	0.3, 27.6/29.2	82	108

Bahram Khamenehpour
GEOTECHNICAL PROFESSIONAL

11-7-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BAHRAM KHAMENEHPOUR — No. 2104 — Exp. 12/31/93 GEOTECHNICAL — STATE OF CALIFORNIA

AGS, INC.
120 HOWARD STREET
SUITE 600
SAN FRANCISCO, CALIFORNIA 94105



PLAN
1"=30'

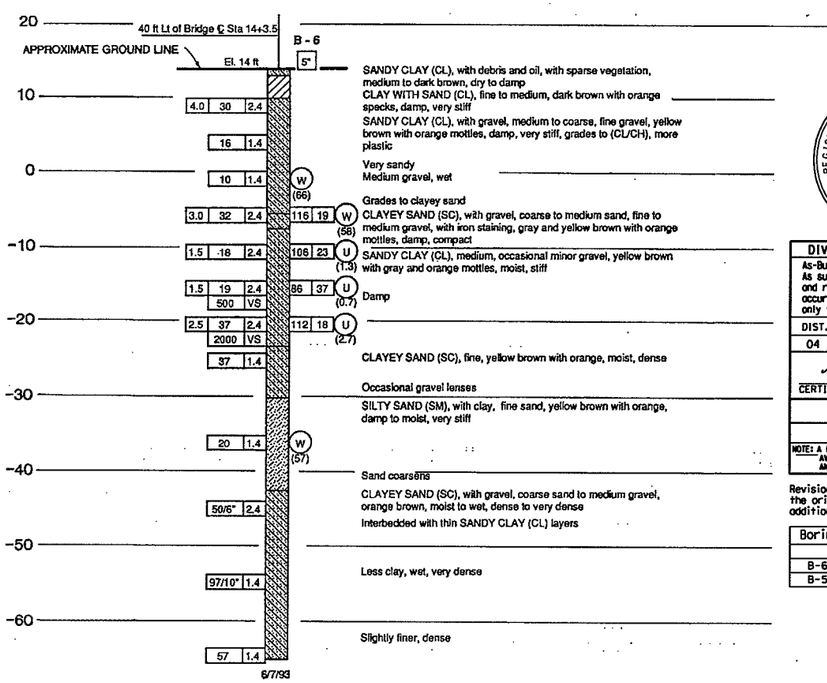
BENCHMARK:

"X" ON CONCRETE CURB 9 FEET RIGHT.
STATION 12+33 "W" LINE.
ELEVATION 11.31' SURVEY DATUM.
CITY OF OAKLAND DATUM.

LABORATORY TESTS

- (W) WASH ANALYSIS (WITH % FINES CONTENT)
- (U) UNCONFINED COMPRESSION (WITH UNCONFINED COMPRESSIVE STRENGTH IN TSF)

NO CORRECTIONS THIS SHEET
AS BUILT
CORRECTIONS BY DT
CONTRACT NO. 04-133234
DATE 11/1/95 - 9/6/96



REGISTERED PROFESSIONAL ENGINEER — Philip Weymond — No. 2596 — Exp. 6/30/13 GEOTECHNICAL — STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Philip J. Weymouth — 3/30/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

29TH AVENUE OFF-RAMP

LOG OF TEST BORINGS 9 OF 9

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

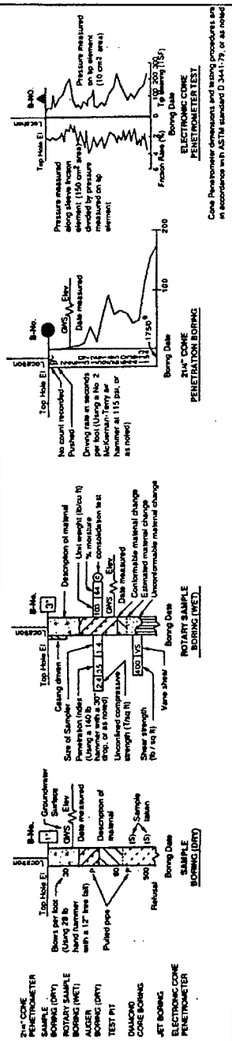
UNIT: 0724 — 04-0A7101
PROJECT NUMBER & PHASE: 04000001601

BRIDGE No.	Sheet	of
33-0752S	34	34

Revisions made to this Log of Test Borings from the original ____ Log of Test Borings are the addition of the following table and notes:

Boring	Station	Offset from "A" Line
B-6	22+35	34.48 Lt
B-5	27+50	15.86 Lt

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and ORGANIC MATTER · FILL MATERIAL · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

Penetration Index (Blows / Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

M J Cullen
DESIGN OVERSIGHT
2-21-94
SIGN OFF DATE

DRAWN BY J. LAPID
CHECKED BY B. BROWN

C. ANDREWS
FIELD INVESTIGATOR
DATE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

B. KHAMENEHPOUR
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 133231

BRIDGE NO. 33 - 0141
POST MILE 28.69

EARTHQUAKE RETROFIT PROJECT NO. 83
29TH AVE OVERCROSSING
LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) 7/7/93 7/31/93 10/8/93

SHEET 7 OF 7

ClibPDF - www.fastio.com

Appendix B
Logs of Test Borings from Current Subsurface Investigation

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alg			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Weymand — No. 2596 — EXP. 6/30/13 GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

CEMENTATION

DESCRIPTION	CRITERIA
WEAK	CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE.
MODERATE	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE.
STRONG	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE.

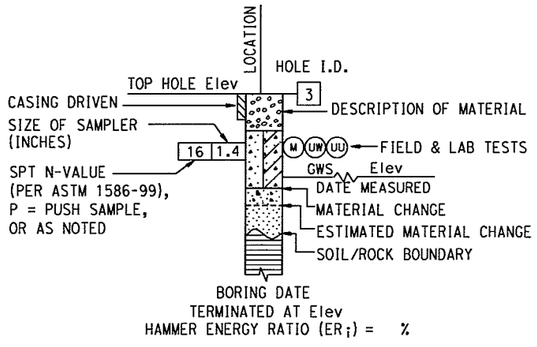
BOREHOLE IDENTIFICATION

SYMBOL	HOLE TYPE	DESCRIPTION
Size	A	AUGER BORING (HOLLOW OR SOLID STEM BUCKET)
Size	R	ROTARY DRILLED BORING (CONVENTIONAL)
	RW	ROTARY DRILLED WITH SELF-CASING WIRE-LINE
	RC	ROTARY CORE WITH CONTINUOUSLY-SAMPLED, SELF-CASING WIRE-LINE
	P	ROTARY PERCUSSION BORING (AIR)
Size	R	ROTARY DRILLED DIAMOND CORE
Size	HD	HAND DRIVEN (1-INCH SOIL TUBE)
	HA	HAND AUGER
●	D	DYNAMIC CONE PENETRATION BORING
▲	CPT	CONE PENETRATION TEST (ASTM D 5778)
⬚	O	OTHER (NOTE ON LOTB)

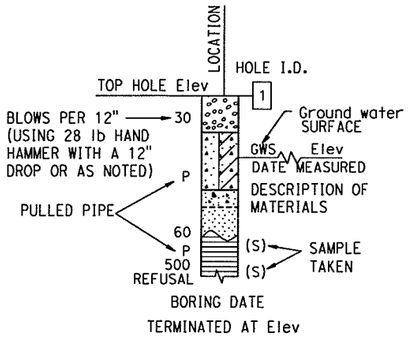
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

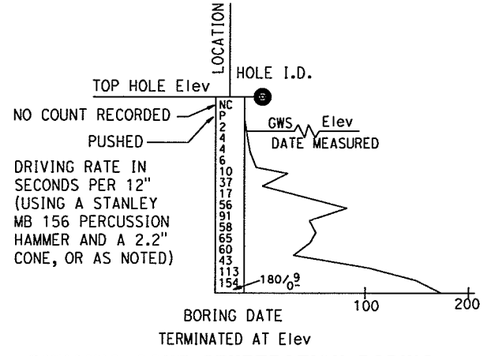
DESCRIPTION	SHEAR STRENGTH (tsf)	POCKET PENETROMETER MEASUREMENT, PP, (tsf)	TORVANE MEASUREMENT, TV, (tsf)	VANE SHEAR MEASUREMENT, VS, (tsf)
VERY SOFT	LESS THAN 0.12	LESS THAN 0.25	LESS THAN 0.12	LESS THAN 0.12
SOFT	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
MEDIUM STIFF	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
STIFF	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
VERY STIFF	1 - 2	2 - 4	1 - 2	1 - 2
HARD	GREATER THAN 2	GREATER THAN 4	GREATER THAN 2	GREATER THAN 2



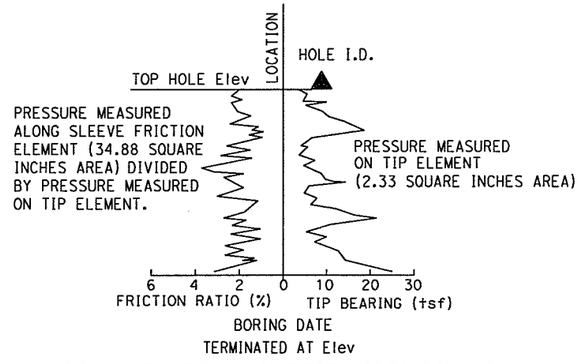
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser PROJECT ENGINEER	BRIDGE NO. 33-0752S	29TH AVENUE OFF-RAMP
SIGN OFF DATE	CHECKED BY	C. TSAI	DATE: 04-25-11 TO 05-04-11			POST MILES 28.69	LOG OF TEST BORINGS 1 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
5-5-11	1-18-12	3-30-12	6-25-12	26	34

FILE => 33-0752S-z-1tb01.dgn

USERNAME => Lynette_D@AE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:33 AM

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

GRAPHIC/SYMBOL	GROUP NAMES
GW	WELL-GRADED GRAVEL WELL-GRADED GRAVEL WITH SAND
GP	POORLY-GRADED GRAVEL POORLY-GRADED GRAVEL WITH SAND
GW-GM	WELL-GRADED GRAVEL WITH SILT WELL-GRADED GRAVEL WITH SILT AND SAND
GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
GP-GM	POORLY-GRADED GRAVEL WITH SILT POORLY-GRADED GRAVEL WITH SILT AND SAND
GP-GC	POORLY-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) POORLY-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND
SW	WELL-GRADED SAND WELL-GRADED SAND WITH GRAVEL
SP	POORLY-GRADED SAND POORLY-GRADED SAND WITH GRAVEL
SW-SM	WELL-GRADED SAND WITH SILT WELL-GRADED SAND WITH SILT AND GRAVEL
SW-SC	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY) WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
SP-SM	POORLY-GRADED SAND WITH SILT POORLY-GRADED SAND WITH SILT AND GRAVEL
SP-SC	POORLY-GRADED SAND WITH CLAY (OR SILTY CLAY) POORLY-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
SM	SILTY SAND SILTY SAND WITH GRAVEL
SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND WITH GRAVEL
PT	PEAT
	COBBLES COBBLES AND BOULDERS BOULDERS

GRAPHIC/SYMBOL	GROUP NAMES
CL	LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL SANDY LEAN CLAY SANDY LEAN CLAY WITH GRAVEL GRAVELLY LEAN CLAY GRAVELLY LEAN CLAY WITH SAND
CL-ML	SILTY CLAY SILTY CLAY WITH SAND SILTY CLAY WITH GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY WITH GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY WITH SAND
ML	SILT SILT WITH SAND SILT WITH GRAVEL SANDY SILT SANDY SILT WITH GRAVEL GRAVELLY SILT GRAVELLY SILT WITH SAND
OL	ORGANIC LEAN CLAY ORGANIC LEAN CLAY WITH SAND ORGANIC LEAN CLAY WITH GRAVEL SANDY ORGANIC LEAN CLAY SANDY ORGANIC LEAN CLAY WITH GRAVEL GRAVELLY ORGANIC LEAN CLAY GRAVELLY ORGANIC LEAN CLAY WITH SAND
OL	ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT WITH GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT WITH SAND
CH	FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL SANDY FAT CLAY SANDY FAT CLAY WITH GRAVEL GRAVELLY FAT CLAY GRAVELLY FAT CLAY WITH SAND
MH	ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL SANDY ELASTIC SILT SANDY ELASTIC SILT WITH GRAVEL GRAVELLY ELASTIC SILT GRAVELLY ELASTIC SILT WITH SAND
OH	ORGANIC FAT CLAY ORGANIC FAT CLAY WITH SAND ORGANIC FAT CLAY WITH GRAVEL SANDY ORGANIC FAT CLAY SANDY ORGANIC FAT CLAY WITH GRAVEL GRAVELLY ORGANIC FAT CLAY GRAVELLY ORGANIC FAT CLAY WITH SAND
OH	ORGANIC ELASTIC SILT ORGANIC ELASTIC SILT WITH SAND ORGANIC ELASTIC SILT WITH GRAVEL SANDY ORGANIC ELASTIC SILT SANDY ORGANIC ELASTIC SILT WITH GRAVEL GRAVELLY ORGANIC ELASTIC SILT GRAVELLY ORGANIC ELASTIC SILT WITH SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL WITH SAND ORGANIC SOIL WITH GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL WITH GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL WITH SAND

FIELD AND LABORATORY TESTING

- (C) CONSOLIDATION (ASTM D 2435)
- (CL) COLLAPSE POTENTIAL (ASTM D 5333)
- (CP) COMPACTION CURVE (CTM 216)
- (CR) CORROSIVITY TESTING (CTM 643, CTM 422, CTM 417)
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 4767)
- (DS) DIRECT SHEAR (ASTM D 3080)
- (EI) EXPANSION INDEX (ASTM D 4829)
- (M) MOISTURE CONTENT (ASTM D 2216)
- (OC) ORGANIC CONTENT-% (ASTM D 2974)
- (P) PERMEABILITY (CTM 220)
- (PA) PARTICLE SIZE ANALYSIS (ASTM D 422)
- (PI) PLASTICITY INDEX (AASHTO T 90) LIQUID LIMIT (AASHTO T 89)
- (PL) POINT LOAD INDEX (ASTM D 5731)
- (PM) PRESSURE METER
- (R) R-VALUE (CTM 301)
- (SE) SAND EQUIVALENT (CTM 217)
- (SG) SPECIFIC GRAVITY (AASHTO T 100)
- (SL) SHRINKAGE LIMIT (ASTM D 427)
- (SW) SWELL POTENTIAL (ASTM D 4546)
- (UC) UNCONFINED COMPRESSION-SOIL (ASTM D 2166) UNCONFINED COMPRESSION-ROCK (ASTM D 2938)
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 2850)
- (UW) UNIT WEIGHT (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alg			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymond — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

APPARENT DENSITY OF COHESIONLESS SOILS

DESCRIPTION	SPT N_{60} (BLOWS / 12 INCHES)
VERY LOOSE	0 - 5
LOOSE	5 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	GREATER THAN 50

MOISTURE

DESCRIPTION	CRITERIA
DRY	NO DISCERNABLE MOISTURE
MOIST	MOISTURE PRESENT, BUT NO FREE WATER
WET	VISIBLE FREE WATER

PERCENT OR PROPORTION OF SOILS

DESCRIPTION	CRITERIA
TRACE	PARTICLES ARE PRESENT BUT ESTIMATED TO BE LESS THAN 5%
FEW	5% - 10%
LITTLE	15% - 25%
SOME	30% - 45%
MOSTLY	50% - 100%

PARTICLE SIZE

DESCRIPTION		SIZE
BOULDER		GREATER THAN 12"
COBBLE		3" - 12"
GRAVEL	COARSE	3/4" - 3"
	FINE	1/5" - 3/4"
SAND	COARSE	1/16" - 1/5"
	MEDIUM	1/64" - 1/16"
	FINE	1/300" - 1/64"
SILT AND CLAY		LESS THAN 1/300"

DESIGN OVERSIGHT — SIGN OFF DATE

DRAWN BY: N. HUTTON — CHECKED BY: C. TSAI

S. JANOWSKI — FIELD INVESTIGATION BY:

DATE: 04-25-11 TO 05-04-11

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Jan Hueser — PROJECT ENGINEER

BRIDGE NO. 33-0752S — POST MILES 28.69

29TH AVENUE OFF-RAMP

LOG OF TEST BORINGS 2 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
9-6-11	1-18-12	3-28-12	6-25-12	27	34

FILE => 33-0752S-z-ltb02.dgn

USERNAME => Lynette_D@ABE PLOTTED => 6/20/2012 TIME PLOTTED => 7:32:34 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Weymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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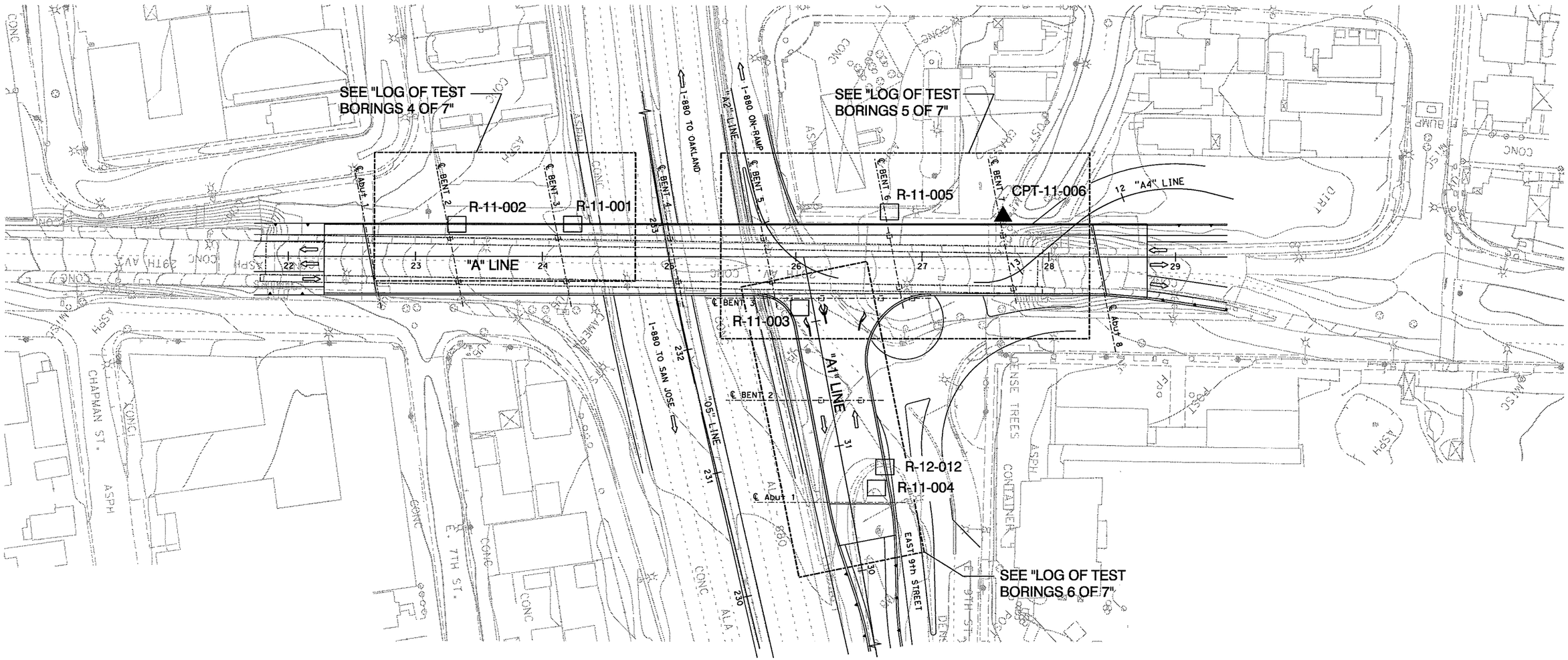
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=40'-0"

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0752S	29TH AVENUE OFF-RAMP
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69	LOG OF TEST BORINGS 3 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
5-5-11	1-18-12	3-30-12	6-25-12	28	34

FILE => 33-0752S-z-ltb03.dgn

USERNAME => Lynette_D@DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:34 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alg			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — EXP. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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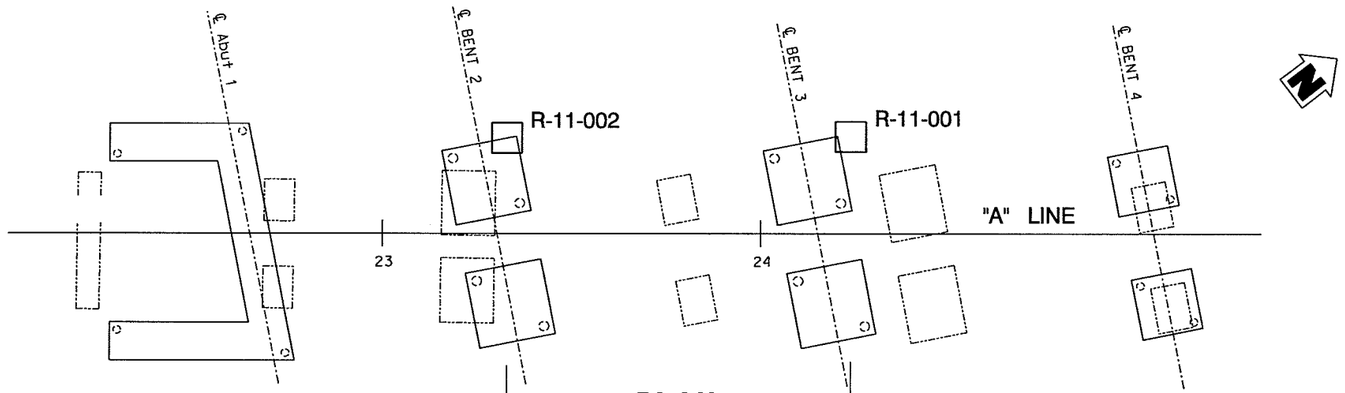
OAKLAND, CA 94612

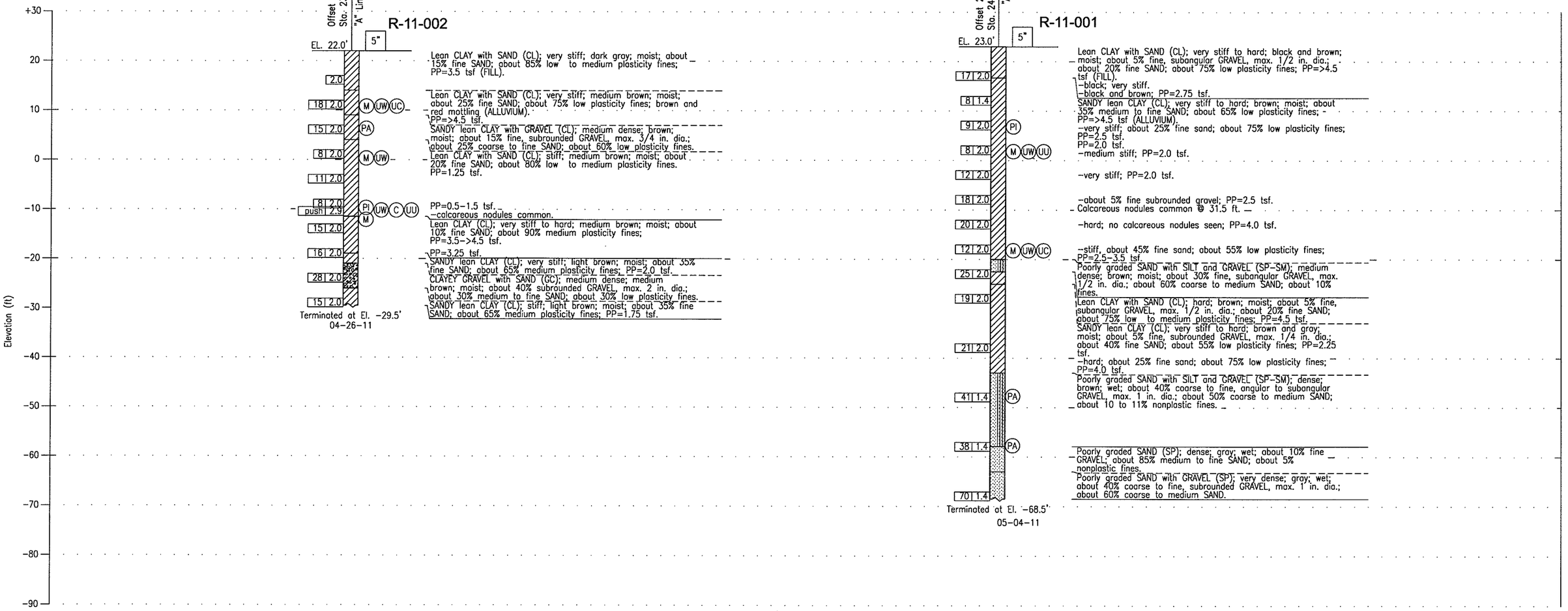
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0752S	29TH AVENUE OFF-RAMP
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69	LOG OF TEST BORINGS 4 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
9-5-11	1-18-12	3-28-12	5-25-12	29	34

FILE => 33-0752S-z-ltb04.dgn

USERNAME => Lynette_D@ATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:35 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Weymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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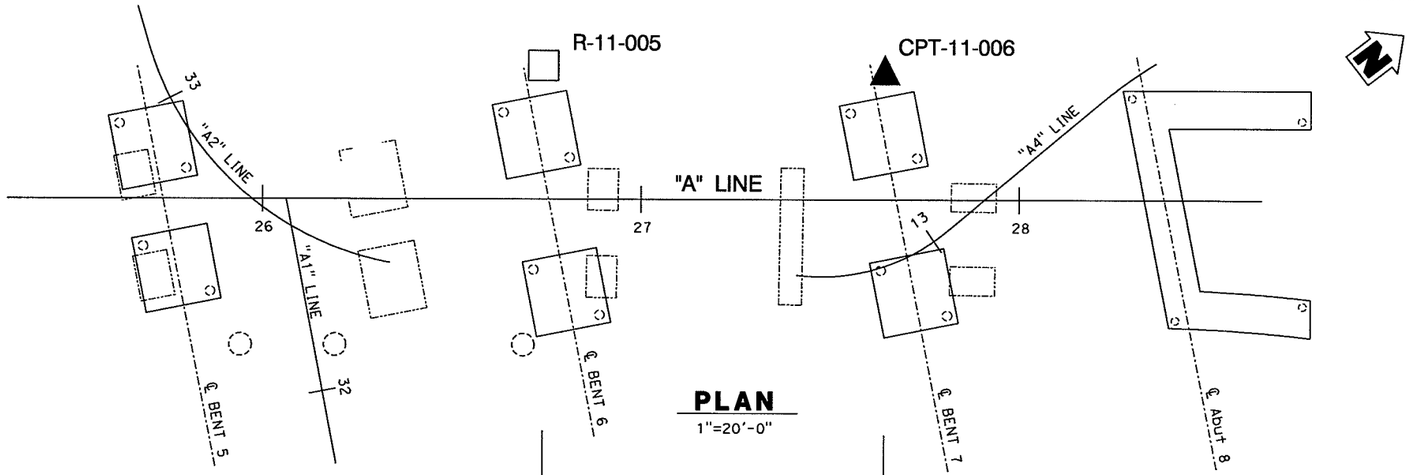
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

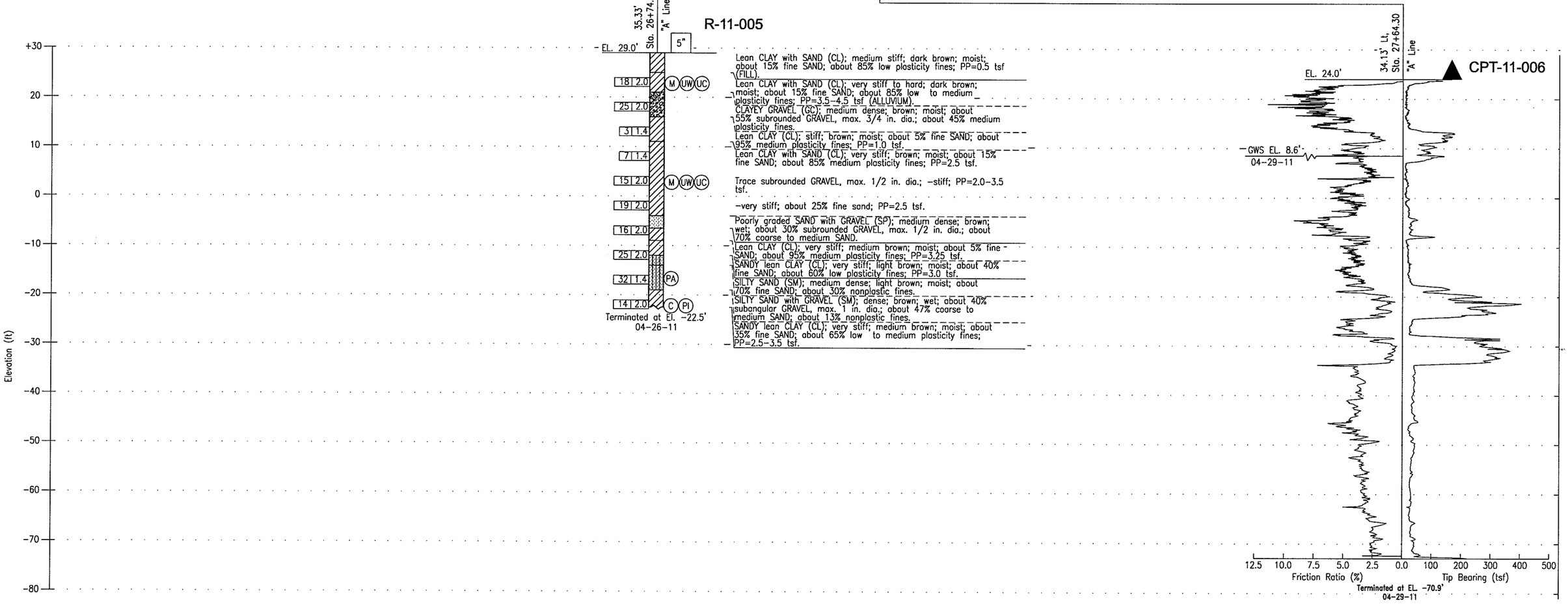
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0752S	29TH AVENUE OFF-RAMP
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69	LOG OF TEST BORINGS 5 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

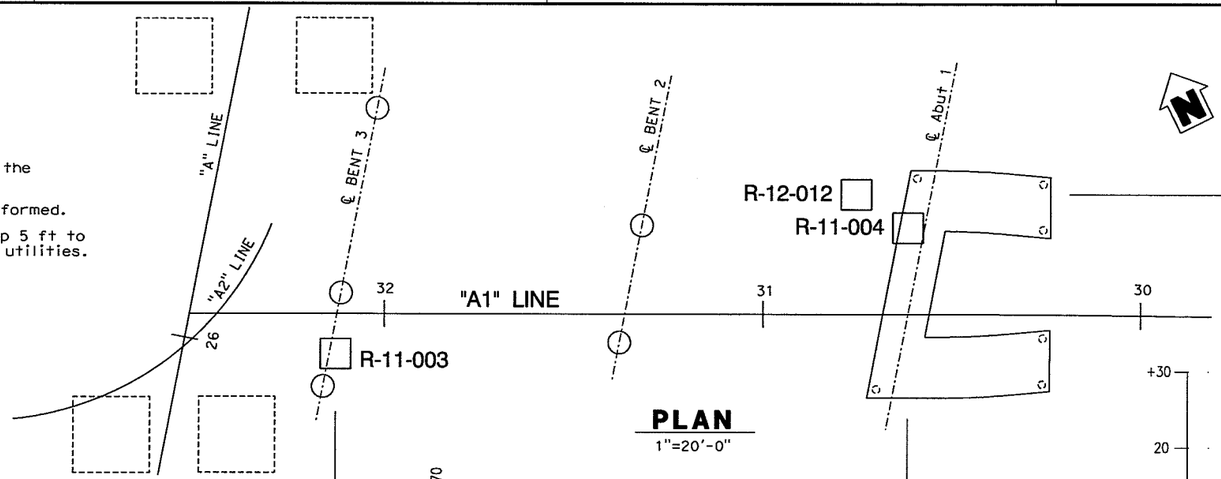
REVISION DATES				SHEET	OF
9-8-11	1-18-12	3-30-12	6-25-12	30	34

FILE => 33-0752S-z-ltb05.dgn

USERNAME => Lynette_Davis TIME PLOTTED => 6/20/2012 7:22:35 AM

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



PLAN
1"=20'-0"

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alc			

REGISTERED CIVIL ENGINEER — 6/25/12 DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Weymond — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

R-11-003

10.51' Lt., Sta. 32+12.79 "A1" Line
EL. 23.0'
5"

- 5 | 2.0 — M, UW
- 29 | 2.0
- 7 | 2.0 — M, UW, PI, UU
- 27 | 1.4
- 16 | 1.4 — PA
- 21 | 2.0
- 16 | 2.0
- 29 | 2.0 — PA
- 15 | 1.4
- 23 | 2.0 — M, UW, UC
- 21 | 2.0 — M, PI
- 49 | 1.4
- 13 | 1.4
- 23 | 2.0
- 50/5 | 2.0

Terminated at El. -77.9'
05-02-11

Fat CLAY (CH); very stiff; dark gray; dry to moist; about 10% fine SAND; about 90% medium to high plasticity, very high dry strength fines; (FILL).

Lean CLAY with SAND (CL); very stiff; medium brown; moist; about 20% fine SAND; about 80% medium plasticity fines; black mottles; PP=3.0 tsf (ALLUVIUM).

Poorly graded GRAVEL with SILT and SAND (GP-GM); medium dense; brown; moist; about 50% subangular GRAVEL, max. 3/4 - in. dia.; about 40% coarse to medium SAND; about 10% low plasticity fines.

Lean CLAY with SAND (CL); medium stiff; medium brown; moist; about 20% fine SAND; about 80% low plasticity fines; PP=1.75 tsf.

SANDY lean CLAY (CL); very stiff; medium brown; moist; about 35% fine SAND; about 65% medium plasticity fines; with occasional gravelly zones; PP=3.25 tsf.

SILTY SAND (SM); medium dense; light brown; moist; about 5% fine, subrounded GRAVEL; about 76% medium to fine SAND; about 19% nonplastic fines.

Lean CLAY with SAND (CL); very stiff; brown; moist; trace fine GRAVEL; about 20% fine SAND; about 80% medium plasticity fines; PP=2.0 tsf.
PP=3.0 tsf.
PP=2.75 tsf.

SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 72% fine SAND; about 28% nonplastic to low plasticity fines.

Lean CLAY (CL); very stiff; gray; moist; trace subrounded GRAVEL, max. 1/2 in. dia.; about 10% fine SAND; about 90% medium plasticity fines; PP=3.75 tsf.

SANDY lean CLAY (CL); very stiff; brown and gray; moist; about 40% fine SAND; about 60% low plasticity fines; PP=2.5 tsf.

Lean CLAY (CL); very stiff; gray; moist; trace subrounded GRAVEL, max. 1/2 in. dia.; about 10% fine SAND; about 90% medium plasticity fines; PP=3.0 tsf.

Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; wet; about 30% subangular GRAVEL, max. 1/2 in. dia.; about 60% coarse to medium SAND; about 10% nonplastic fines.

Lean CLAY (CL); stiff; gray; moist; about 10% fine SAND; about 90% medium plasticity fines; PP=1.75 tsf.

Lean CLAY with SAND (CL); very stiff; dark gray; moist; about 25% fine SAND; about 75% medium plasticity fines; PP=3.75 tsf.

SILTY SAND (SM); very dense; light gray; moist; about 55% fine SAND; about 45% nonplastic fines.

Poorly graded SAND with SILT and GRAVEL (SP-SM); very dense; medium brown; moist; about 25% subangular GRAVEL, max. 1/2 in. dia.; about 65% coarse to medium SAND; about 10% nonplastic fines.

R-11-004

22.77' Rt., Sta. 30+61.70 "A1" Line
EL. 22.0'
5"

- 23 | 2.0 — UC
- 12 | 2.0
- 11 | 2.0
- 13 | 2.0 — C, PI
- 19 | 2.0
- 26 | 2.0
- 18 | 2.0 — M, PI
- 22 | 1.4 — PA
- 28 | 2.0 — M, UW
- 28 | 2.0
- 38 | 2.0 — M, UW, PA
- 50 | 1.4
- 12 | 1.4
- 18 | 2.0
- 27 | 2.0

Terminated at El. -79.5'
04-29-11

Fat CLAY with SAND (CH); dark brown; moist; high plasticity fines; (FILL).

Lean CLAY with SAND (CL); dark brown; moist; about 20% fine SAND; about 80% low plasticity fines; roots and organic detrius common (ALLUVIUM).
-medium brown; very stiff to hard; no roots or organic material; PP=4.5 tsf.
-very stiff; PP=2.0 tsf.

SANDY lean CLAY with GRAVEL (CL); very stiff; medium brown; moist; about 15% fine, subrounded GRAVEL; about 35% medium to fine SAND; about 50% low to medium plasticity fines; PP=2.5 tsf.

Lean CLAY with SAND (CL); very stiff; medium brown; moist; about 20% fine SAND; about 80% low plasticity fines; PP=3.0 tsf.
PP=3.0 tsf.

SANDY lean CLAY (CL); hard; medium brown; moist; about 5% fine GRAVEL; about 30% medium to fine SAND; about 65% low to medium plasticity fines; PP=4.5 tsf.
-about 40% sand; PP=4.0 tsf.

Fat CLAY (CH); very stiff; medium brown; moist; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; PP=2.75 tsf.

SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 77% fine SAND; about 23% nonplastic to low plasticity fines.

Lean CLAY (CL); hard; brown and gray; moist; about 5 to 10% fine SAND; about 90 to 95% medium plasticity fines; PP=4.5 tsf.

Poorly graded SAND (SP); medium dense; dark brown; wet; trace GRAVEL; medium SAND.

Lean CLAY with SAND (CL); very stiff; light brown; moist; about 15% fine SAND; about 85% low plasticity fines; silty.

SANDY SILT (ML); medium dense; medium brown; moist; about 45% fine SAND; about 55% nonplastic to low plasticity fines.

Lean CLAY (CL); very stiff; gray; moist; about 10% fine SAND; medium plasticity fines; PP=3.25 tsf.

SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 74% fine SAND; about 26% nonplastic to low plasticity fines.

Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; brown; moist; about 15 to 20% subangular GRAVEL, max. 1/2 in. dia.; about 70% coarse to medium SAND; about 5 to 10% nonplastic fines.
-very dense.

SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace coarse, subrounded GRAVEL, max. 1 in. dia.; about 30% fine SAND; medium plasticity, high dry strength fines; PP=3.75 tsf.

-greenish-gray; high dry strength; PP=2.0-3.0 tsf.

SANDY lean CLAY with GRAVEL (CL); hard; brown and gray; moist; about 15% fine, subrounded GRAVEL, max. 1/2 in. dia.; about 15% coarse to fine SAND; about 70% low plasticity fines; PP=4.25 tsf.

R-12-012

31.62' Rt., Sta. 30+75.41 "A1" Line
EL. 22.0'
4"

- 51 | 2.5
- 64 | 1.4
- 42 | 2.5 — UC
- push | 2.9 — UU
- 86/12 | 2.5 — UC
- 50 | 1.4
- 67 | 1.4
- 42 | 1.4
- 62 | 2.5 — UU
- 67 | 2.5 — UC
- 51 | 2.5

Terminated at El. -109.5'
03-21-12

Fat CLAY with SAND (CH); stiff; dark brown; moist; about 15% fine SAND; about 85% medium to high plasticity fines; PP=1.25 tsf; (FILL).

Lean CLAY with SAND (CL); very stiff to hard; yellowish-brown; moist; about 20% fine SAND; about 80% medium plasticity fines; PP=2.0-4.5 tsf; (ALLUVIUM).

Lean CLAY (CL); very stiff; gray; moist; about 10% fine SAND; medium plasticity fines; PP=3.25 tsf.

SILTY, CLAYEY SAND (SC-SM); medium dense; brown and gray; moist; about 74% fine SAND; about 26% nonplastic to low plasticity fines.

Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; brown; moist; about 15 to 20% subangular GRAVEL, max. 1/2 in. dia.; about 70% coarse to medium SAND; about 5 to 10% nonplastic fines.
-very dense.
-clay interbed 68.5' to 69'.

SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace coarse, subrounded GRAVEL, max. 1 in. dia.; about 30% fine SAND; medium plasticity fines; PP=2.0 tsf.

-gray; very stiff; PP=1.75 tsf.

-very stiff; PP=>4.5 tsf.

SANDY lean CLAY with GRAVEL (CL); very stiff; brown and gray; moist; about 15% fine, subrounded GRAVEL, max. 1/2 in. dia.; about 15% coarse to fine SAND; about 70% low plasticity fines; PP=3.0 tsf.

Well-graded SAND with GRAVEL (SW); very dense; brown and gray; moist; about 35% fine GRAVEL, max. 3/4 in. dia.; about 60% coarse to fine SAND; about 5% fines.

Lean CLAY with SAND (CL); hard; gray; moist; about 20% fine SAND; about 80% medium plasticity fines; PP=3.25 tsf->4.5 tsf.

SANDY SILTY CLAY (CL-ML); hard; gray; moist; about 30% fine SAND; about 70% low plasticity fines; PP=2.75 tsf.

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0752S	29TH AVENUE OFF-RAMP
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.69	LOG OF TEST BORINGS 6 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
9-9-11	1-10-12	3-30-12	6-25-12	31	34

FILE => 33-0752S-z-1tb06.dgn

USERNAME => Lynette_D DATE PLOTTED => 6/20/2012 TIME PLOTTED => 7:22:36 AM

Appendix C
Laboratory Test Results

MOISTURE & DENSITY TEST

Client : URS Project : I-880 @ 23rd and 29th Ave. Job no : 27560836

	Boring #	R-11-002	R-11-003	R-11-003	R-11-004	R-11-004	R-11-008	R-11-008	R-11-009	
	Sample #	3-3	2-3	12-3	8-2	10-3	6-3	8-3	11-2	
	Depth (ft.)	21-21.5	6-6.5	61-61.5	35.5-36	46-46.5	26-26.5	36-36.5	50.5-51	
	Soil type: (visual)	Brown lean clay	Grayish brown lean clay	Grayish brown lean clay	Dark reddish brown fat clay	Mottled grayish brown lean clay	Grayish brown lean clay	Olive gray fat clay	Dark olive gray fat clay	
1.	Date tested:	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	05/25/11	1.
2.	Tested by:	JH	JH	JH	JH	JH	JH	JH	JH	2.
3.	Specimen height (in.)	5.96	3.75			6.01	5.98			3.
4.	Wt. of specimen + tare (gm)	535.6	275.3			588.5	491.7			4.
5.	Tare wt. (gm)	0.00	0.00			0.00	0.00			5.
6.	Diameter (in.)	1.90	1.88			1.93	1.87			6.
7.	Wet wt. of soil + dish wt. (gm)	221.47	229.57	204.55	169.24	230.11	206.74	164.51	168.69	7.
8.	Dry wt. of soil + dish wt. (gm)	183.03	199.36	174.49	142.09	197.38	163.45	136.53	135.88	8.
9.	Wt. of dish (gm)	43.17	51.47	55.50	60.73	42.51	40.61	51.82	51.64	9.
10.	Dish ID									10.
	Wet Density (pcf)	120.7	100.7			127.4	114.0			
	Dry Density (pcf)	94.6	83.6			105.2	84.3			
	Moisture Content (%)	27.5	20.4	25.3	33.4	21.1	35.2	33.0	38.9	
	Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	
	Void Ratio	0.780	1.016			0.602	0.999			
	Saturation (%)	95.1	54.3			94.8	95.2			

Additional data:

Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

MOISTURE & DENSITY TEST

Client : URS Project : I-880 @ 23rd and 29th Ave. Job no : 27560836

	Boring #	R-11-009	R-11-009	R-11-011						
	Sample #	12-3	14-2	15-3						
	Depth (ft.)	61-61.5	80.5-81	81-81.5						
	Soil type: (visual)	Dark olive lean clay	Brown lean clay with sand	Light olive brown lean clay						
1.	Date tested:	05/25/11	05/25/11	05/25/11						1.
2.	Tested by:	JH	JH	JH						2.
3.	Specimen height (in.)	6.00		5.98						3.
4.	Wt. of specimen + tare (gm)	607.1		573.2						4.
5.	Tare wt. (gm)	0.00		0.00						5.
6.	Diameter (in.)	1.93		1.93						6.
7.	Wet wt. of soil + dish wt. (gm)	220.94	140.74	246.05						7.
8.	Dry wt. of soil + dish wt. (gm)	191.82	127.71	205.76						8.
9.	Wt. of dish (gm)	41.71	58.91	43.29						9.
10.	Dish ID									10.
	Wet Density (pcf)	131.7		124.7						
	Dry Density (pcf)	110.3		99.9						
	Moisture Content (%)	19.4	18.9	24.8						
	Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	
	Void Ratio	0.528		0.686						
	Saturation (%)	99.2		97.6						

Additional data:

Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

ASTM D-1140
PERCENT PASSING NO. 200 SIEVE REPORT

Method A
Specimens Soaked Overnight without Deflocculating Agent
Dry Mass Determined Directly

Client Name URS
Project Name I-880 @ 23rd and 29th Ave.
Project Number 27560836

Boring Number	R-11-001	R-11-001	R-11-003	R-11-003	R-11-004
Sample Number	13	14-1	6	9-3	9
Depth (ft)	70-71.5	80-80.75	25-26	41-41.5	40-41.5
Percent of Soil Finer than No. 200 Sieve	10.4	11.2	18.5	27.5	23.4
Visual Classification	Brown poorly graded gravel with sand	Brown poorly graded gravel with silt and sand	Brown clayey sand with gravel	Olive gray clayey sand	Light olive gray clayey sand with gravel
Date	05/17/11	05/17/11	05/17/11	05/25/11	05/17/11
Weight of Dry Soil + Pan (before wash)	768.1	743.7	760.6	188.2	831.0
Weight of Dry Soil + Pan (after wash)	705.7	694.5	650.9	147.5	675.3
Weight of Pan	166.2	303.9	166.4	40.4	166.0

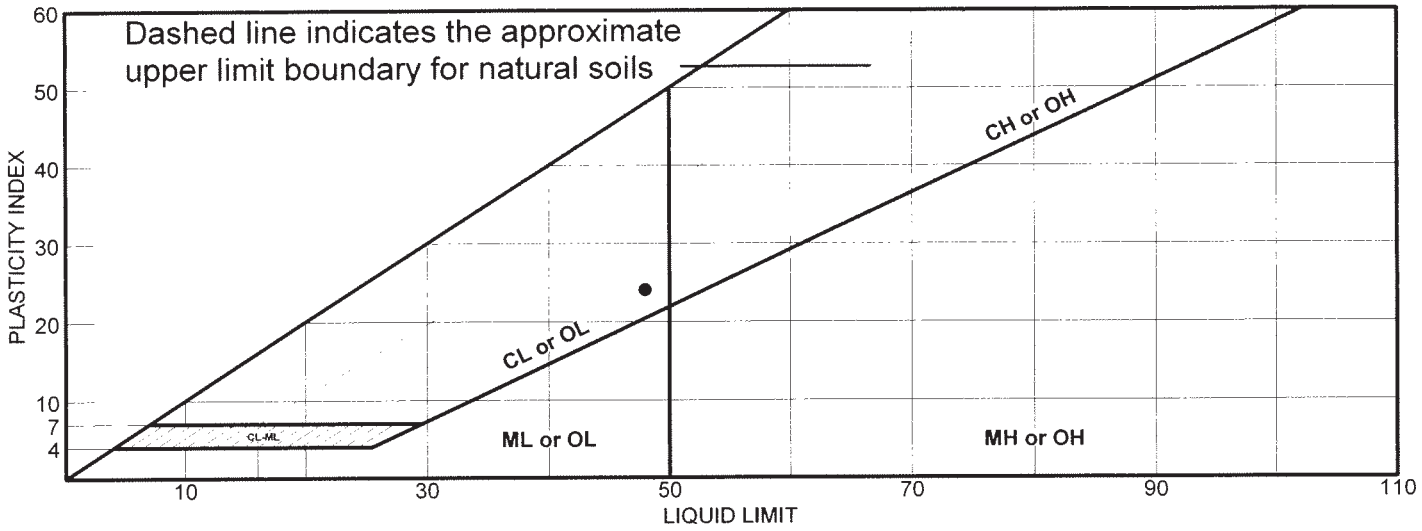
ASTM D-1140
PERCENT PASSING NO. 200 SIEVE REPORT

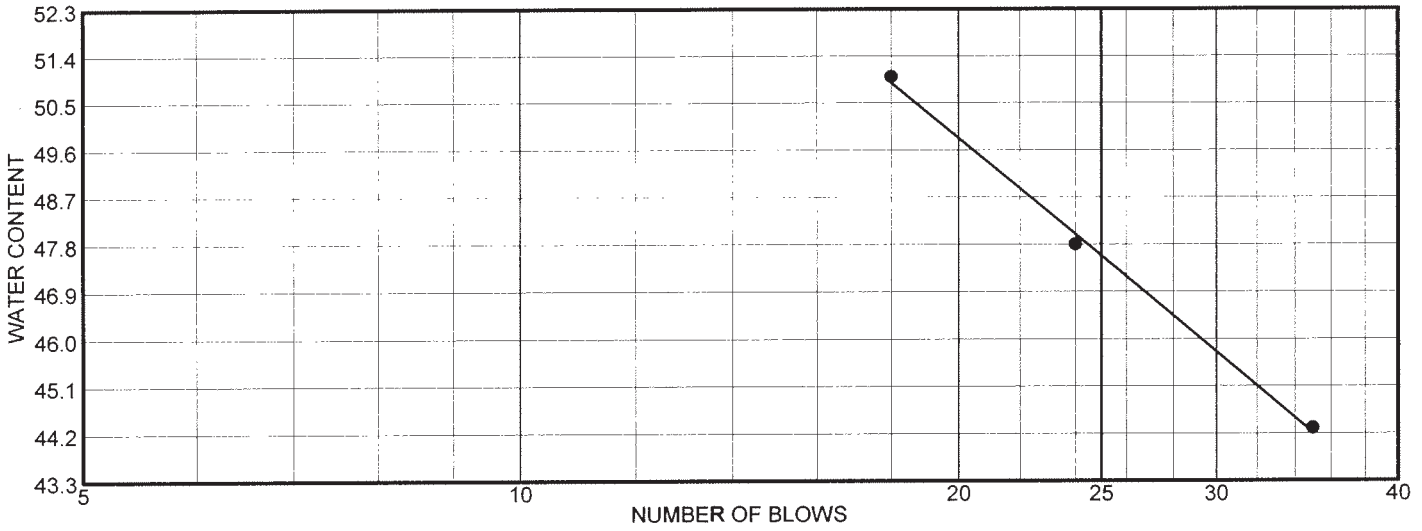
Method A
Specimens Soaked Overnight without Deflocculating Agent
Dry Mass Determined Directly

Client Name URS
Project Name I-880 @ 23rd and 29th Ave.
Project Number 27560836

Boring Number	R-11-004	R-11-005	R-11-008		
Sample Number	12-3	10	9-2		
Depth (ft)	61-61.5	45-46.5	40.5-41		
Percent of Soil Finer than No. 200 Sieve	26.1	13.2	16.6		
Visual Classification	Grayish brown clayey sand	Brown silty gravel with sand	Olive gray clayey sand with gravel		
Date	05/25/11	05/17/11	05/25/11		
Weight of Dry Soil + Pan (before wash)	214.3	762.9	745.7		
Weight of Dry Soil + Pan (after wash)	169.5	684.2	649.3		
Weight of Pan	43.0	167.4	165.4		

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark grayish brown lean clay with sand	48	24	24			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-005 **Sample No.:** 11-2 **Elev./Depth:** 50.5-51

Remarks:

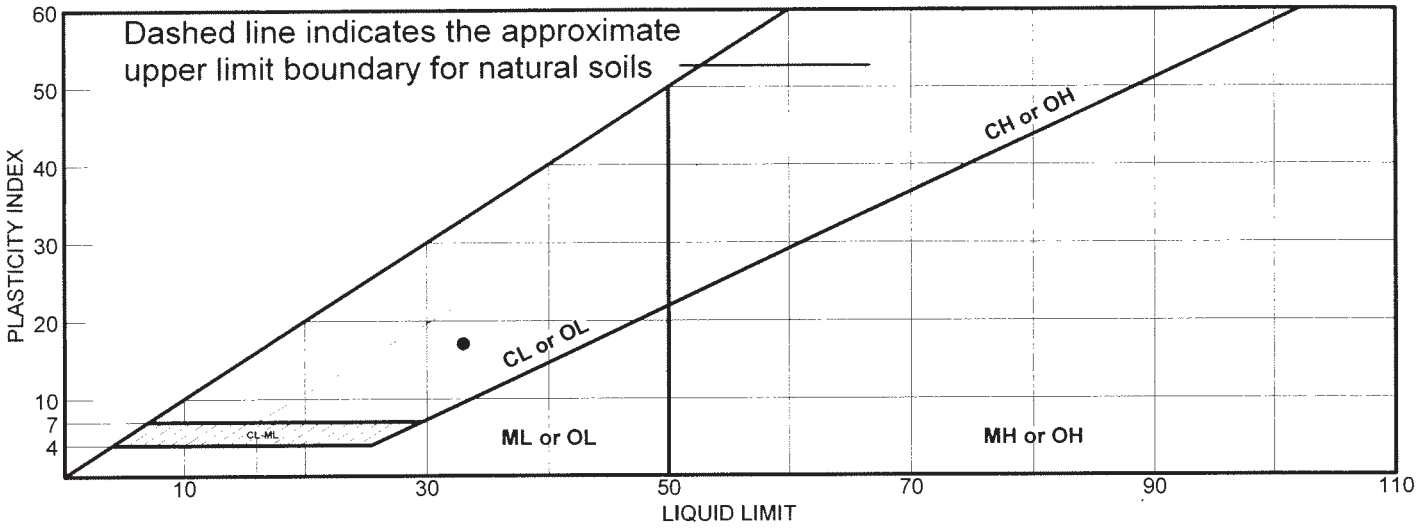
●

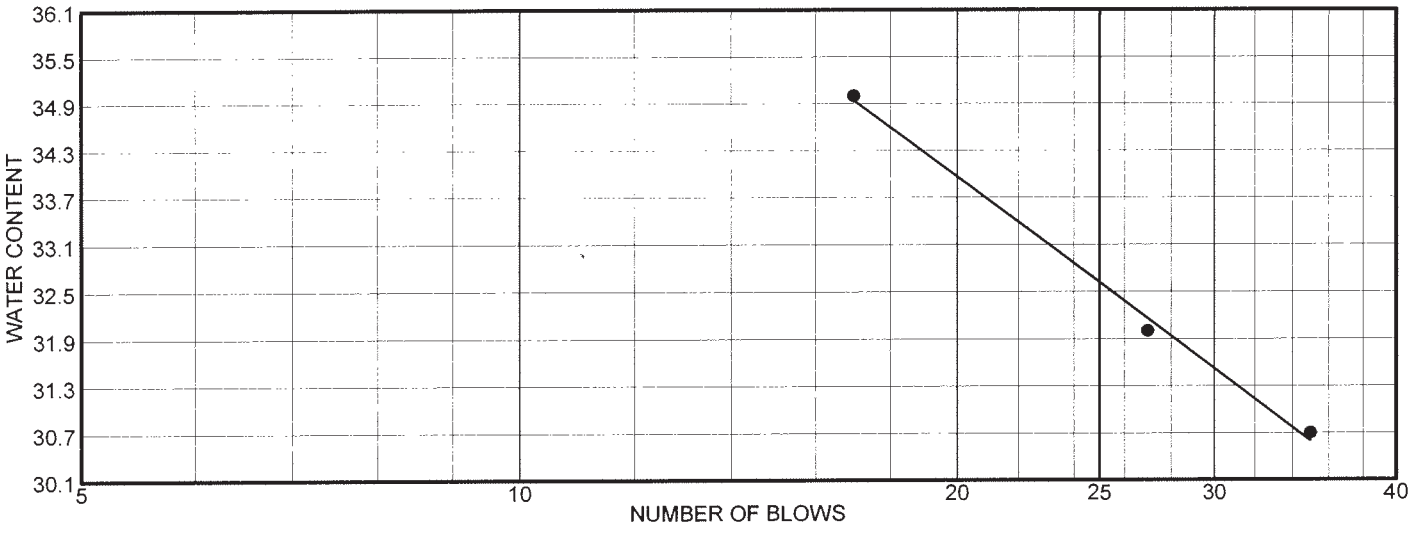
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay with sand	33	16	17			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

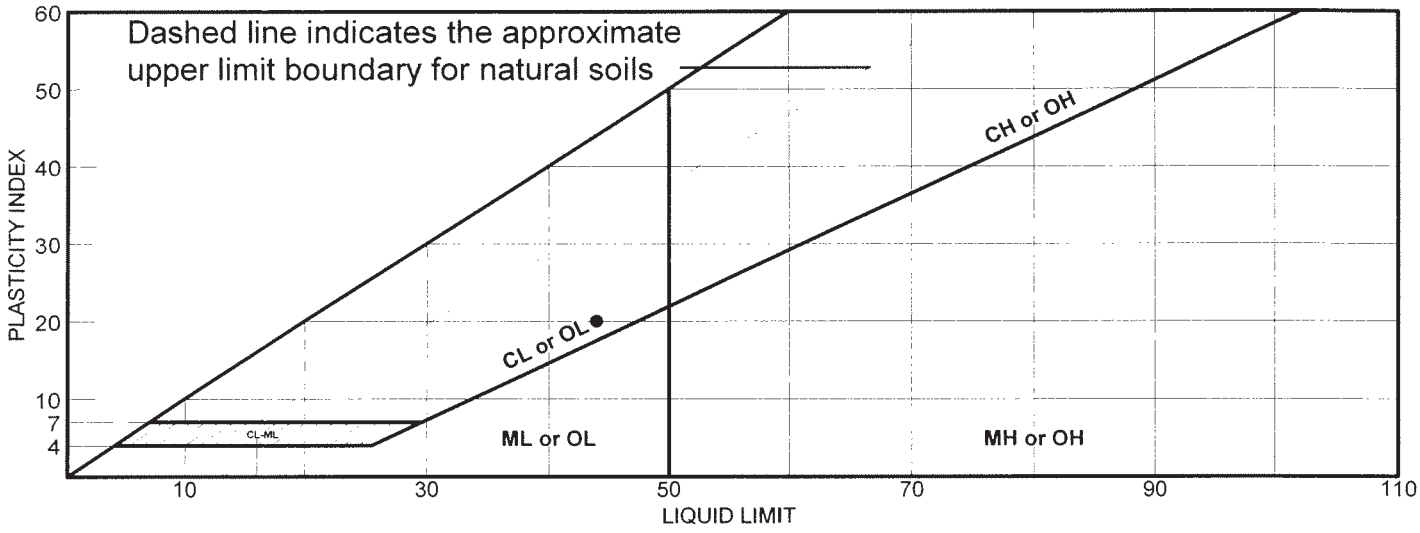
●

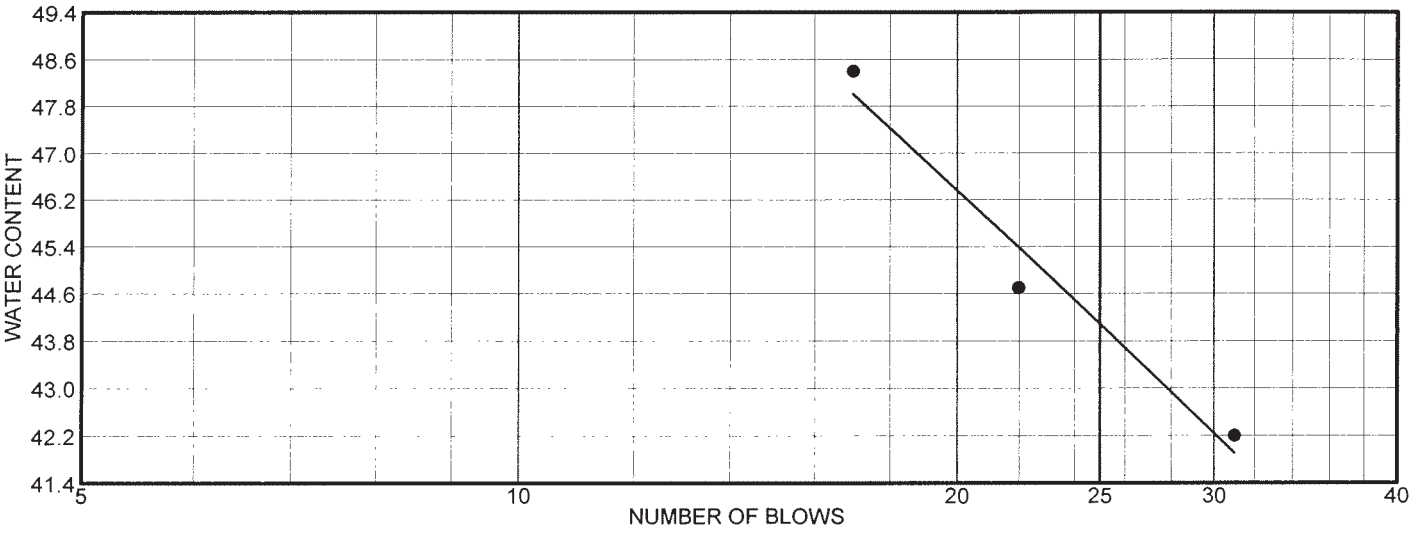
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive brown sandy lean clay	44	24	20			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 5-3 **Elev./Depth:** 21-21.5

Remarks:

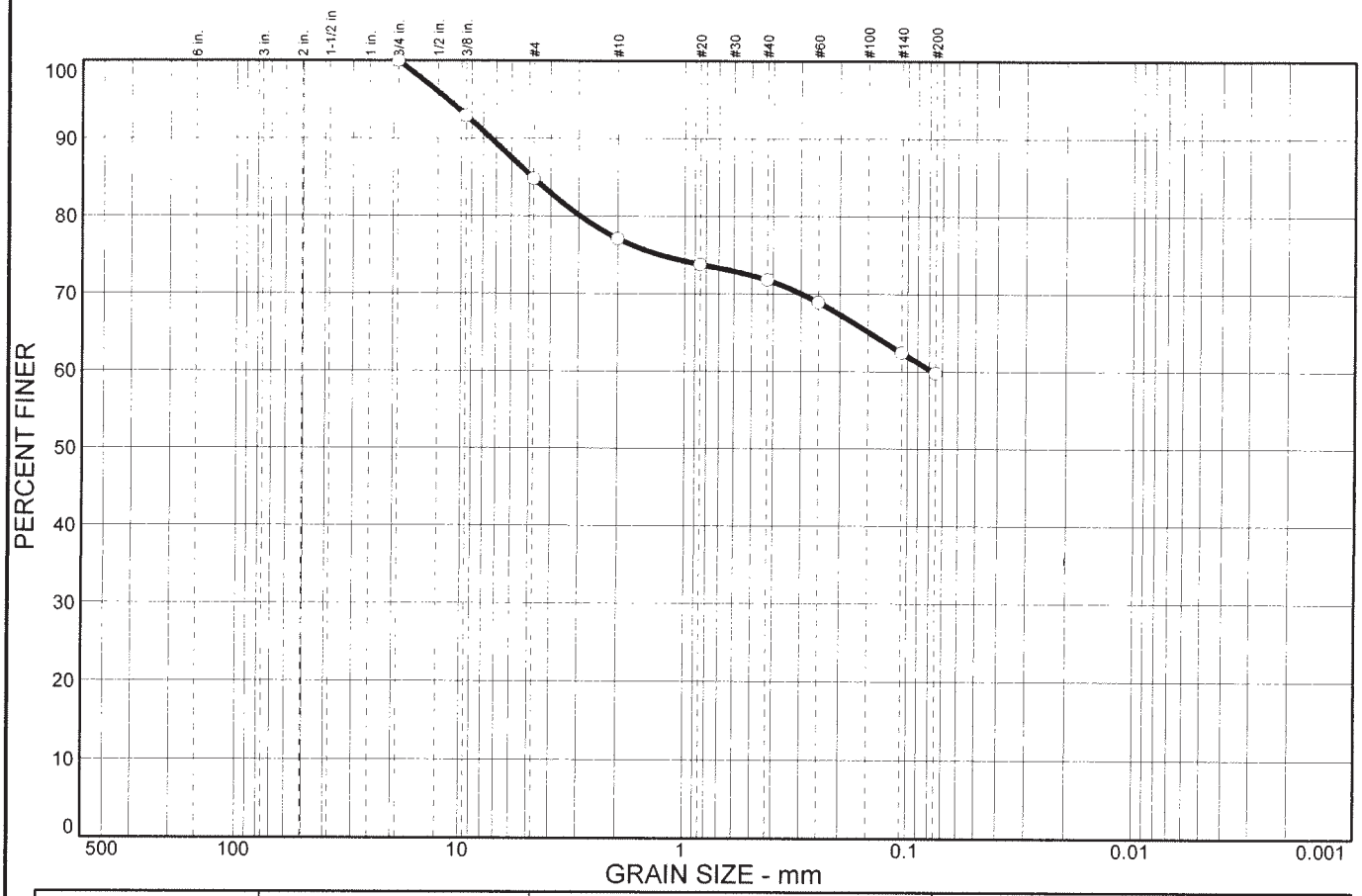
●

LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	15.2	7.7	5.3	12.0	59.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	92.9		
#4	84.8		
#10	77.1		
#20	73.8		
#40	71.8		
#60	68.9		
#140	62.4		
#200	59.8		

* (no specification provided)

Soil Description

Mottled brown sandy lean clay with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 4.84 D_{60}= 0.0770 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

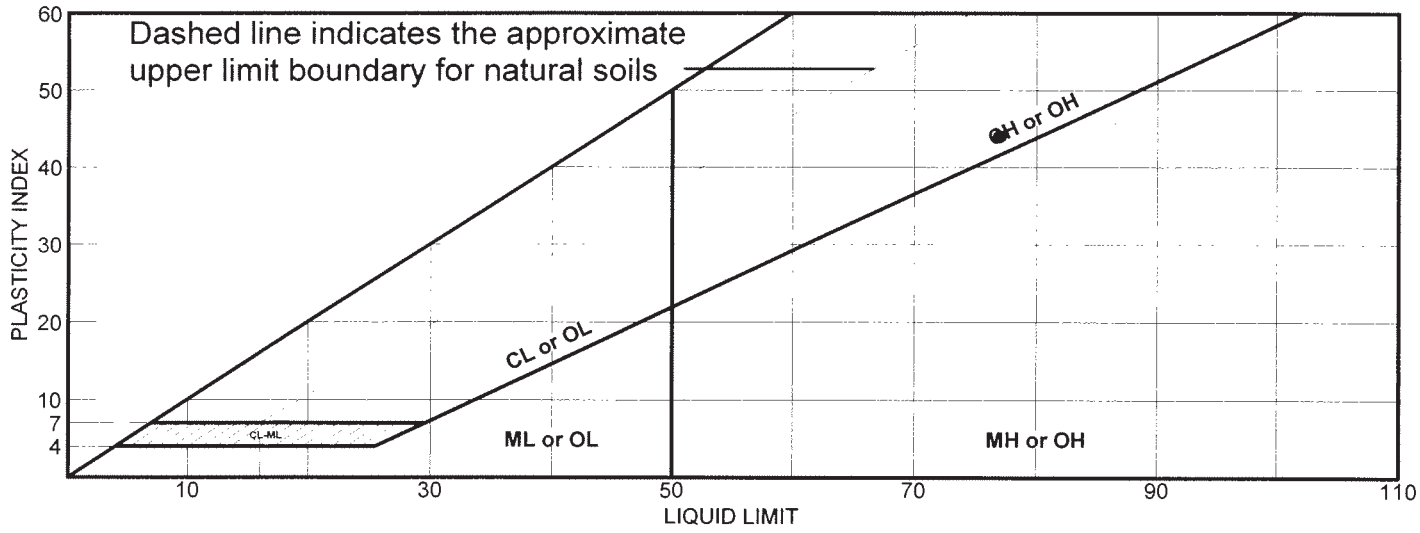
Remarks

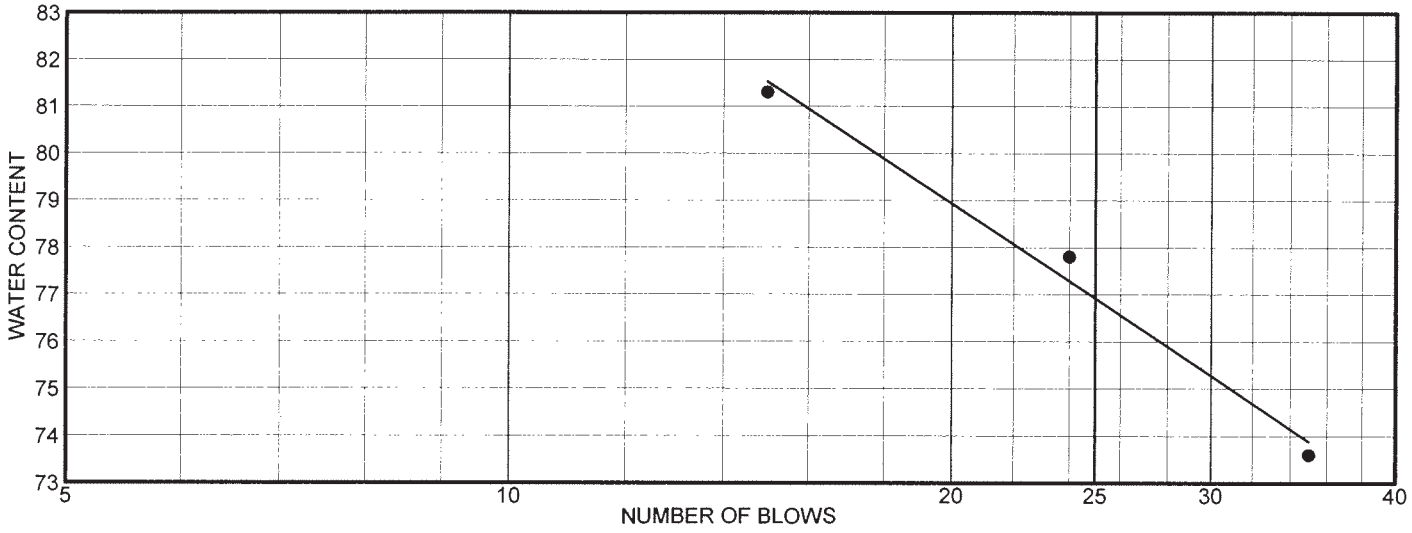
Sample No.: 2-1 **Source of Sample:** R-11-002 **Date:**
Location: **Elev./Depth:** 15-15.5

SIGNET Testing Labs

Client: URS
Project: I-880 @ 23rd and 29th Ave.
Project No: 27560836 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark reddish brown fat clay	77	33	44			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 8-2 **Elev./Depth:** 35.5-36

Remarks:

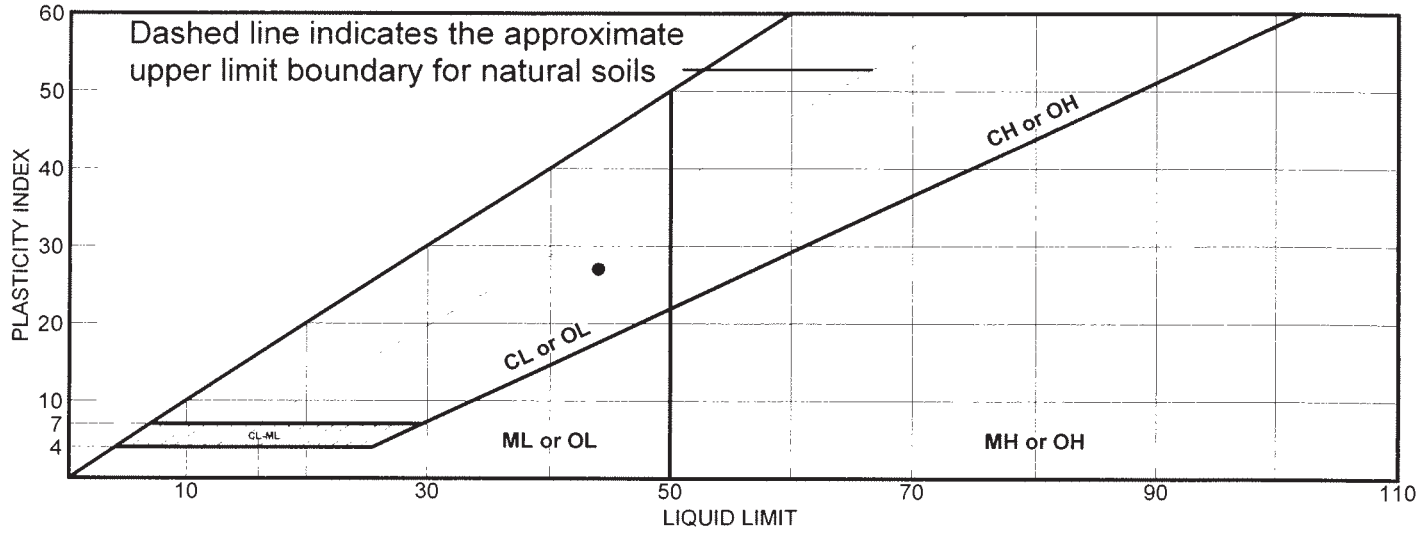
●

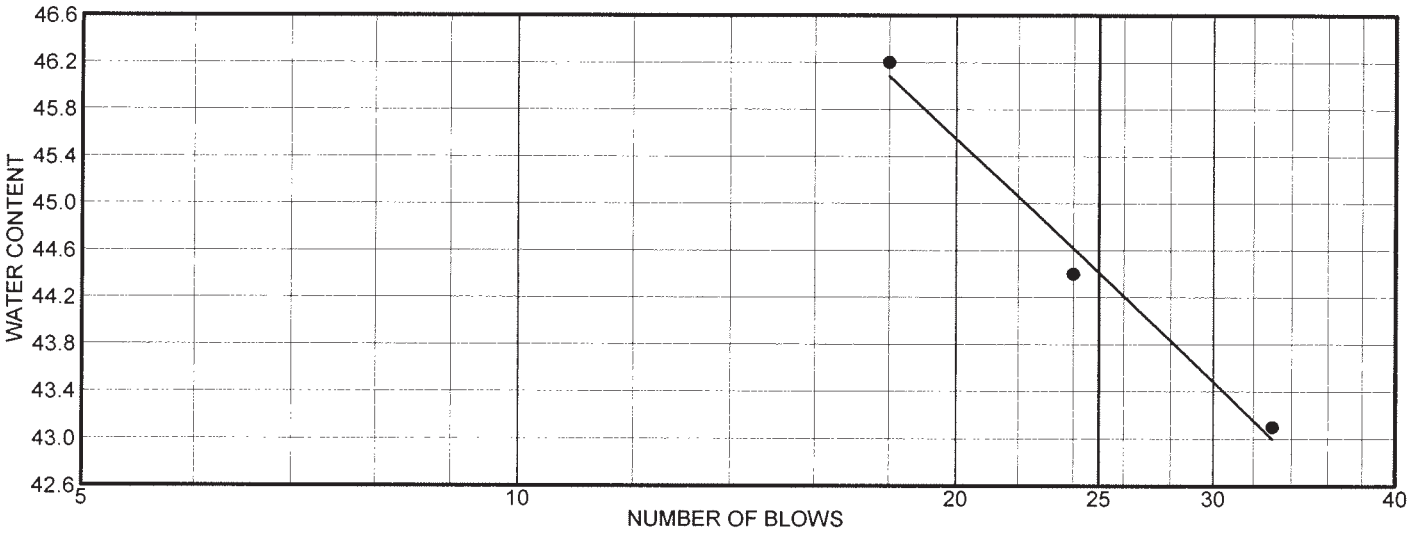
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	44	17	27			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-002 **Sample No.:** 5-3 **Elev./Depth:** 31-31.5

Remarks:

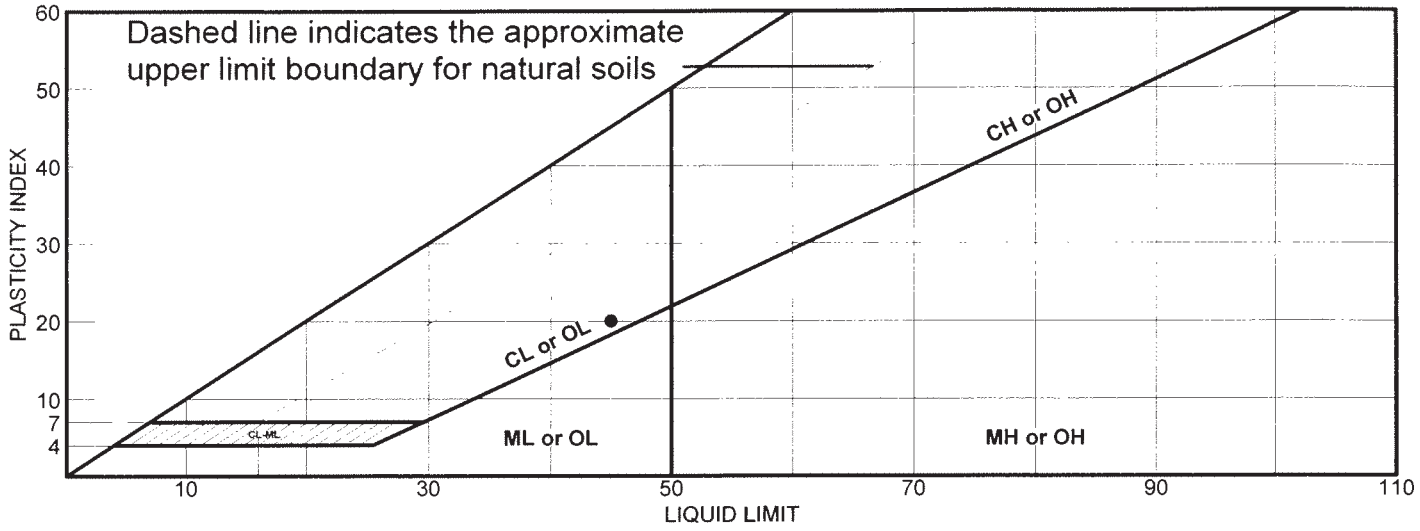
●

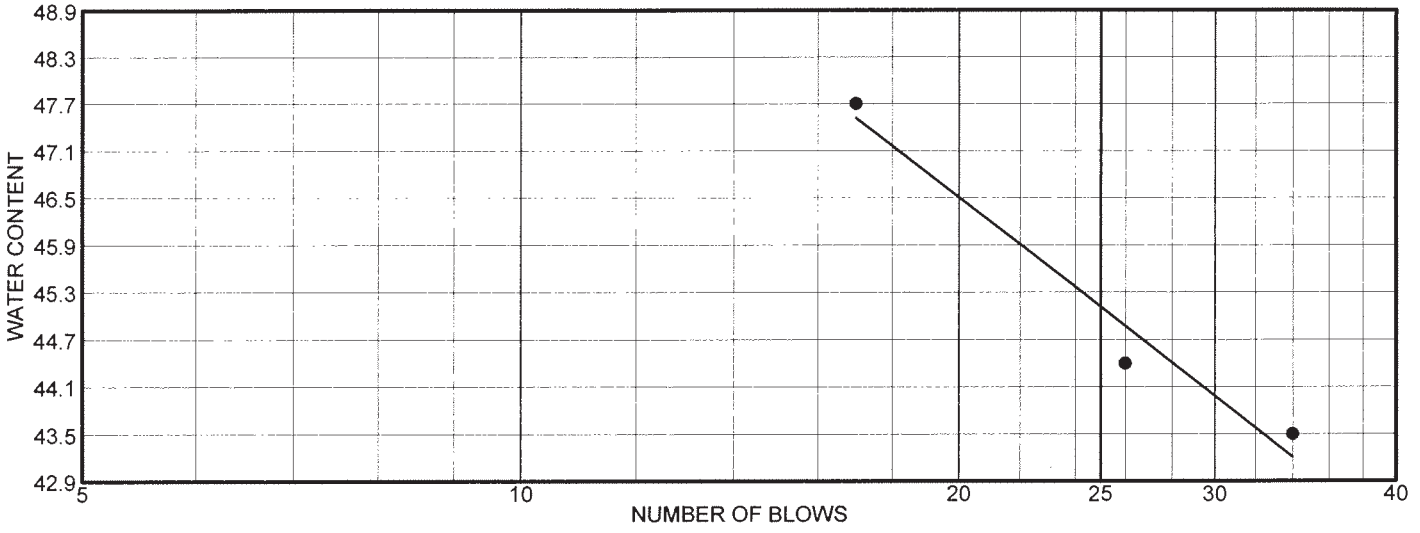
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	45	25	20			

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 12-3 **Elev./Depth:** 61-61.5

Remarks:

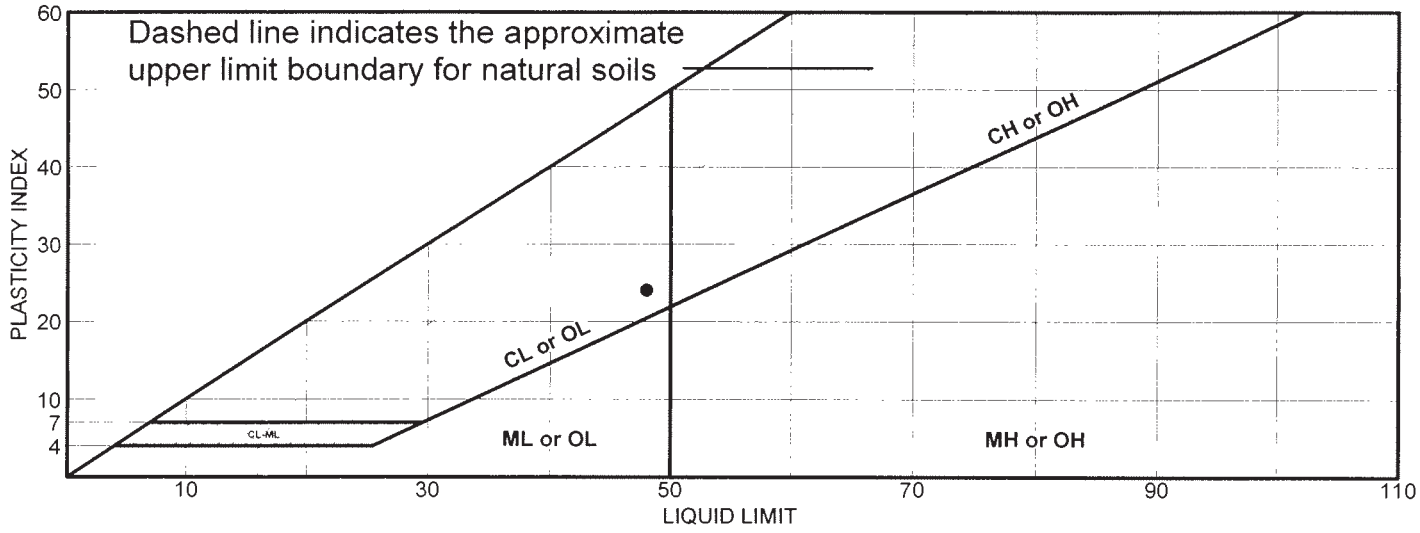
●

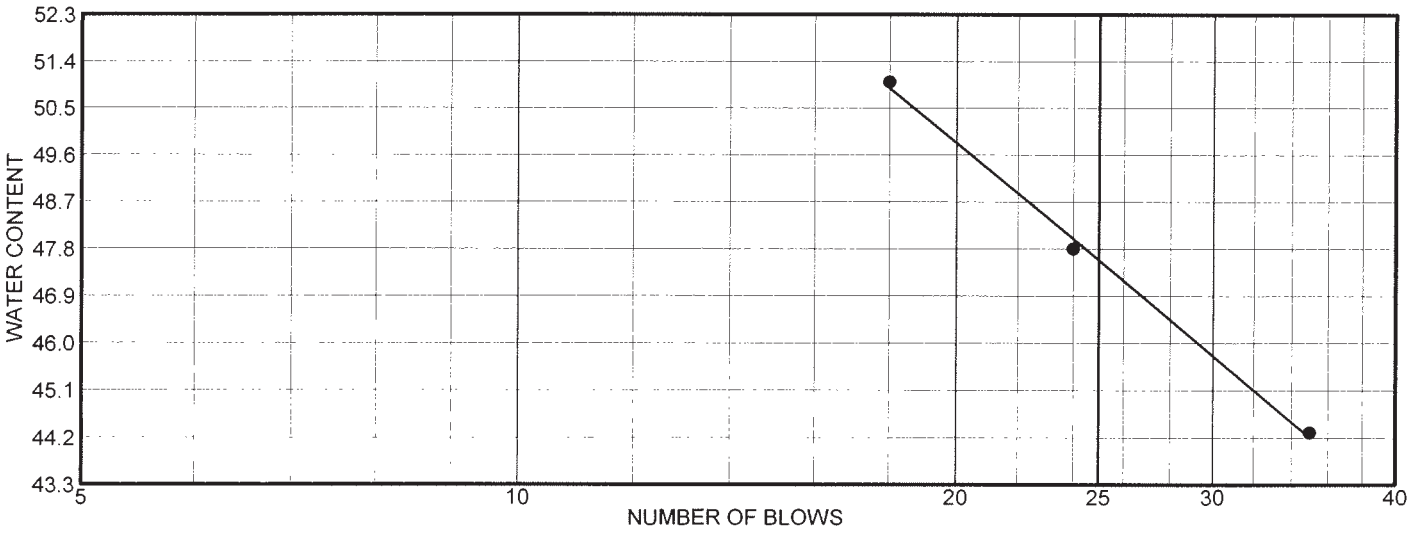
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark grayish brown lean clay with sand	48	24	24			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-005 **Sample No.:** 11-2 **Elev./Depth:** 50.5-51

Remarks:

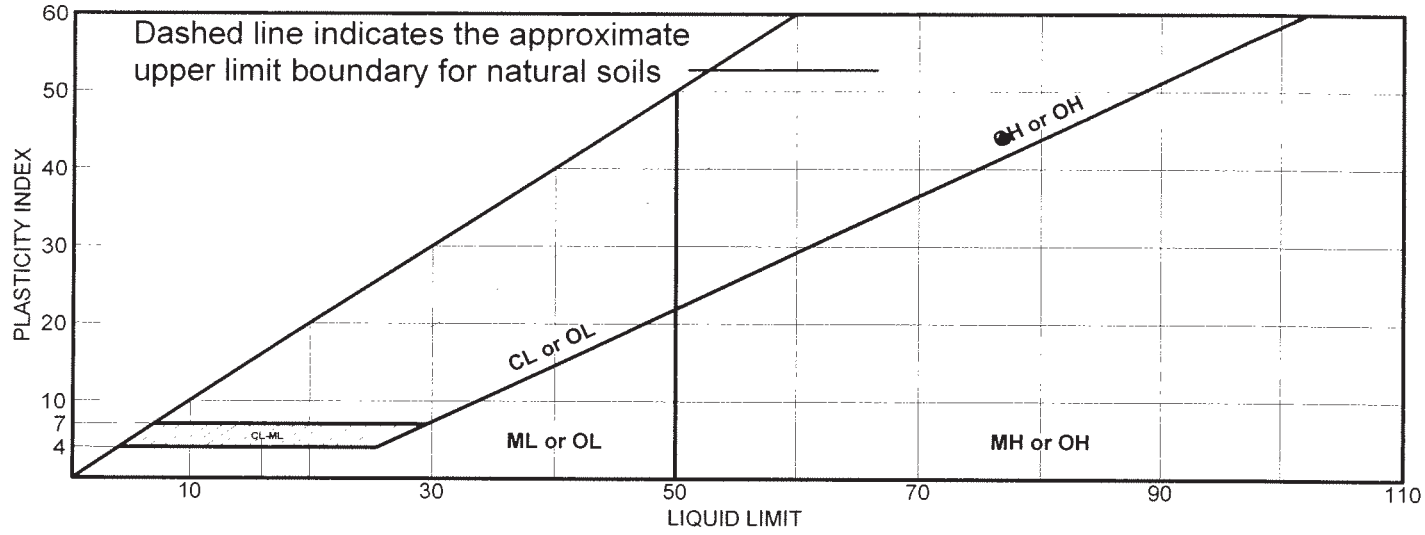
●

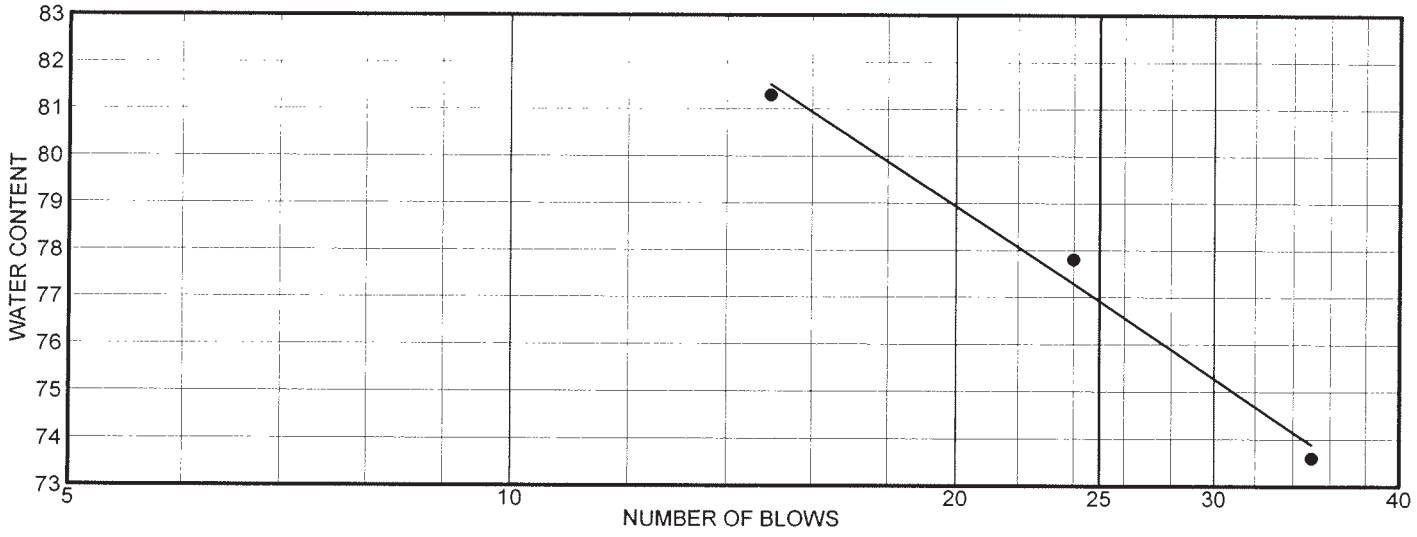
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark reddish brown fat clay	77	33	44			CH

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 8-2 **Elev./Depth:** 35.5-36

Remarks:

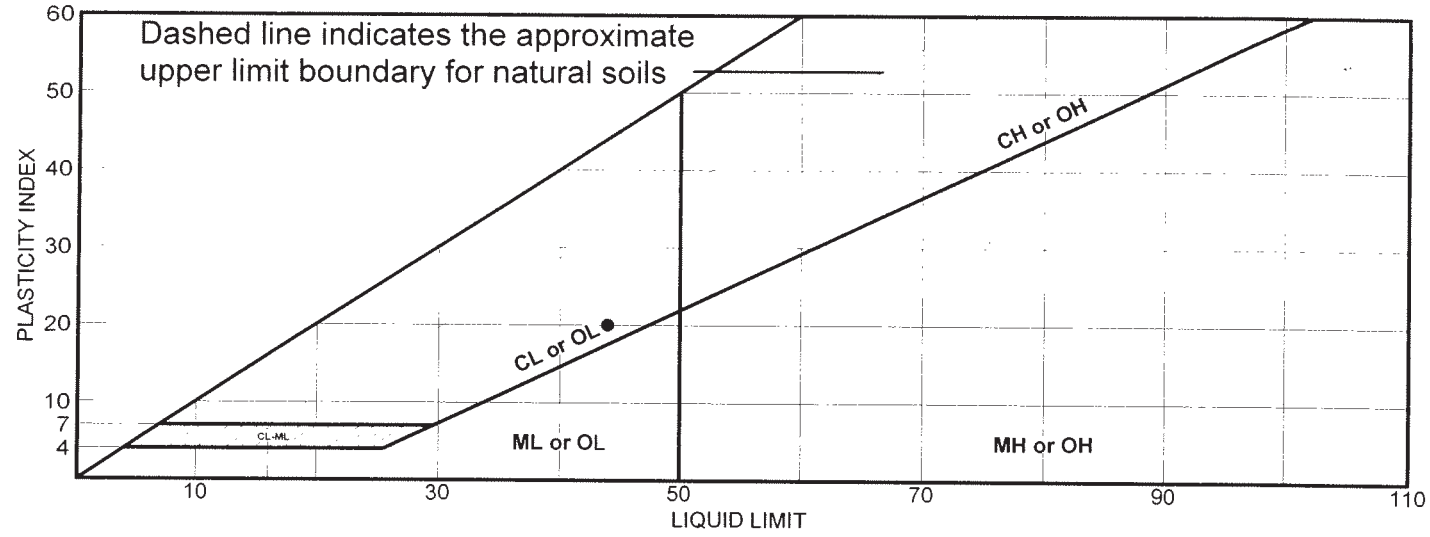
●

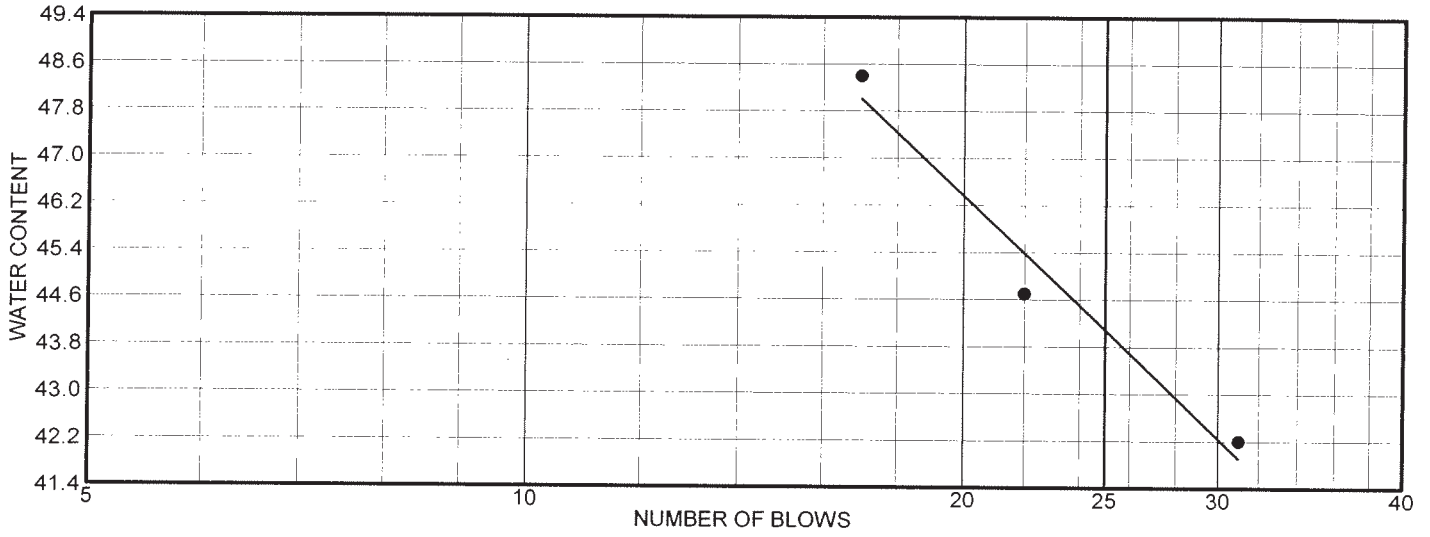
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive brown sandy lean clay	44	24	20			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-004 **Sample No.:** 5-3 **Elev./Depth:** 21-21.5

Remarks:

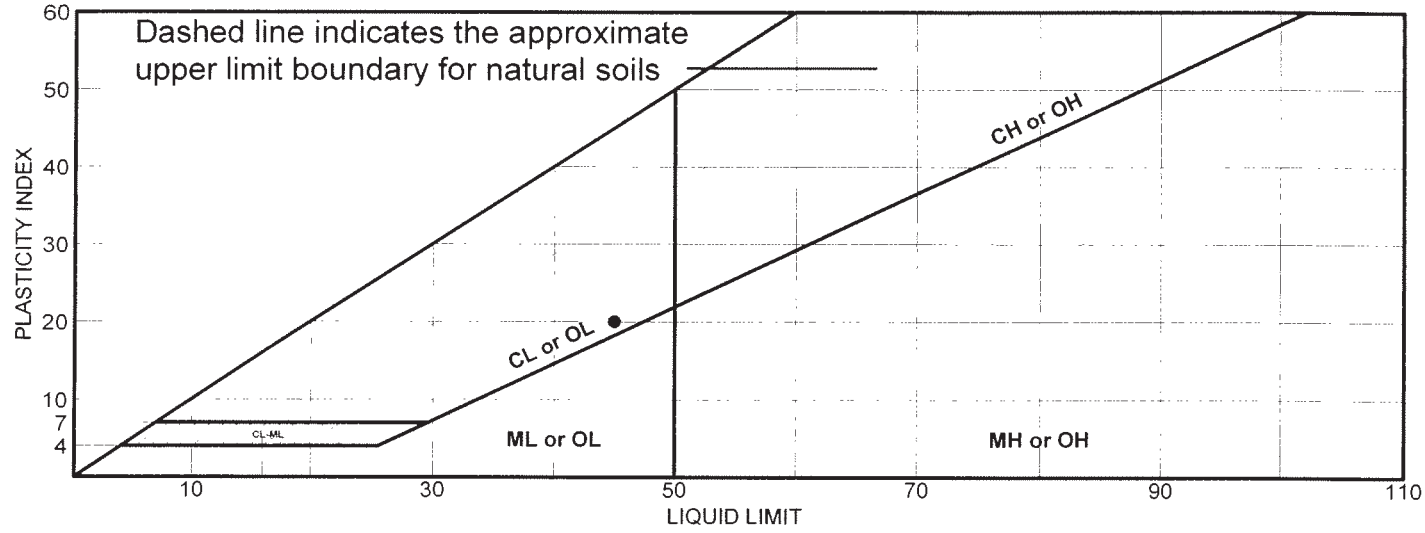
●

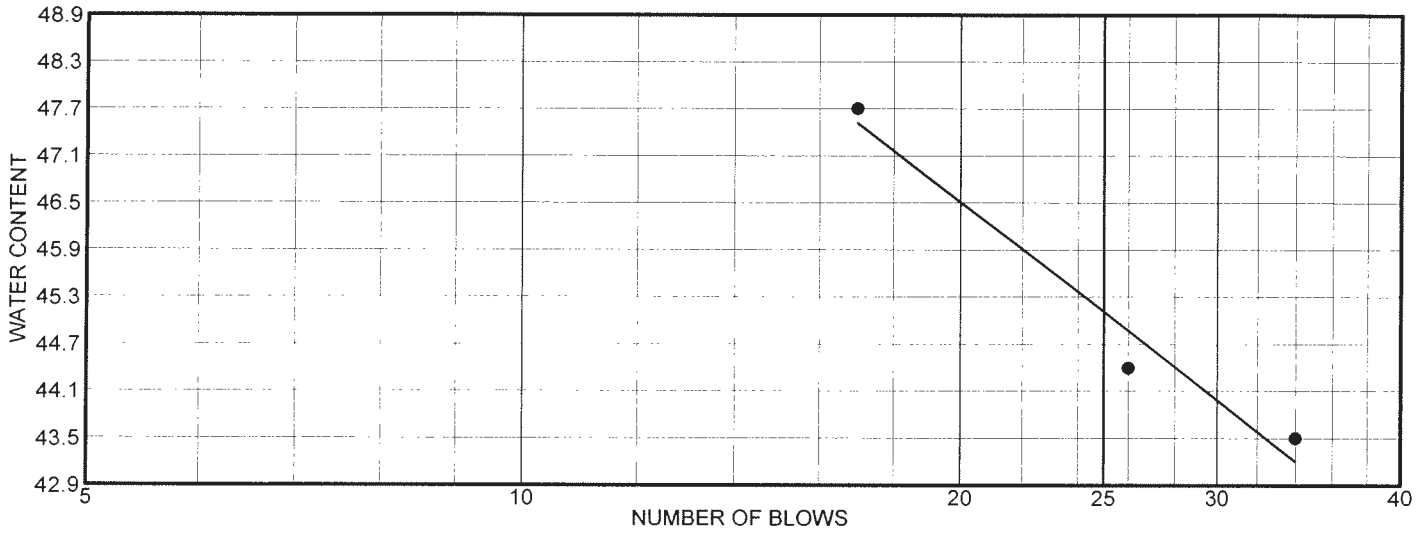
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	45	25	20			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 12-3 **Elev./Depth:** 61-61.5

Remarks:

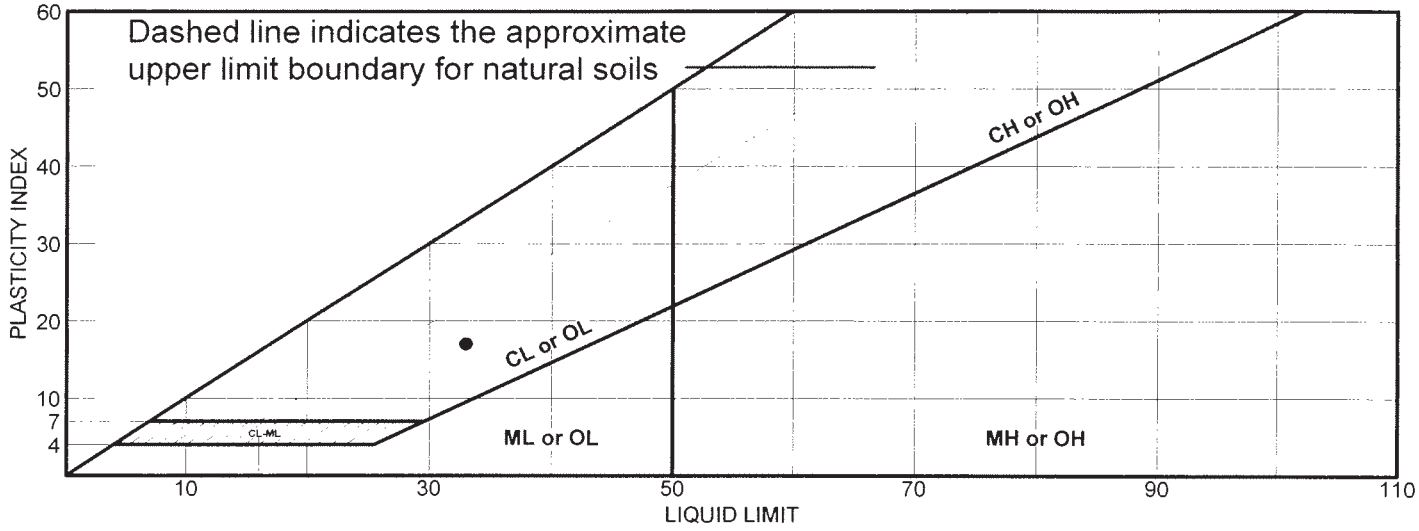
●

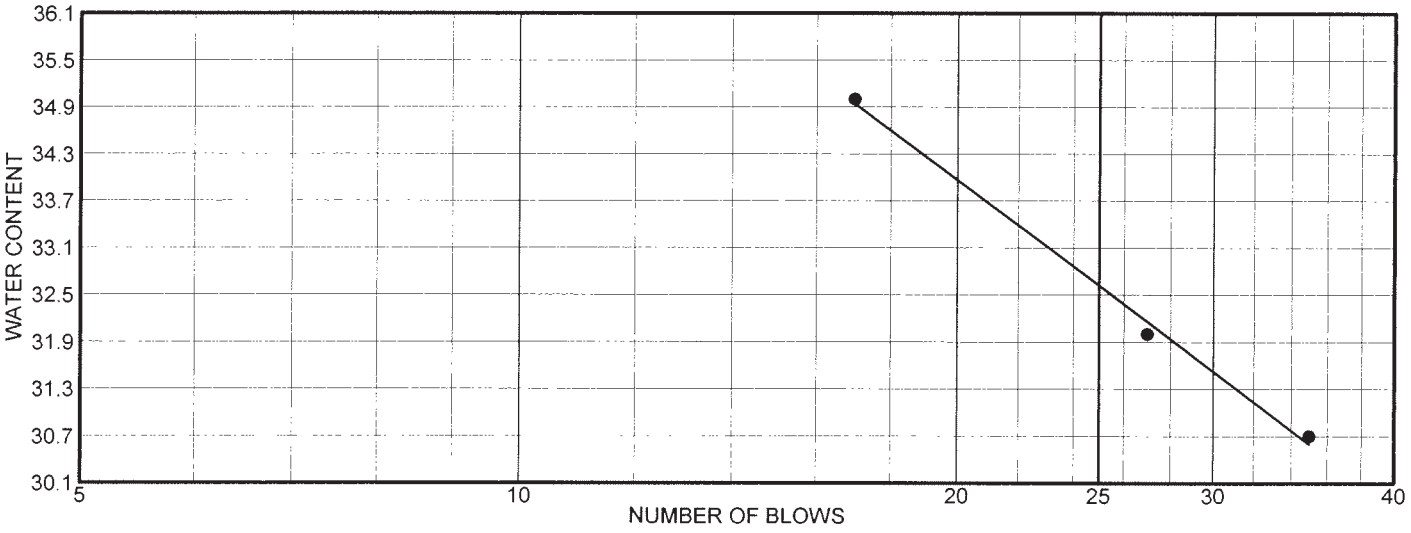
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay with sand	33	16	17			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-003 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

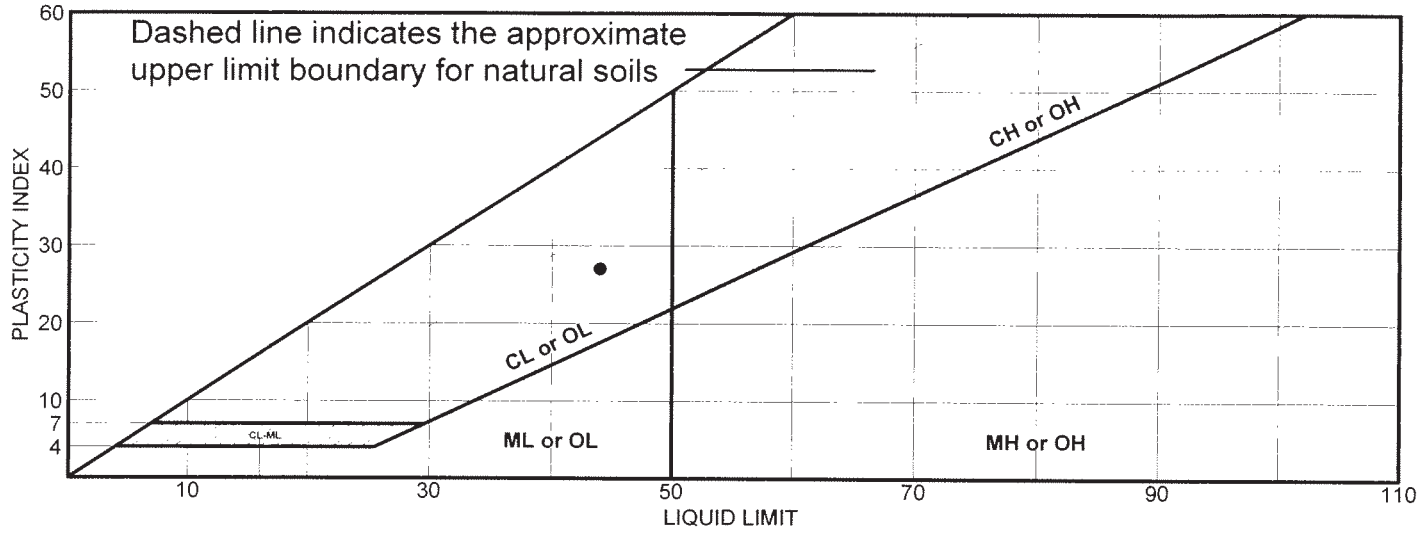
●

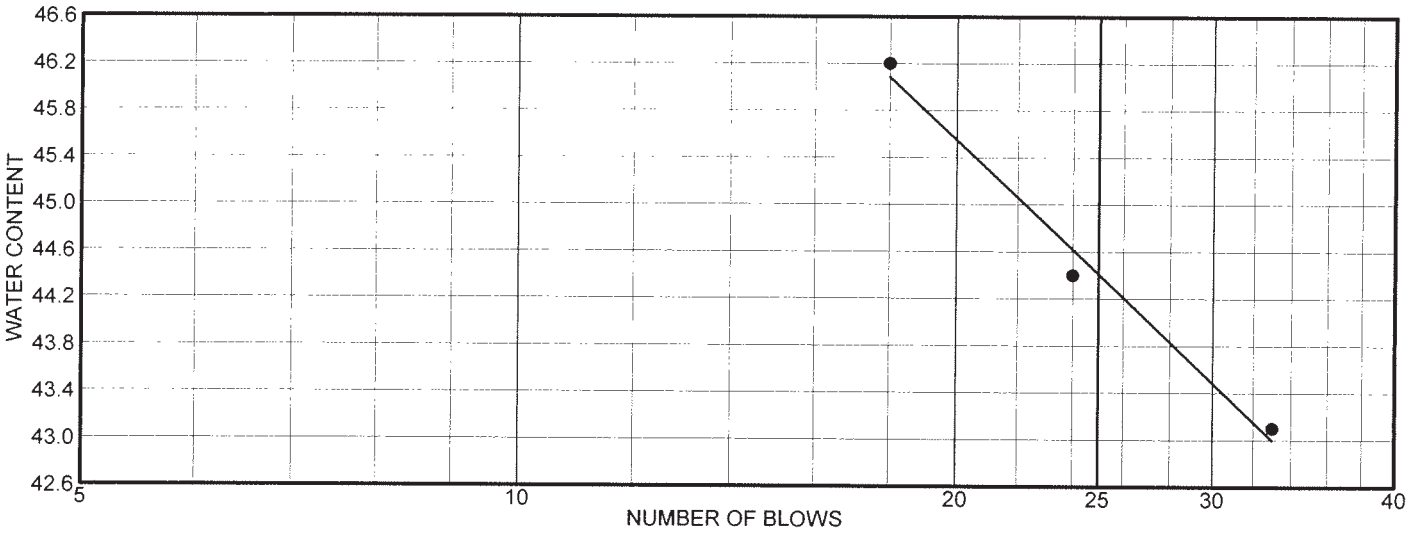
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown lean clay	44	17	27			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-002 **Sample No.:** 5-3 **Elev./Depth:** 31-31.5

Remarks:

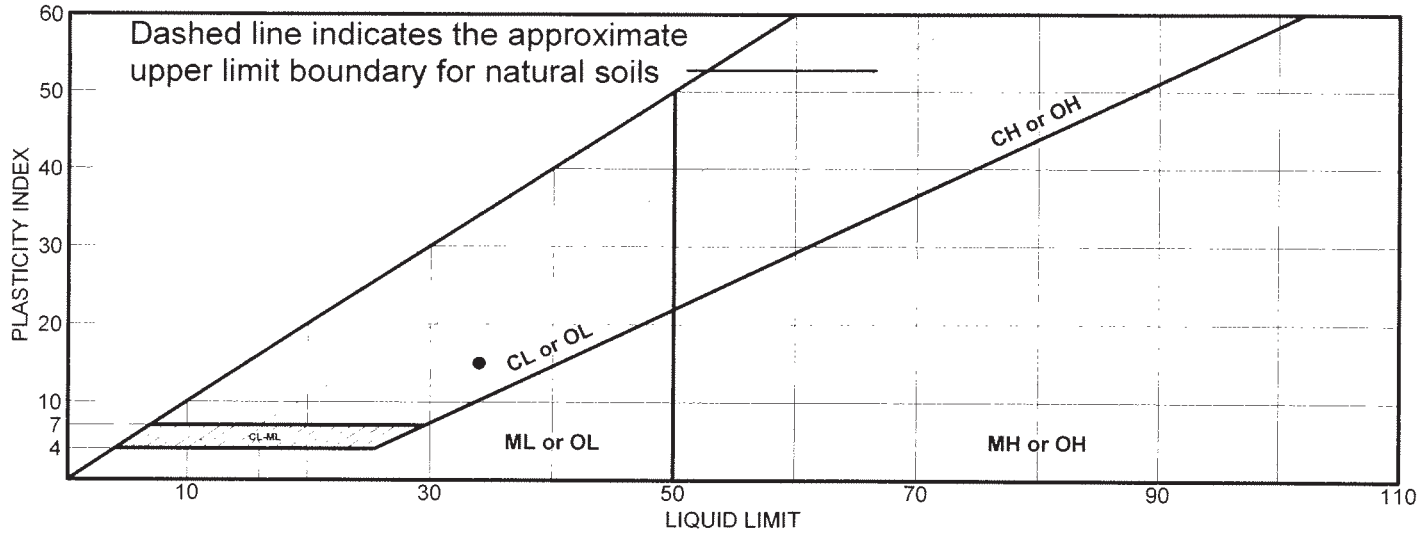
●

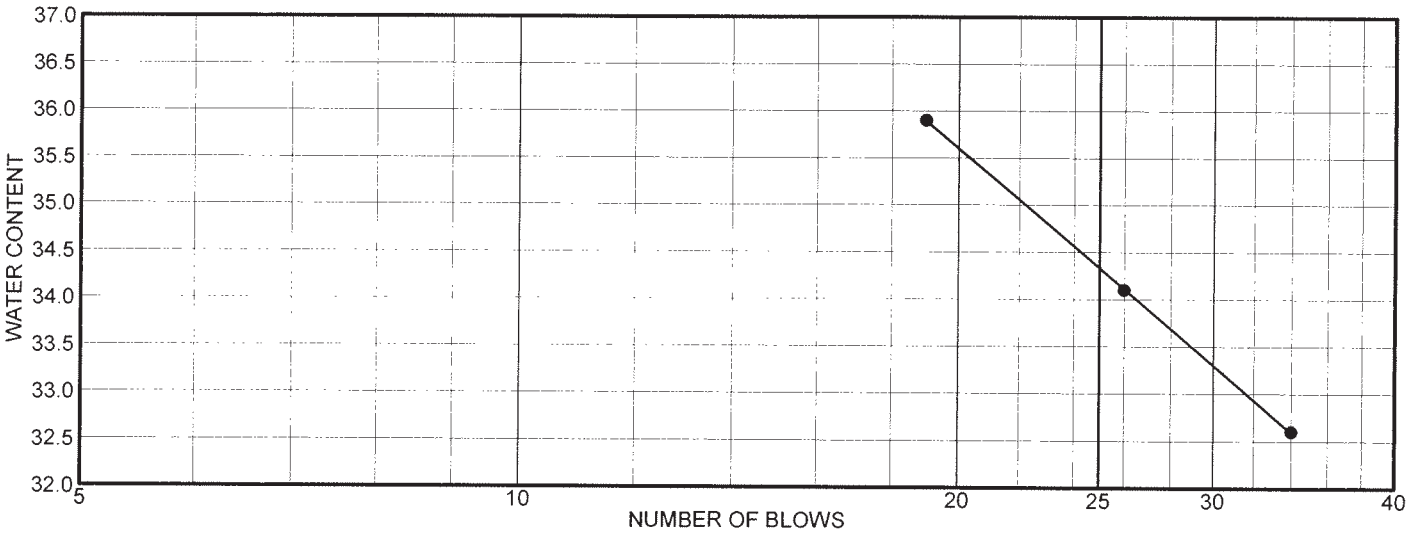
LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay	34	19	15			CL

Project No. 27560836 **Client:** URS

Project: I-880 @ 23rd and 29th Ave.

● **Source:** R-11-001 **Sample No.:** 4-2 **Elev./Depth:** 15.5-16

Remarks:

●

LIQUID AND PLASTIC LIMITS TEST REPORT

SIGNET TESTING LABS, INC.

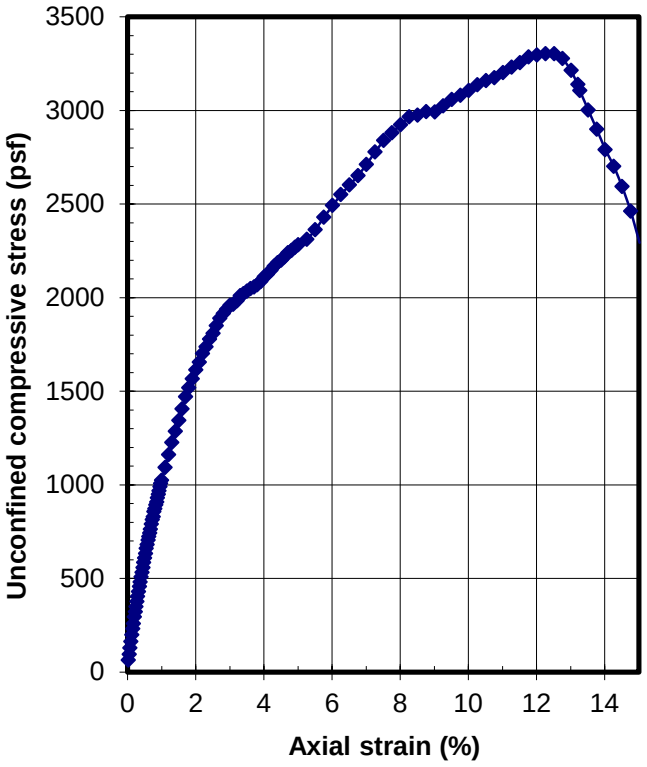
Figure

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-001
Sample No,	9-2
Depth (ft)	40.5-41
Date Tested	05/24/11
Soil Description	Undisturbed olive lean clay
Total wet weight	442.97 gms
Average Height	4.68 in
Average Diameter	1.92 in
Area	2.88 sq.in
Volume	220.77 c.c.
Void ratio	0.690
Ht/Dia ratio	2.44
Moisture	25.61 %
Wet density	125.26 pcf
Dry density	99.73 pcf
Saturation	100.2 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	3303 psf
Shear strength	1652 psf
Strain @ failure	12.52 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	63.13	1.60	1405.49	7.76	2881.05
0.05	93.94	1.70	1469.89	8.01	2923.60
0.07	129.12	1.80	1518.98	8.26	2965.38
0.10	163.42	1.90	1565.29	8.51	2975.14
0.13	198.83	2.00	1613.42	8.76	2993.29
0.15	231.18	2.11	1654.88	9.02	2992.00
0.17	258.44	2.20	1700.71	9.26	3024.21
0.20	294.67	2.31	1737.59	9.51	3058.16
0.23	321.11	2.40	1777.84	9.77	3080.70
0.25	348.49	2.51	1808.94	10.01	3106.87
0.27	376.42	2.61	1850.53	10.26	3137.03
0.30	404.66	2.71	1889.36	10.52	3159.74
0.32	429.86	2.81	1914.80	10.76	3173.96
0.35	456.81	2.90	1937.49	11.01	3201.17
0.37	481.36	3.01	1958.80	11.27	3230.54
0.40	508.62	3.11	1964.43	11.51	3254.37
0.42	532.81	3.21	1983.70	11.76	3284.66
0.45	558.06	3.31	2011.30	12.02	3295.94
0.47	584.59	3.40	2021.30	12.26	3302.78
0.50	609.15	3.51	2033.80	12.52	3303.38
0.53	632.11	3.61	2047.85	12.77	3277.61
0.55	660.01	3.71	2056.93	13.01	3214.02
0.57	681.30	3.81	2068.70	13.21	3137.76
0.60	704.90	3.90	2085.50	13.27	3106.06
0.63	722.77	4.01	2110.70	13.52	3001.19
0.65	741.92	4.11	2125.62	13.76	2899.26
0.67	762.83	4.21	2145.98	14.02	2790.15
0.70	789.78	4.31	2167.06	14.27	2701.62
0.73	813.82	4.41	2187.17	14.51	2592.45
0.75	829.61	4.51	2200.01	14.77	2461.21
0.77	857.50	4.61	2217.26	15.02	2293.21
0.80	871.93	4.71	2239.63		
0.83	893.14	4.81	2251.81		
0.85	908.90	4.91	2267.72		
0.87	929.62	5.01	2282.04		
0.90	948.39	5.26	2311.20		
0.93	968.35	5.51	2362.16		
0.95	990.30	5.76	2429.92		
0.97	1007.03	6.01	2492.29		
1.00	1023.79	6.26	2551.30		
1.10	1093.44	6.51	2601.02		
1.20	1160.59	6.76	2652.06		
1.30	1226.47	7.01	2711.47		
1.40	1286.03	7.26	2778.34		
1.50	1343.93	7.51	2838.57		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

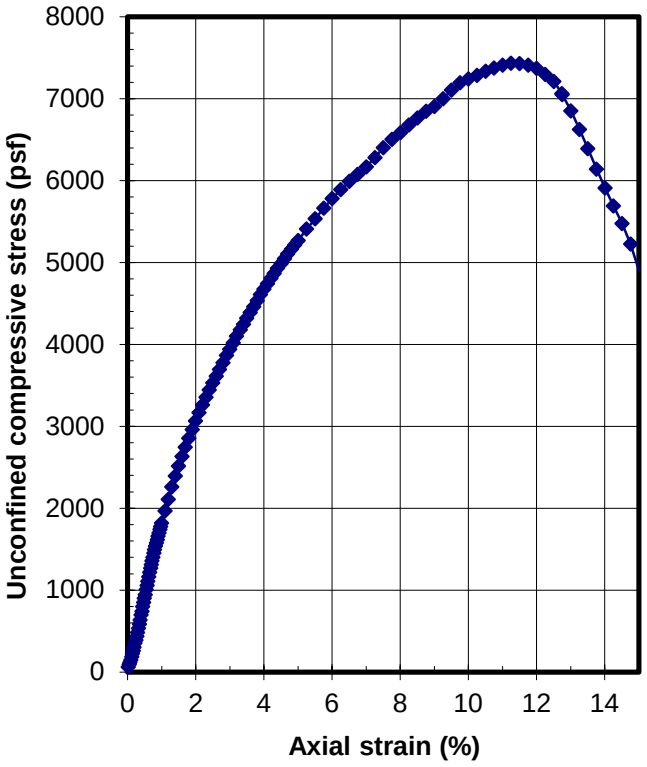
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-002
Sample No,	1-2
Depth (ft)	10.5-11
Date Tested	05/24/11
Soil Description	Undisturbed olive brown lean clay
Total wet weight	450.7 gms
Average Height	4.52 in
Average Diameter	1.92 in
Area	2.89 sq.in
Volume	213.78 c.c.
Void ratio	0.503
Ht/Dia ratio	2.36
Moisture	17.33 %
Wet density	131.62 pcf
Dry density	112.18 pcf
Saturation	93.1 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	7432 psf
Shear strength	3716 psf
Strain @ failure	11.26 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	58.83	1.60	2631.64	7.76	6502.31
0.05	89.87	1.70	2743.25	8.01	6582.49
0.07	113.73	1.79	2852.04	8.25	6675.94
0.09	144.64	1.90	2957.67	8.51	6763.89
0.12	183.82	2.00	3062.38	8.76	6843.95
0.15	222.94	2.10	3163.69	9.00	6905.67
0.17	260.62	2.20	3260.54	9.26	6998.19
0.19	302.82	2.30	3352.90	9.51	7102.83
0.22	351.66	2.40	3443.32	9.76	7192.41
0.25	389.48	2.50	3530.13	10.01	7238.84
0.27	436.14	2.60	3612.44	10.26	7282.39
0.29	482.80	2.70	3694.56	10.51	7335.10
0.32	533.08	2.80	3776.59	10.76	7373.21
0.35	582.38	2.90	3862.97	11.01	7408.45
0.37	634.78	3.00	3939.47	11.26	7431.88
0.39	695.70	3.10	4018.51	11.51	7425.96
0.42	738.66	3.20	4097.39	11.76	7409.35
0.45	798.11	3.30	4176.12	12.01	7370.50
0.47	848.42	3.40	4245.08	12.26	7294.55
0.49	899.02	3.50	4318.25	12.51	7209.34
0.52	944.05	3.60	4388.78	12.74	7060.45
0.55	1003.84	3.70	4457.99	12.76	7047.72
0.57	1054.88	3.80	4532.15	13.01	6850.10
0.59	1107.52	3.90	4606.23	13.26	6622.86
0.62	1160.56	4.01	4673.58	13.51	6388.46
0.65	1216.13	4.10	4738.98	13.76	6140.14
0.67	1264.93	4.21	4806.92	14.01	5908.19
0.69	1309.11	4.30	4866.59	14.26	5687.79
0.72	1358.50	4.40	4926.35	14.51	5473.91
0.75	1400.00	4.51	4984.77	14.76	5222.88
0.77	1450.26	4.60	5043.89	15.01	4895.63
0.79	1491.92	4.70	5101.81		
0.82	1535.10	4.81	5161.35		
0.85	1577.42	4.90	5213.68		
0.87	1616.15	5.01	5268.65		
0.89	1655.95	5.25	5409.63		
0.92	1696.46	5.51	5533.66		
0.95	1739.91	5.76	5661.86		
0.97	1773.70	6.00	5780.04		
0.99	1817.49	6.26	5889.06		
1.10	1965.76	6.51	5989.13		
1.20	2105.73	6.75	6074.02		
1.30	2257.79	7.01	6167.13		
1.40	2392.60	7.26	6279.44		
1.49	2514.16	7.50	6400.57		



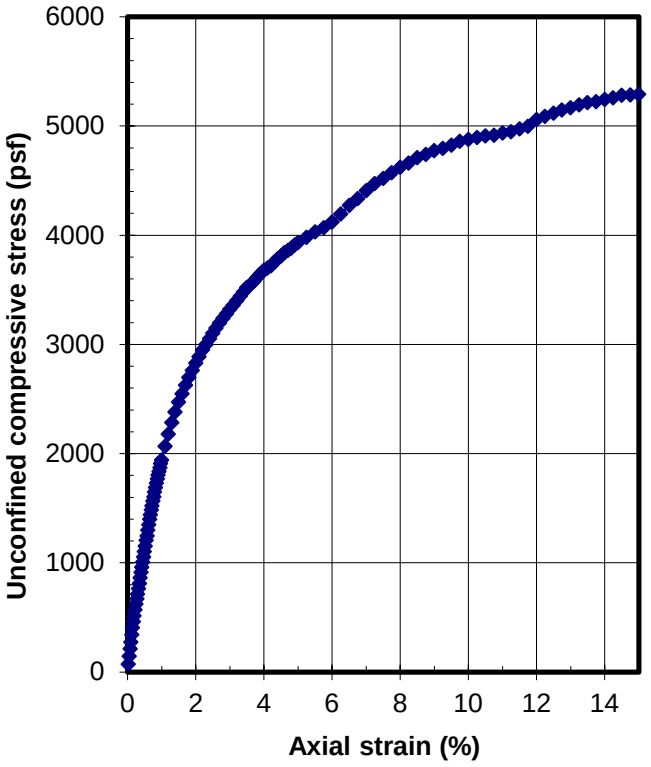
See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-003
Sample No,	11-3
Depth (ft)	51-51.5
Date Tested	05/24/11
Soil Description	Undisturbed grayish brown lean clay
Total wet weight	485.56 gms
Average Height	4.81 in
Average Diameter	1.93 in
Area	2.93 sq.in
Volume	231.31 c.c.
Void ratio	0.536
Ht/Dia ratio	2.49
Moisture	19.44 %
Wet density	131.05 pcf
Dry density	109.72 pcf
Saturation	97.9 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	5292 psf
Shear strength	2646 psf
Strain @ failure	15.00 %



Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	72.10	1.60	2546.79	7.75	4572.68
0.05	143.71	1.70	2625.63	8.01	4620.84
0.07	210.57	1.80	2697.15	8.25	4660.98
0.09	274.74	1.90	2762.22	8.50	4710.61
0.12	340.66	2.00	2828.05	8.75	4738.79
0.15	403.88	2.10	2887.42	9.00	4775.06
0.17	459.91	2.20	2947.66	9.25	4795.47
0.19	514.33	2.30	2998.94	9.50	4822.33
0.22	570.64	2.40	3049.53	9.75	4858.27
0.25	622.29	2.50	3100.73	10.00	4877.27
0.27	669.03	2.60	3147.33	10.25	4894.31
0.29	713.31	2.70	3193.26	10.50	4907.26
0.32	762.56	2.80	3238.90	10.75	4914.34
0.35	808.55	2.90	3278.80	11.00	4936.19
0.37	861.99	3.00	3320.18	11.25	4947.19
0.39	913.21	3.10	3358.88	11.50	4973.47
0.42	958.45	3.20	3400.49	11.75	4996.46
0.45	1004.49	3.31	3440.90	12.00	5057.01
0.47	1053.28	3.40	3477.92	12.25	5088.45
0.49	1101.60	3.50	3518.68	12.50	5116.21
0.52	1151.28	3.60	3546.02	12.75	5146.50
0.55	1203.75	3.70	3574.84	13.00	5164.94
0.57	1245.92	3.81	3612.49	13.25	5193.08
0.59	1299.02	3.90	3646.06	13.50	5214.14
0.62	1348.75	4.01	3677.21	13.75	5221.19
0.65	1397.44	4.10	3699.78	14.00	5241.23
0.67	1439.74	4.21	3719.66	14.25	5256.90
0.69	1482.60	4.30	3752.09	14.50	5281.06
0.72	1522.48	4.40	3781.16	14.75	5284.38
0.75	1565.20	4.51	3809.91	15.00	5289.69
0.77	1603.75	4.60	3839.43	15.00	5292.46
0.79	1648.59	4.71	3858.97		
0.82	1687.22	4.80	3879.84		
0.85	1730.90	4.90	3910.59		
0.87	1767.64	5.01	3931.96		
0.89	1803.50	5.25	3979.11		
0.92	1835.00	5.50	4029.84		
0.95	1870.49	5.76	4066.73		
0.97	1908.42	6.00	4120.77		
0.99	1941.34	6.25	4194.61		
1.10	2066.13	6.51	4273.18		
1.20	2176.49	6.75	4335.37		
1.30	2283.21	7.00	4408.66		
1.40	2379.99	7.26	4473.26		
1.50	2470.99	7.50	4517.98		

See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

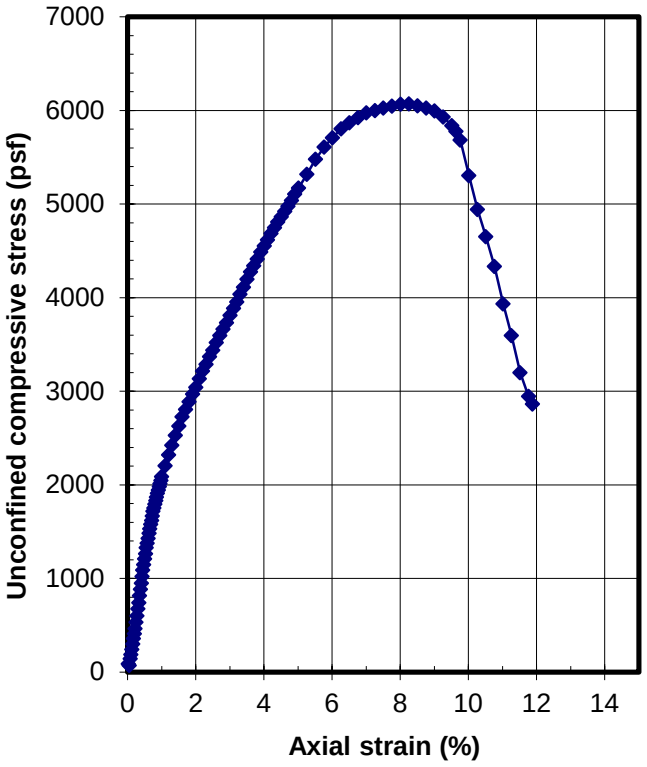
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-004
Sample No,	2-3
Depth (ft)	6-6.5
Date Tested	05/24/11
Soil Description	Undisturbed brown lean clay
Total wet weight	444.51 gms
Average Height	4.62 in
Average Diameter	1.90 in
Area	2.83 sq.in
Volume	213.97 c.c.
Void ratio	0.524
Ht/Dia ratio	2.43
Moisture	17.24 %
Wet density	129.69 pcf
Dry density	110.62 pcf
Saturation	88.9 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	6070 psf
Shear strength	3035 psf
Strain @ failure	8.26 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	87.96	1.60	2726.68	7.76	6046.02
0.05	67.92	1.70	2804.75	8.01	6064.21
0.07	142.18	1.80	2884.33	8.26	6069.95
0.10	185.72	1.91	2968.62	8.51	6049.66
0.12	240.85	2.00	3038.32	8.76	6024.17
0.15	299.11	2.11	3131.31	9.01	5993.00
0.18	355.22	2.20	3215.26	9.26	5929.88
0.20	409.32	2.30	3284.38	9.52	5834.95
0.22	463.46	2.41	3369.34	9.63	5774.13
0.25	531.97	2.50	3435.85	9.76	5682.34
0.28	600.69	2.61	3518.00	10.01	5303.76
0.30	676.04	2.70	3593.16	10.27	4938.83
0.33	740.86	2.80	3661.95	10.51	4651.54
0.35	816.03	2.91	3728.71	10.77	4331.33
0.38	882.53	3.00	3807.96	11.02	3932.68
0.40	948.84	3.11	3883.68	11.26	3594.22
0.43	1017.93	3.21	3952.63	11.52	3197.44
0.45	1086.89	3.30	4034.29	11.77	2945.74
0.48	1146.09	3.41	4108.82	11.88	2861.76
0.50	1208.57	3.50	4193.91		
0.53	1260.86	3.61	4273.44		
0.55	1325.62	3.71	4340.06		
0.58	1375.51	3.81	4410.94		
0.60	1427.13	3.91	4484.55		
0.63	1482.22	4.01	4549.36		
0.65	1527.47	4.11	4615.15		
0.68	1577.42	4.21	4684.17		
0.70	1616.78	4.31	4745.71		
0.73	1664.19	4.41	4805.66		
0.75	1715.42	4.51	4861.20		
0.78	1750.05	4.61	4920.47		
0.80	1793.70	4.71	4974.34		
0.83	1828.56	4.81	5035.63		
0.85	1867.14	4.91	5105.44		
0.88	1909.17	5.01	5168.53		
0.90	1943.24	5.26	5315.02		
0.93	1979.11	5.51	5476.89		
0.95	2012.54	5.76	5606.67		
0.98	2046.82	6.01	5707.32		
1.00	2086.90	6.26	5801.72		
1.10	2203.40	6.51	5867.93		
1.20	2319.51	6.76	5920.05		
1.30	2422.09	7.01	5971.08		
1.41	2525.96	7.26	5998.28		
1.50	2624.57	7.51	6023.80		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

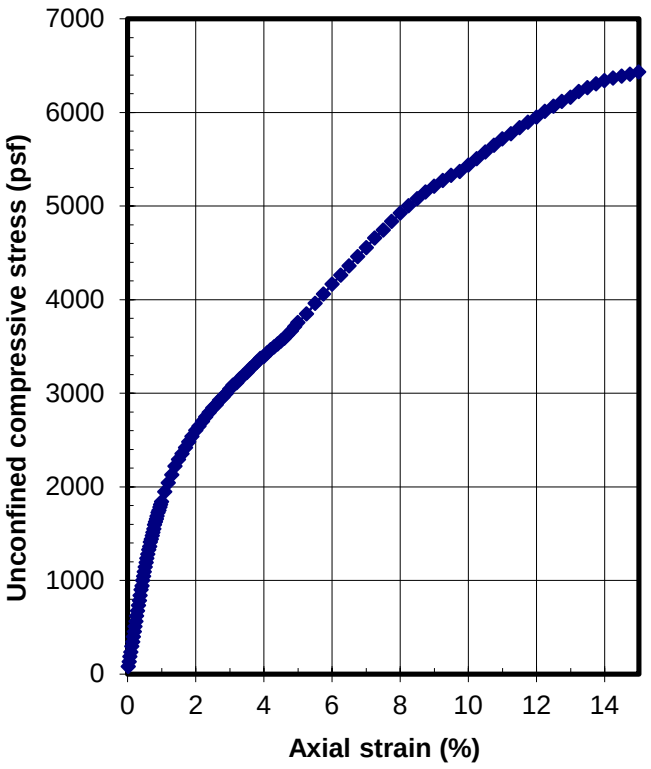
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-005
Sample No,	2-2
Depth (ft)	5.5-6
Date Tested	05/25/11
Soil Description	Undisturbed brown lean clay
Total wet weight	466.99 gms
Average Height	4.71 in
Average Diameter	1.92 in
Area	2.90 sq.in
Volume	223.59 c.c.
Void ratio	0.493
Ht/Dia ratio	2.45
Moisture	15.51 %
Wet density	130.39 pcf
Dry density	112.89 pcf
Saturation	84.9 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	6431 psf
Shear strength	3216 psf
Strain @ failure	15.00 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	78.35	1.60	2354.22	7.75	4833.76
0.05	132.25	1.70	2418.11	8.00	4922.66
0.07	186.79	1.80	2479.95	8.25	5003.11
0.10	234.69	1.89	2536.87	8.50	5077.80
0.12	293.97	2.00	2600.95	8.75	5150.07
0.15	341.24	2.10	2647.60	9.00	5210.36
0.17	397.02	2.20	2696.37	9.25	5270.42
0.20	453.61	2.30	2746.29	9.50	5325.49
0.22	507.97	2.40	2793.90	9.75	5366.80
0.25	560.55	2.50	2842.38	10.00	5434.86
0.27	620.54	2.60	2876.15	10.25	5503.58
0.30	673.20	2.70	2923.95	10.50	5576.24
0.32	732.44	2.80	2956.72	10.75	5648.36
0.35	782.39	2.90	2998.44	11.00	5716.08
0.37	838.12	3.00	3044.80	11.25	5772.57
0.40	898.60	3.10	3083.81	11.50	5836.01
0.42	940.40	3.20	3113.31	11.75	5895.50
0.45	997.66	3.30	3152.75	12.00	5949.12
0.47	1043.25	3.40	3185.49	12.25	6008.94
0.50	1092.51	3.50	3220.18	12.50	6064.20
0.52	1143.65	3.60	3261.28	12.75	6117.15
0.55	1190.43	3.70	3295.78	13.00	6159.69
0.57	1234.26	3.80	3330.98	13.25	6223.35
0.60	1278.13	3.90	3371.15	13.50	6262.48
0.62	1327.65	4.00	3393.09	13.75	6305.93
0.65	1362.07	4.10	3429.23	14.00	6337.28
0.67	1409.28	4.20	3462.39	14.25	6364.29
0.70	1441.68	4.30	3496.06	14.50	6387.01
0.72	1478.77	4.40	3525.87	14.75	6406.82
0.75	1511.94	4.50	3555.97	15.00	6431.15
0.77	1549.06	4.60	3586.11	15.01	6430.22
0.80	1592.76	4.70	3625.27		
0.82	1623.14	4.81	3666.68		
0.85	1654.68	4.90	3711.34		
0.87	1687.08	5.00	3755.93		
0.90	1724.48	5.25	3847.17		
0.92	1748.52	5.50	3959.09		
0.95	1782.30	5.75	4059.05		
0.97	1809.60	6.00	4162.96		
1.00	1838.50	6.25	4260.37		
1.09	1945.65	6.50	4360.29		
1.20	2041.31	6.75	4457.84		
1.30	2127.67	7.00	4554.39		
1.39	2219.31	7.25	4658.16		
1.50	2292.38	7.50	4741.22		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

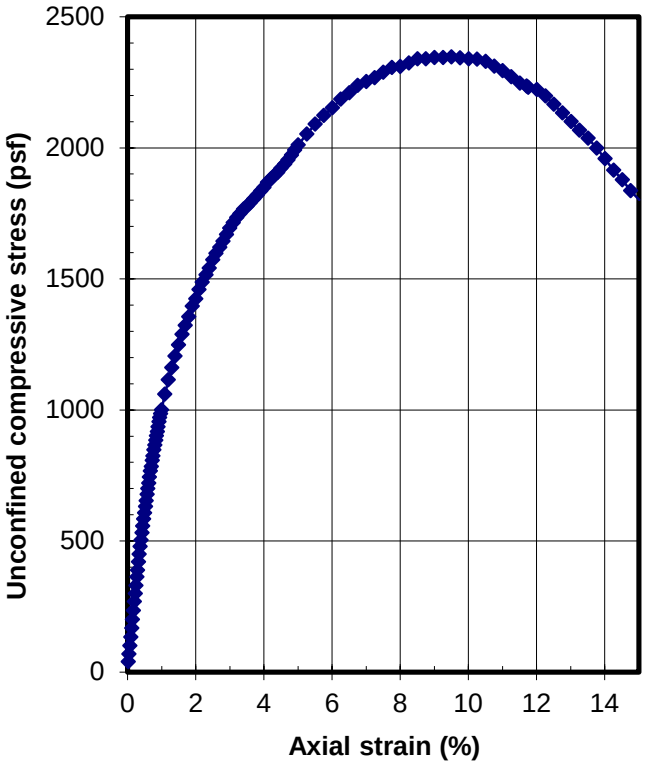
Signet Testing Labs, Inc.

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
ASTM D-2166

Client	URS
Project Name	I-880 @ 23rd and 29th Ave.
Project No.	27560836
Boring No.	R-11-005
Sample No,	6-2
Depth (ft)	25.5-26
Date Tested	05/24/11
Soil Description	Undisturbed brown lean clay
Total wet weight	444.18 gms
Average Height	4.56 in
Average Diameter	1.93 in
Area	2.93 sq.in
Volume	218.49 c.c.
Void ratio	0.622
Ht/Dia ratio	2.36
Moisture	22.11 %
Wet density	126.92 pcf
Dry density	103.94 pcf
Saturation	96.0 %
Gs (assumed)	2.70

Shearing rate	0.06 inch/min
Shearing rate	0.75 %/min
Unconfined compressive strength	2347 psf
Shear strength	1173 psf
Strain @ failure	9.51 %

Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.02	39.92	1.60	1288.13	7.76	2306.99
0.04	68.49	1.69	1322.39	8.01	2310.03
0.07	99.95	1.80	1356.00	8.26	2323.78
0.10	133.32	1.90	1395.20	8.51	2338.98
0.12	167.27	2.00	1424.26	8.76	2339.46
0.14	201.04	2.10	1459.68	9.01	2343.75
0.17	234.50	2.20	1487.37	9.26	2343.95
0.20	268.41	2.30	1514.89	9.51	2346.53
0.22	299.16	2.40	1541.32	9.76	2343.50
0.24	330.15	2.50	1572.38	10.01	2339.68
0.27	362.94	2.60	1596.59	10.26	2337.80
0.30	388.78	2.70	1620.09	10.51	2329.45
0.32	420.34	2.80	1643.17	10.76	2311.41
0.34	450.14	2.90	1668.73	11.01	2294.68
0.37	479.10	3.00	1693.28	11.26	2270.99
0.40	503.19	3.10	1713.89	11.51	2247.00
0.42	531.38	3.20	1733.67	11.71	2235.40
0.44	556.91	3.30	1748.75	11.76	2231.41
0.47	584.16	3.41	1765.28	12.01	2222.23
0.50	607.48	3.50	1776.34	12.26	2197.42
0.52	631.65	3.60	1790.58	12.51	2165.72
0.54	653.34	3.70	1804.96	12.76	2132.96
0.57	677.38	3.80	1819.76	13.01	2099.92
0.60	699.64	3.91	1835.78	13.26	2067.12
0.62	720.95	4.00	1848.59	13.51	2036.35
0.64	743.34	4.11	1868.81	13.76	1999.10
0.67	766.43	4.20	1880.68	14.01	1958.28
0.70	783.95	4.31	1894.56	14.26	1914.41
0.72	807.73	4.41	1905.61	14.52	1878.16
0.74	824.87	4.50	1921.87	14.76	1836.25
0.77	847.30	4.61	1937.49	15.01	1802.04
0.80	865.38	4.71	1953.57		
0.82	884.61	4.81	1971.42		
0.85	901.12	4.91	1991.84		
0.87	917.22	5.00	2010.81		
0.90	935.86	5.26	2053.05		
0.92	954.91	5.51	2089.89		
0.94	970.90	5.76	2122.80		
0.97	985.16	6.01	2152.89		
1.00	1000.47	6.26	2185.26		
1.10	1060.26	6.51	2210.50		
1.20	1115.04	6.76	2238.24		
1.30	1161.27	7.01	2252.90		
1.39	1205.61	7.26	2267.81		
1.50	1247.95	7.51	2287.70		



See worksheet for failure sketch, remarks and whether moisture content was obtained from entire sample

Signet Testing Labs, Inc.

UNCONFINED COMPRESSION TEST - Uc
ASTM D-2166

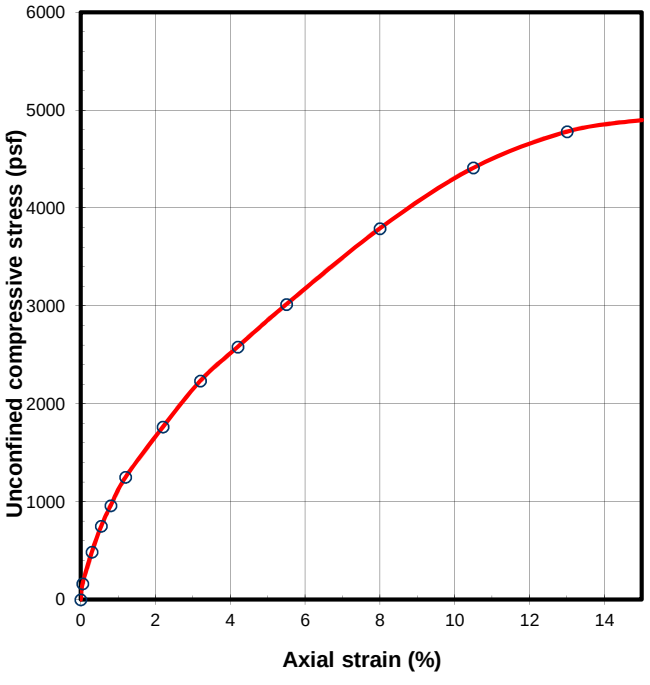
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job No. : 27560836
Boring # : R-12-012
Sample # : 3-2
Depth (ft) : 75.5-76
Date tested : 04/18/12
Soil (Visual Description) : Grayish brown lean clay with sand

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 802.7 gms
Ht. = 5.28 in
Ave dia. = 2.397 in
Area = 4.513 sq.in
Volume = 390.5 c.c.
Shearing rate = 0.11 inch/min
Shearing rate = 0.50 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.606
Ht/Dia ratio = 2.20
Moisture = 22.3 %
Total density = 128.3 pcf
Dry density = 104.9 pcf
Saturation = 99.2 %
Unconfined compressive strength = 4900 psf
Shear strength = 2450 psf
Strain @ failure = 15.00 %

Dial Read.	Load Read.	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.003	5.1	0.05	163.4
0.016	15.2	0.30	484.8
0.029	23.7	0.55	752.5
0.042	30.3	0.80	959.7
0.063	39.7	1.20	1250.6
0.116	56.5	2.20	1763.4
0.169	72.4	3.20	2236.0
0.222	84.5	4.20	2583.0
0.290	100.1	5.50	3016.8
0.422	129.2	8.00	3793.1
0.554	154.5	10.50	4412.5
0.686	172.3	13.00	4781.7
0.792	180.7	15.00	4900.0



(see worksheet for sketch of failure)

UNCONFINED COMPRESSION TEST - Uc
ASTM D-2166

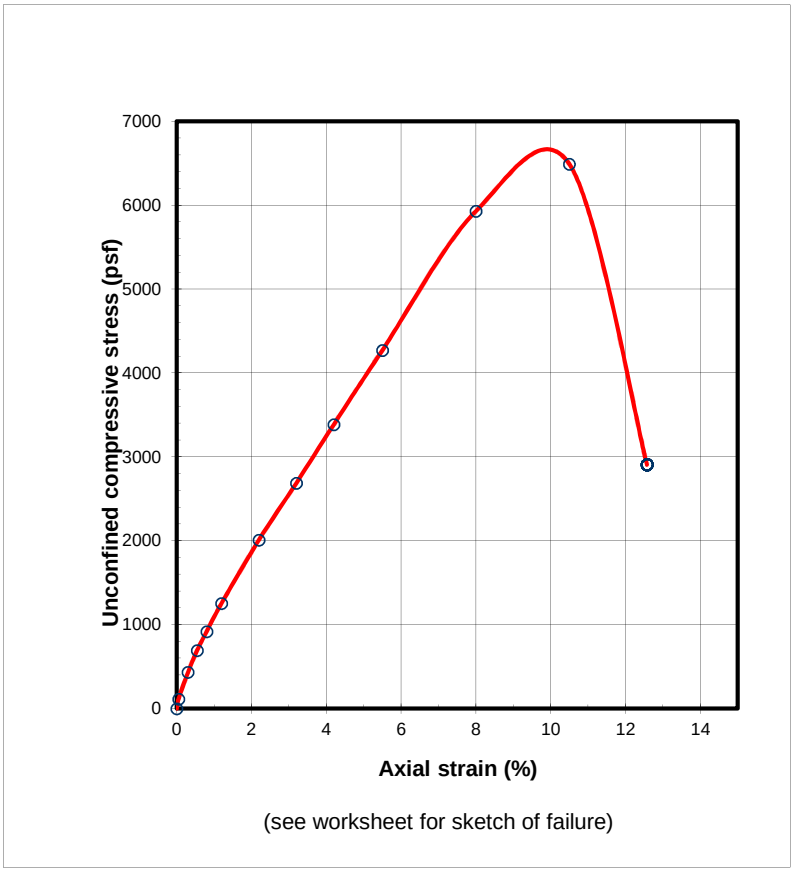
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job No. : 27560836
Boring # : R-12-012
Sample # : 5-2
Depth (ft) : 95.5-96
Date tested : 04/18/12
Soil (Visual Description) : Olive sandy lean clay

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 921.2 gms
Ht. = 5.79 in
Ave dia. = 2.393 in
Area = 4.501 sq.in
Volume = 427.0 c.c.
Shearing rate = 0.12 inch/min
Shearing rate = 0.50 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.459
Ht/Dia ratio = 2.42
Moisture = 16.5 %
Total density = 134.6 pcf
Dry density = 115.5 pcf
Saturation = 97.4 %
Unconfined compressive strength = 6491 psf
Shear strength = 3246 psf
Strain @ failure = 10.50 %

Dial Read.	Load Read.	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.003	3.6	0.05	115.0
0.017	13.6	0.30	432.4
0.032	21.8	0.55	693.6
0.046	28.9	0.80	917.4
0.069	39.7	1.20	1253.9
0.127	64.2	2.20	2010.1
0.185	86.8	3.20	2687.8
0.243	110.5	4.20	3385.9
0.318	141.3	5.50	4271.7
0.463	201.4	8.00	5929.7
0.608	226.7	10.50	6491.1
0.728	103.9	12.57	2907.8



(see worksheet for sketch of failure)

UNCONFINED COMPRESSION TEST - Uc
ASTM D-2166

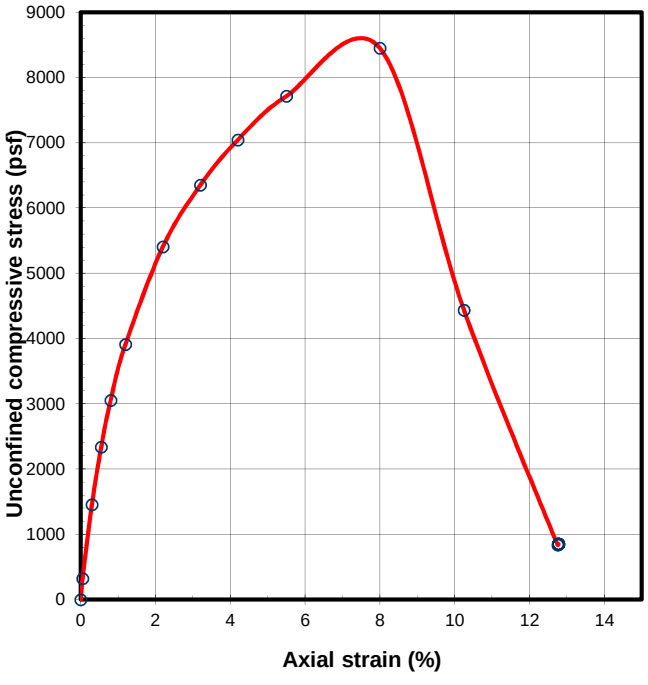
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job No. : 27560836
Boring # : R-12-012
Sample # : 10-2
Depth (ft) : 125.5-126
Date tested : 04/18/12
Soil (Visual Description) : Yellowish brown lean to fat clay

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 890.1 gms
Ht. = 5.80 in
Ave dia. = 2.420 in
Area = 4.601 sq.in
Volume = 437.3 c.c.
Shearing rate = 0.12 inch/min
Shearing rate = 0.50 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.649
Ht/Dia ratio = 2.40
Moisture = 24.3 %
Total density = 127.0 pcf
Dry density = 102.1 pcf
Saturation = 101.2 %
Unconfined compressive strength = 8451 psf
Shear strength = 4226 psf
Strain @ failure = 8.00 %

Dial Read.	Load Read.	Axial Strain (%)	Unconfined Compressive Stress (psf)
0.003	10.3	0.05	321.8
0.017	46.6	0.30	1454.0
0.032	75.1	0.55	2336.2
0.046	98.3	0.80	3053.2
0.069	126.6	1.20	3913.6
0.127	176.7	2.20	5409.2
0.186	209.8	3.20	6354.2
0.243	235.0	4.20	7046.0
0.319	260.9	5.50	7716.6
0.464	293.5	8.00	8451.0
0.594	157.9	10.25	4435.7
0.739	30.7	12.75	837.2
0.741	31.2	12.77	852.7



(see worksheet for sketch of failure)

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-001
Sample # : 5-2
Depth (ft) : 20.5-21
Date tested : 05/18/11
Soil : Brown lean clay

Data Reduction:

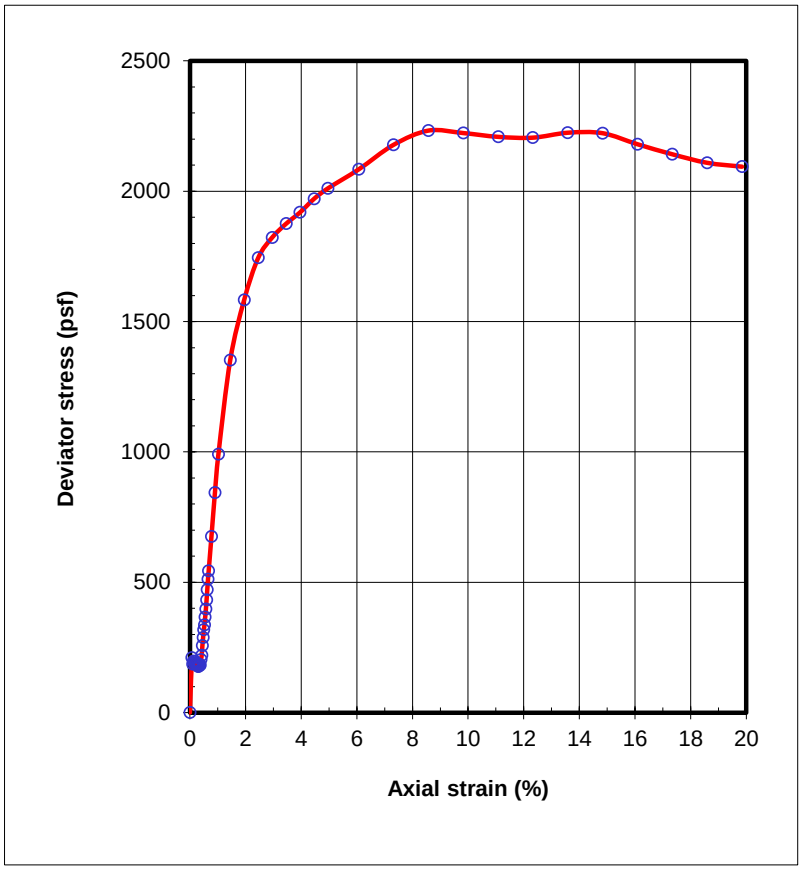
Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:

Total wt. =	382.6	gms	
Ht. =	4.050	in	
Ave dia. =	1.930	in	
Area =	2.927	sq.in	
Volume =	194.2	c.c.	
Shearing rate =	0.03	inch/min	
Shearing rate =	0.75	%/min	
Gs (assumed) =	2.70		

Test Report:

Void ratio =	0.737	
Ht/Dia ratio =	2.10	
Moisture =	26.7	%
Total density =	122.9	pcf
Dry density =	97.0	pcf
Saturation =	97.9	%
Chamber pressure =	1900	psf
Max. deviator stress =	2233	psf
Strain @ failure =	8.58	%



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	4.3	0.07	210.4
0.002	3.8	0.10	185.9
0.003	4.0	0.13	196.8
0.004	3.9	0.15	190.5
0.005	3.8	0.17	187.7
0.006	4.0	0.20	196.0
0.007	3.8	0.23	187.6
0.008	3.7	0.25	183.5
0.009	3.8	0.28	184.0
0.010	3.6	0.30	177.5
0.011	3.7	0.33	181.2
0.012	3.8	0.35	184.2
0.013	3.7	0.38	181.6
0.014	4.2	0.40	203.4
0.015	4.5	0.43	219.9
0.016	5.2	0.45	256.9
0.017	5.9	0.48	287.4
0.018	6.5	0.50	317.2
0.019	6.9	0.53	336.6
0.020	7.5	0.55	366.4
0.021	8.1	0.58	396.8
0.022	8.8	0.60	432.3
0.023	9.6	0.63	471.6
0.024	10.5	0.65	511.1
0.025	11.1	0.68	543.3
0.029	13.8	0.78	675.8
0.034	17.3	0.90	844.0
0.039	20.3	1.03	990.9
0.057	27.9	1.45	1351.9
0.077	32.8	1.95	1583.2
0.097	36.4	2.46	1744.7
0.118	38.2	2.96	1822.6
0.138	39.5	3.46	1875.4
0.158	40.6	3.96	1918.7
0.179	41.9	4.46	1970.9
0.199	43.0	4.96	2011.1
0.244	45.1	6.07	2084.3
0.294	47.8	7.32	2178.0
0.345	49.6	8.58	2232.7
0.396	50.1	9.82	2223.1
0.447	50.5	11.08	2208.6
0.497	51.1	12.33	2205.5
0.548	52.3	13.58	2224.4
0.599	53.0	14.83	2222.6
0.649	52.8	16.09	2180.3
0.700	52.7	17.33	2141.9
0.751	52.7	18.59	2109.0

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

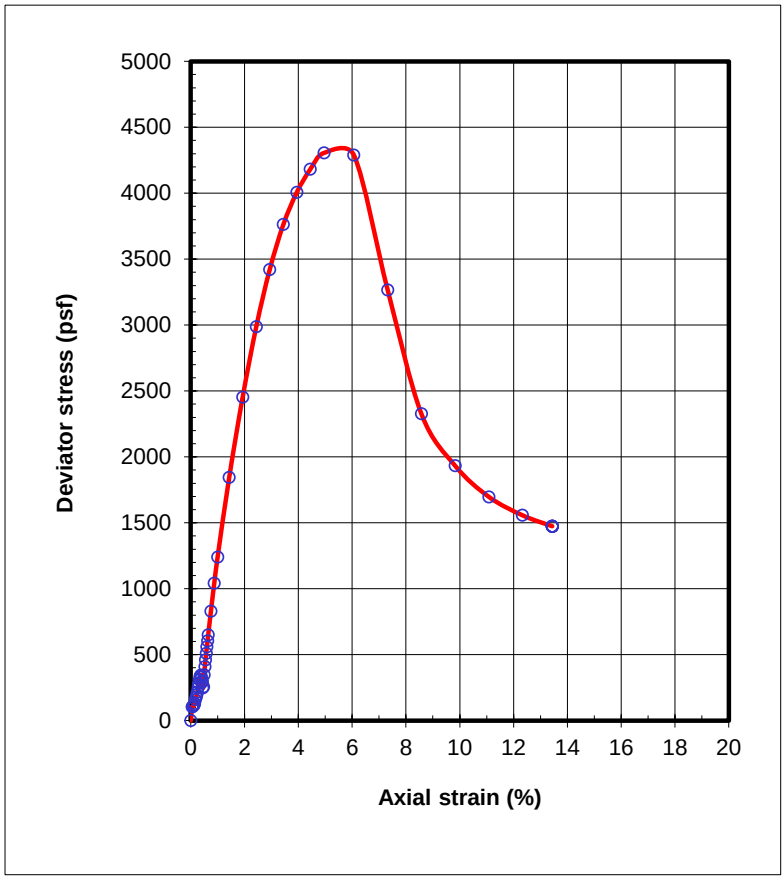
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-002
Sample # : 6
Depth (ft) : 31.5-34
Date tested : 05/19/11
Soil : Brown lean clay

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 1201.6 gms
Ht. = 5.760 in
Ave dia. = 2.853 in
Area = 6.397 sq.in
Volume = 603.8 c.c.
Shearing rate = 0.04 inch/min
Shearing rate = 0.75 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.668
Ht/Dia ratio = 2.02
Moisture = 23.0 %
Total density = 124.2 pcf
Dry density = 101.0 pcf
Saturation = 92.8 %
Chamber pressure = 2750 psf
Max. deviator stress = 4305 psf
Strain @ failure = 4.95 %



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.001		0.00	0.0
0.002	4.6	0.05	104.2
0.003	4.8	0.08	108.4
0.004	4.9	0.10	110.7
0.006	5.2	0.12	117.3
0.007	5.8	0.15	130.4
0.009	7.1	0.17	159.1
0.010	7.9	0.20	177.3
0.011	8.8	0.22	196.8
0.013	9.7	0.25	217.1
0.014	11.2	0.27	251.6
0.016	12.6	0.30	283.5
0.017	13.8	0.32	310.6
0.019	14.9	0.35	334.4
0.020	15.4	0.37	345.7
0.022	14.7	0.40	328.8
0.023	13.3	0.42	298.3
0.025	11.0	0.45	247.4
0.026	11.4	0.47	256.4
0.027	15.5	0.50	347.6
0.029	18.2	0.52	408.0
0.030	20.6	0.55	460.4
0.032	22.8	0.57	510.0
0.033	25.0	0.60	558.4
0.035	27.0	0.62	604.2
0.036	29.1	0.65	649.8
0.042	37.1	0.75	829.0
0.049	46.7	0.87	1042.3
0.056	55.7	1.00	1241.0
0.081	83.1	1.43	1844.4
0.110	111.2	1.93	2454.1
0.139	136.0	2.44	2987.5
0.168	156.5	2.93	3419.9
0.197	173.1	3.44	3762.5
0.226	185.2	3.94	4005.7
0.255	194.4	4.44	4181.3
0.284	201.2	4.95	4305.0
0.348	202.8	6.06	4289.5
0.420	156.5	7.32	3265.3
0.492	113.1	8.57	2326.7
0.565	95.2	9.83	1933.0
0.637	84.7	11.08	1696.3
0.709	78.9	12.33	1556.8
0.773	75.7	13.44	1474.2

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

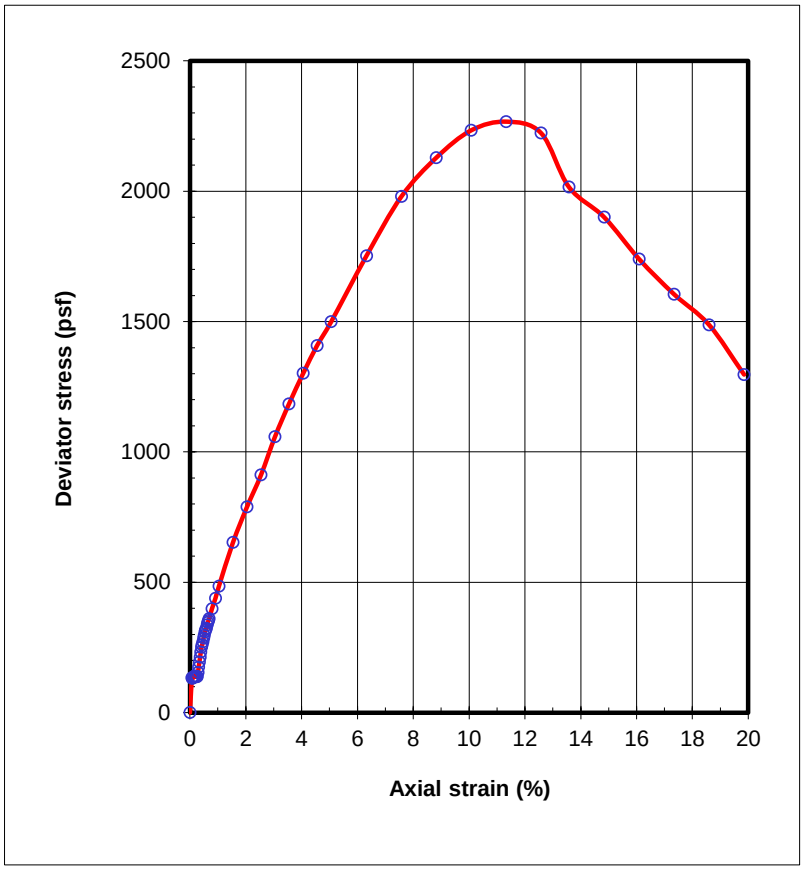
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-11-003
Sample # : 4-2
Depth (ft) : 15.5-16
Date tested : 05/18/11
Soil : Brown lean clay with sand

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 426.3 gms
Ht. = 4.330 in
Ave dia. = 1.923 in
Area = 2.907 sq.in
Volume = 206.2 c.c.
Shearing rate = 0.03 inch/min
Shearing rate = 0.75 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.599
Ht/Dia ratio = 2.25
Moisture = 22.5 %
Total density = 129.0 pcf
Dry density = 105.3 pcf
Saturation = 101.2 %
Chamber pressure = 1700 psf
Max. deviator stress = 2267 psf
Strain @ failure = 11.33 %



Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	2.7	0.07	133.5
0.002	2.6	0.09	130.8
0.003	2.7	0.12	135.1
0.004	2.8	0.14	136.1
0.005	2.8	0.16	140.7
0.006	2.8	0.19	137.7
0.007	2.8	0.21	138.7
0.009	2.8	0.24	137.5
0.010	2.8	0.26	138.6
0.011	3.1	0.29	153.7
0.012	3.5	0.31	174.6
0.013	3.9	0.34	193.9
0.014	4.3	0.36	212.8
0.015	4.7	0.39	232.6
0.016	5.1	0.41	251.2
0.017	5.3	0.44	259.8
0.018	5.5	0.46	271.0
0.019	5.8	0.49	286.1
0.020	6.0	0.51	296.4
0.022	6.3	0.54	309.6
0.023	6.4	0.57	317.6
0.024	6.6	0.59	322.8
0.025	6.8	0.61	336.1
0.026	7.0	0.64	345.8
0.027	7.2	0.66	352.7
0.028	7.3	0.69	359.5
0.032	8.1	0.79	398.6
0.038	8.9	0.91	438.5
0.043	9.9	1.04	485.1
0.065	13.4	1.54	653.1
0.087	16.3	2.04	788.9
0.109	18.9	2.55	911.7
0.130	22.0	3.05	1058.5
0.152	24.8	3.55	1184.0
0.174	27.4	4.06	1301.4
0.195	29.8	4.55	1407.8
0.217	31.9	5.06	1499.0
0.272	37.8	6.33	1752.3
0.326	43.2	7.58	1979.9
0.380	47.1	8.82	2128.3
0.435	50.1	10.08	2233.7
0.489	51.6	11.33	2266.9
0.543	51.3	12.58	2223.1
0.586	47.1	13.58	2016.0
0.641	45.0	14.84	1900.4
0.695	41.8	16.09	1739.4
0.749	39.2	17.34	1604.6
0.803	36.9	18.60	1487.3

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-12-012
Sample # : 4
Depth (ft) : 85-87.5
Date tested : 04/16/12
Soil : Olive gray fat clay

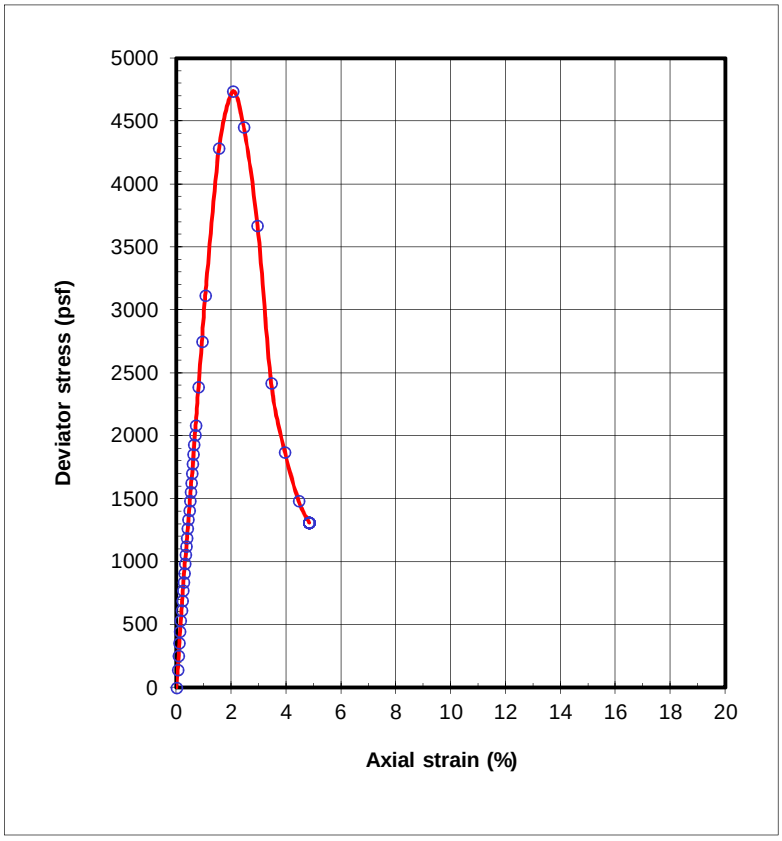
Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 1183.7 gms
Ht. = 5.980 in
Ave dia. = 2.873 in
Area = 6.487 sq.in
Volume = 635.7 c.c.
Shearing rate = 0.03 inch/min
Shearing rate = 0.5 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.958
Ht/Dia ratio = 2.08
Moisture = 35.1 %
Total density = 116.2 pcf
Dry density = 86.0 pcf
Saturation = 98.8 %
Chamber pressure = 4500 psf
Max. deviator stress = 4738 psf
Strain @ failure = 2.05 %

Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	6.3	0.05	140.5
0.003	11.4	0.08	253.7
0.005	16.1	0.10	356.0
0.006	20.1	0.13	445.5
0.008	24.0	0.16	532.0
0.009	27.8	0.18	615.2
0.011	31.1	0.21	688.2
0.012	34.7	0.23	769.3
0.014	37.8	0.26	837.7
0.015	41.1	0.28	909.5
0.017	44.5	0.30	984.4
0.018	47.7	0.33	1055.4
0.020	50.9	0.36	1124.8
0.021	53.8	0.38	1190.0
0.023	57.1	0.41	1263.1
0.024	60.3	0.43	1333.7
0.026	63.7	0.46	1406.6
0.028	67.2	0.49	1485.4
0.029	70.3	0.51	1552.9
0.031	73.6	0.54	1626.0
0.032	77.1	0.56	1701.3
0.034	80.6	0.59	1778.1
0.035	84.1	0.62	1854.5
0.037	87.6	0.64	1931.7
0.038	91.1	0.67	2009.8
0.040	94.6	0.70	2085.4
0.046	108.5	0.80	2389.1
0.054	125.1	0.93	2751.4
0.061	141.8	1.05	3115.1
0.091	196.0	1.55	4283.4
0.121	217.9	2.05	4738.1
0.145	205.6	2.45	4453.1
0.175	170.5	2.95	3672.1
0.205	112.9	3.45	2418.9
0.235	87.8	3.95	1872.5
0.265	69.9	4.45	1483.4
0.288	62.1	4.84	1312.4



UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

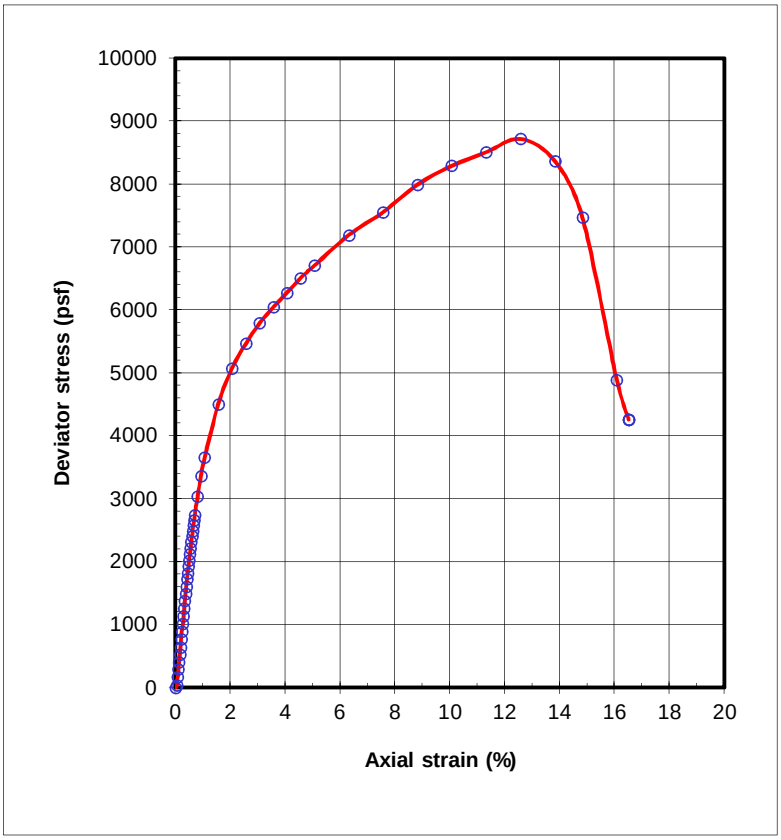
Client : URS
Project : I-880 @ 23rd and 29th Ave.
Job # : 27560836
Boring # R-12-012
Sample # : 9-2
Depth (ft) : 120.5-121
Date tested : 04/18/12
Soil : Light grayish brown lean clay

Data Reduction:

Dial factor = 1.0 in/unit
Load factor = 1.0 lb/unit

Specimen:
Total wt. = 843.5 gms
Ht. = 5.620 in
Ave dia. = 2.400 in
Area = 4.526 sq.in
Volume = 416.8 c.c.
Shearing rate = 0.03 inch/min
Shearing rate = 0.5 %/min
Gs (assumed) = 2.70

Test Report:
Void ratio = 0.657
Ht/Dia ratio = 2.34
Moisture = 24.2 %
Total density = 126.3 pcf
Dry density = 101.7 pcf
Saturation = 99.5 %
Chamber pressure = 6000 psf
Max. deviator stress = 8721 psf
Strain @ failure = 12.57 %

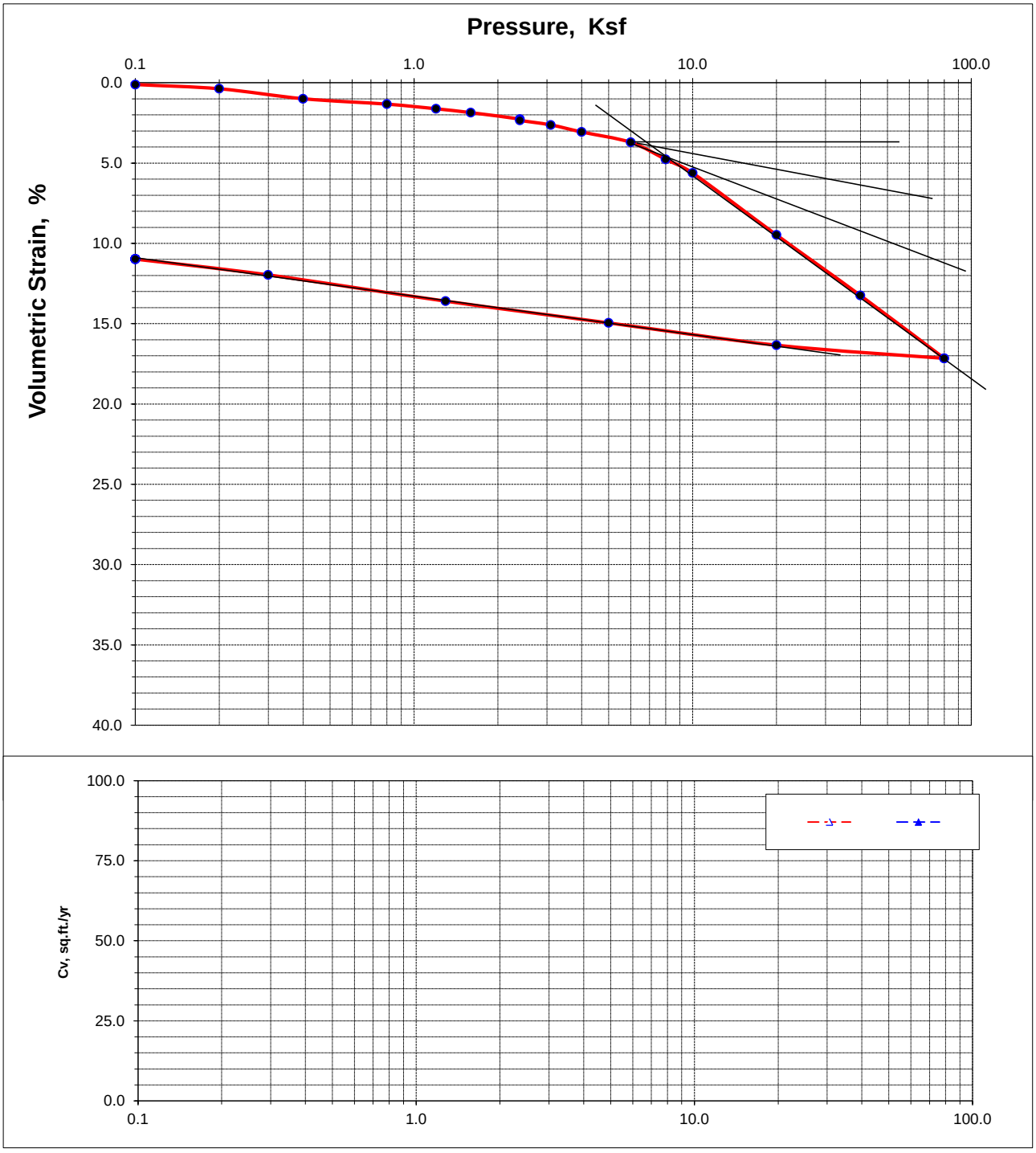


Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.001	1.3	0.05	41.2
0.003	5.2	0.08	166.7
0.004	9.1	0.11	289.6
0.006	12.8	0.13	406.3
0.007	16.5	0.16	525.7
0.009	20.2	0.18	642.4
0.010	24.1	0.21	765.7
0.012	28.0	0.24	890.1
0.013	31.8	0.26	1010.6
0.015	35.8	0.29	1136.1
0.016	39.7	0.32	1258.0
0.018	43.6	0.34	1381.3
0.019	47.2	0.37	1497.5
0.021	50.7	0.39	1607.7
0.022	54.3	0.42	1721.8
0.023	57.5	0.45	1822.6
0.025	60.9	0.47	1928.3
0.026	63.9	0.49	2022.0
0.028	67.1	0.52	2122.8
0.029	70.1	0.55	2216.7
0.031	73.1	0.57	2313.1
0.032	76.1	0.60	2407.7
0.034	78.9	0.63	2493.8
0.035	81.6	0.65	2578.4
0.036	84.3	0.68	2665.5
0.038	86.8	0.70	2742.4
0.044	96.3	0.80	3040.4
0.051	106.9	0.94	3368.7
0.058	116.2	1.06	3656.9
0.086	143.9	1.56	4506.9
0.114	162.8	2.06	5074.5
0.142	176.3	2.56	5464.6
0.170	187.7	3.06	5789.6
0.199	197.0	3.56	6045.0
0.227	205.5	4.06	6273.6
0.255	214.4	4.56	6509.7
0.283	222.0	5.06	6707.2
0.353	241.2	6.31	7191.4
0.423	256.9	7.56	7556.4
0.494	275.4	8.81	7991.7
0.564	289.8	10.06	8292.1
0.635	301.6	11.32	8509.0
0.705	313.5	12.57	8720.9
0.775	305.1	13.83	8364.4
0.832	275.6	14.83	7470.1
0.902	183.0	16.08	4887.7
0.926	160.3	16.51	4257.6

CONSOLIDATION TEST

Boring Number	R-11-002	Sample Number	6	Depth (ft)	31.5-34	
Soil Description	Brown sandy lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	20.8	124.1	0.641	87.6	1.00	2.420	(assumed) 2.70		
Final	16.9	135.7	0.452	100.7	0.885				



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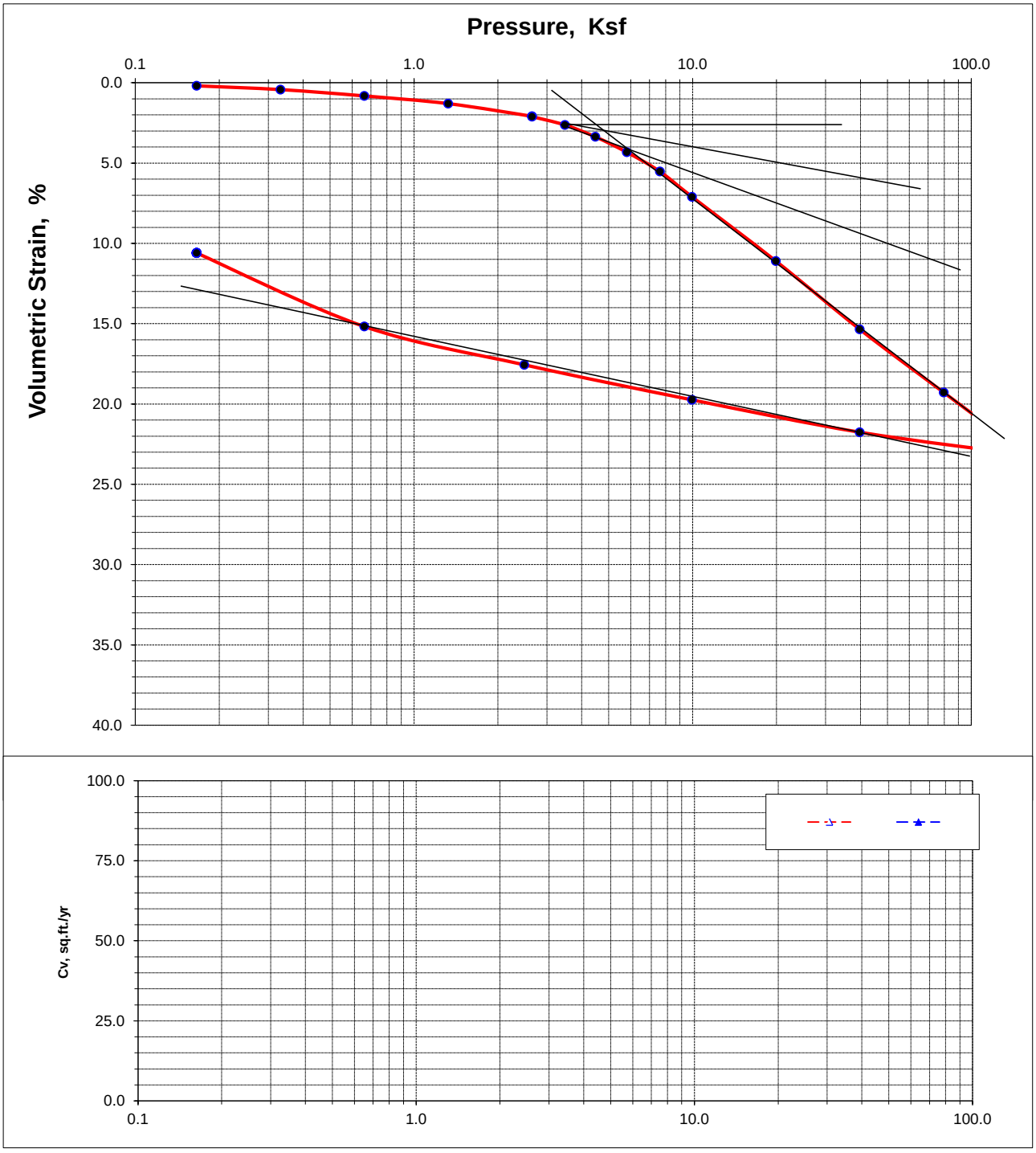
CONSOLIDATION TEST

Boring Number	R-11-004	Sample Number	5-3	Depth (ft)	21-21.5	
Soil Description	Olive brown sandy lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	24.6	126.9	0.656	101.1	0.69	1.880	(assumed) 2.70		
Final	18.2	135.5	0.470	104.4	0.613				



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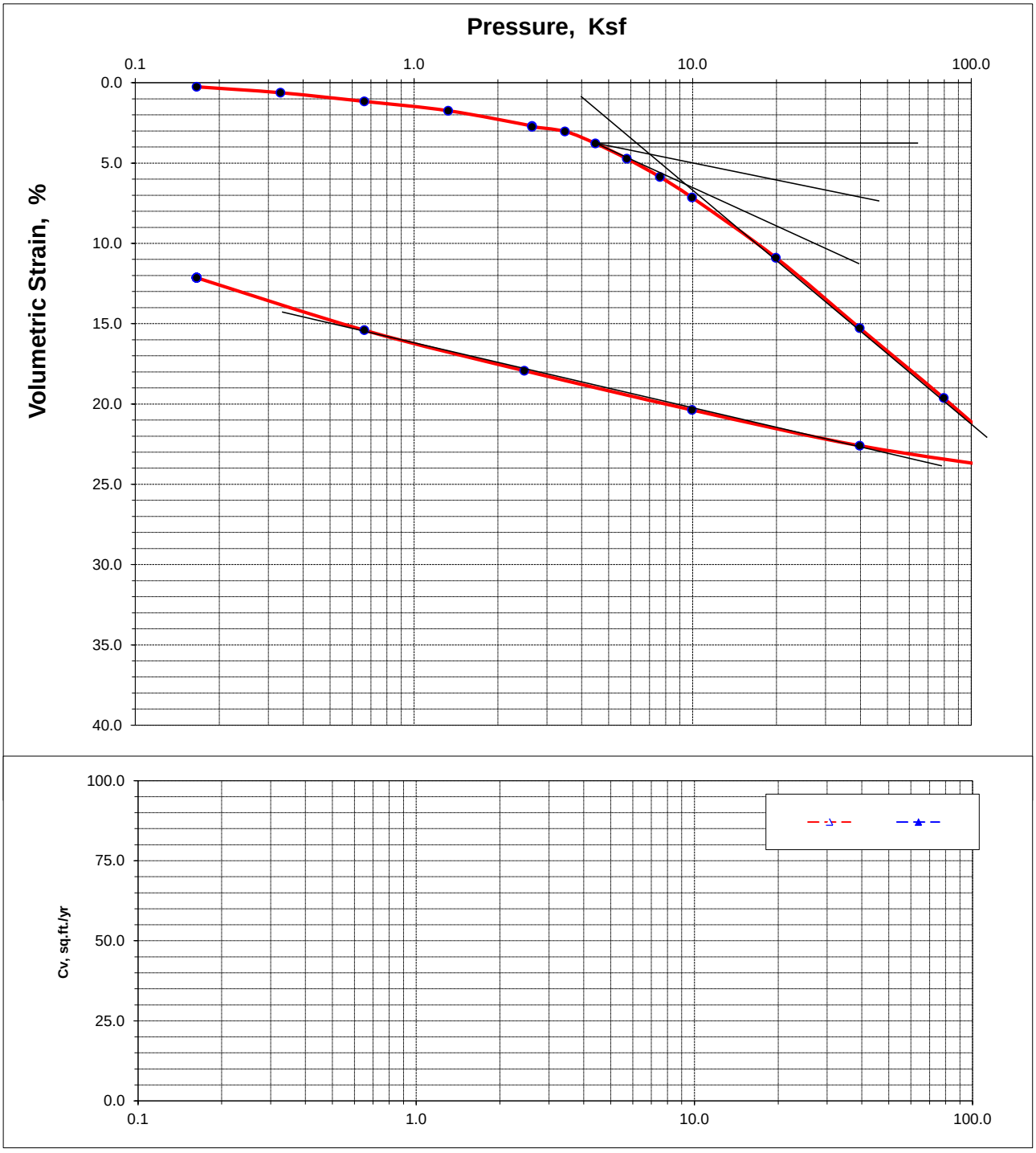
CONSOLIDATION TEST

Boring Number	R-11-005	Sample Number	11-2	Depth (ft)	50.5-51	
Soil Description	Dark grayish brown lean clay with sand					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	25.4	123.0	0.719	95.5	0.70	1.880	(assumed) 2.70		
Final	19.2	133.0	0.511	101.5	0.615				



27560836

Appendix D

Analysis and Calculations

URS CALCULATION SHEET		Sheet No. 1 of 3	
		Project No. 27560836.60203	
Project Title: ACMMA I-880 23rd & 29th Subject/Feature: Caltrans ARS.		Calc By CCT	Date 10/28/2010
		Checked By EN	Date 12/6/2010

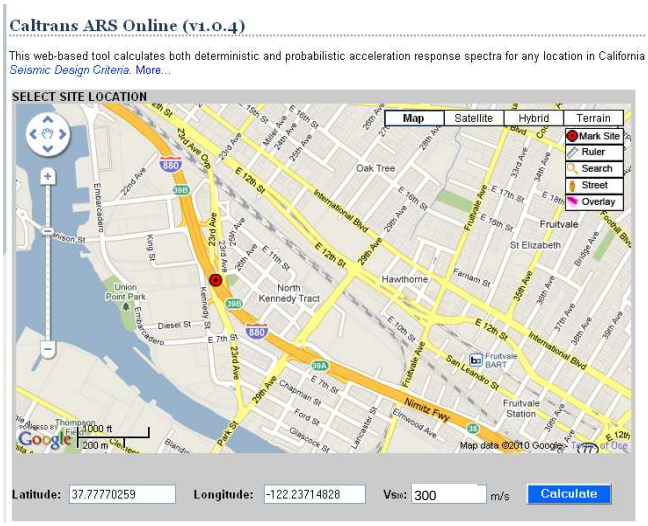
Rev: 2

Introduction

Caltrans ARS curve was calculated following the Caltran's procedure (seismic design criteria, Caltrans 2009).

Approach

-Site location coordinate is (37.778, -122.237)
-Use Caltrans ARS online tool



- Vs30 of is estimated using
  1. Vs measurement of 3 S-CPTs (X:\x_geo\ACCMA 23rd and 29th Ave\04 Analysis\01 seismic criteria\Vs30_rev2)

Elevation	Vs, 30 (m/sec)
B-6	251
B-7	255
B-10	236

2. Empirical correlation by $V_s = 132\ N^{0.271}$ (Pitilakis, 1999) for clay which is mostly encountered at the project site .

Elevation	N60*	Vs (m/sec)	d/vs (t)
20	10	246	
10	10	246	0.040591
0	10	246	0.040591
-10	10	246	0.040591
-20	10	246	0.040591
-30	12.85714	264	0.039209
-40	15.71429	278	0.036887
-50	18.57143	291	0.035098
-60	21.42857	303	0.033656
-70	24.28571	313	0.032456
-80	27.14286	323	0.031434
-90	30	332	0.030548
		Vs30	249

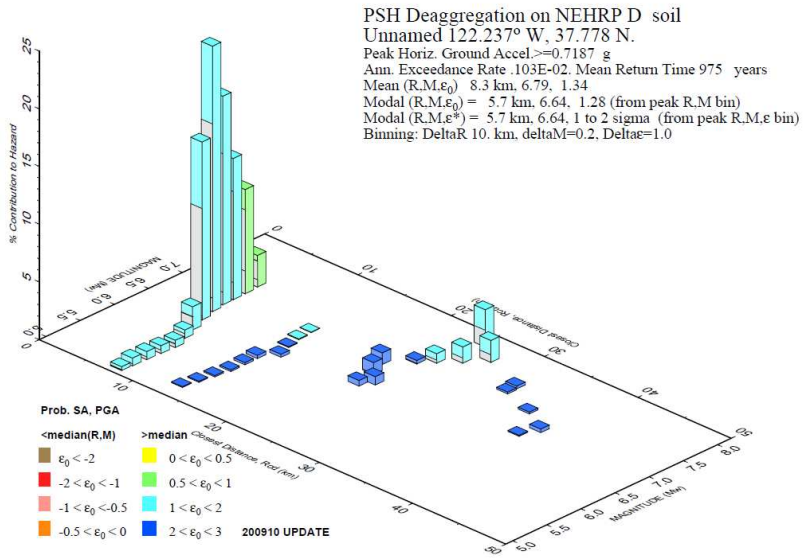
*The represented N60 profile is shown in attached figure

3. Vs estimated by empirical correlation and the filed measurement are consistent. Vs=250m/s is selected for design

- Since Vs30 =250 is less than 300m/s, additional USGS deaggregation analysis was performed to get 5%-50yr PSHA and compared with those by ARS online. The comparison is performed using attached spreadsheet provided by Caltrans. The envelope will be the design ARS

- R=5.7km is selected for perform PSHA based on USGS deaggregation tool

URS *CALCULATION SHEET*		Sheet No. 3 of 3	
		Project No. 27560836.60203	
Project Title: ACMMA I-880 23rd & 29th Subject/Feature: Caltrans ARS.		Calc By CCT	Date 10/28/2010
		Checked By EN	Date 12/6/2010

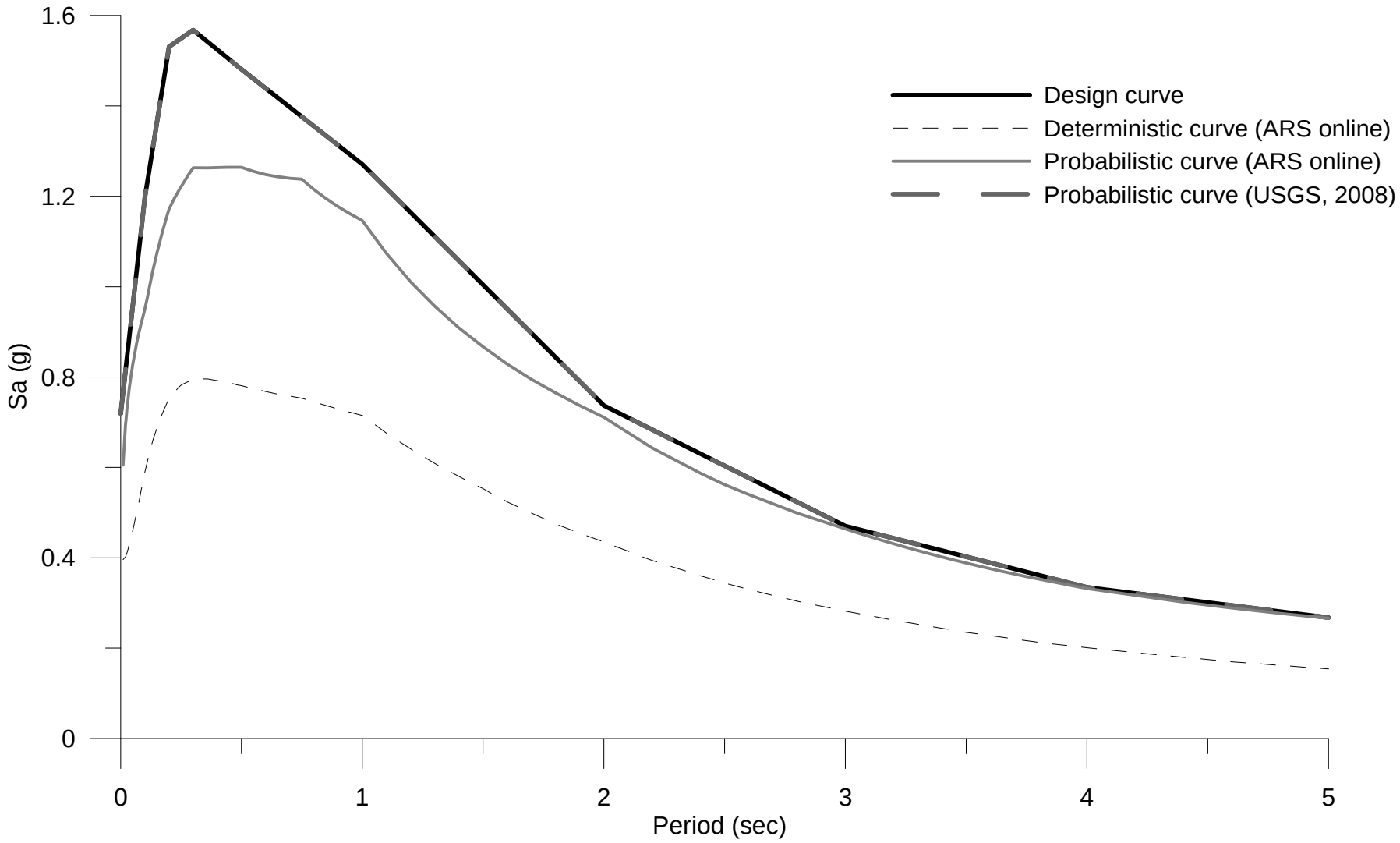


-Near fault effect is applied automatically by ARS online since R <25km

- No basin effect is considered

Results

See attached



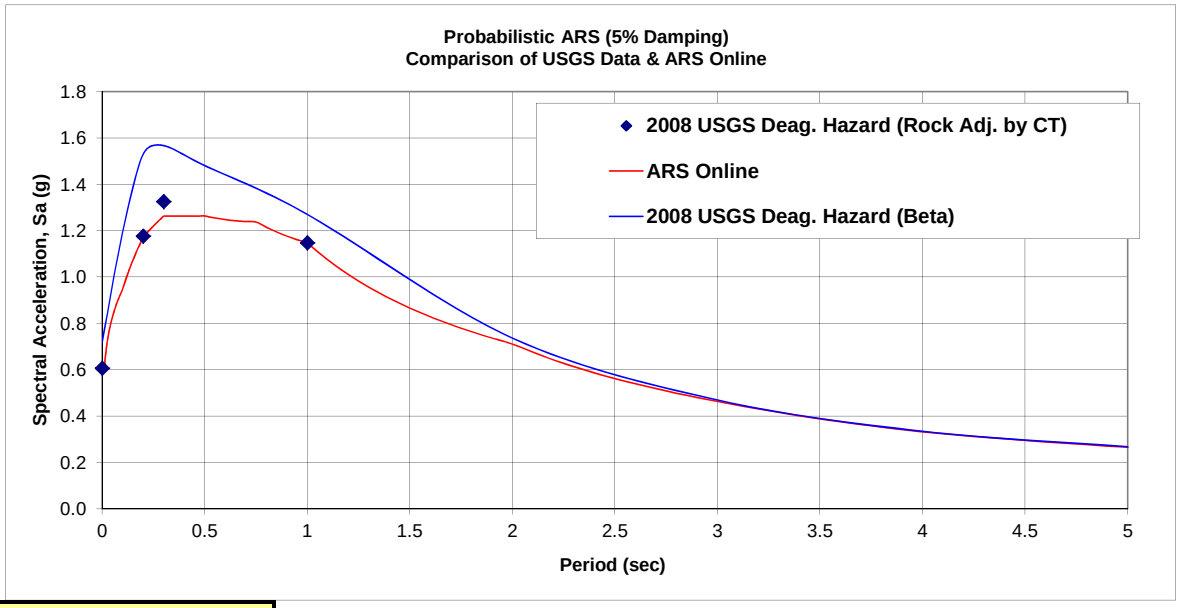
Note: 1. 5% damping spectrum
2. Near fault effects are included

URS	ACMMA I-880 23rd and 29th Project # 27560836	ARS Curve $V_{s,30}$=250 m/sec	Figure 9

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
37.7778	-122.2371
V_{S30} (m/s) =	250
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.7
$Z_{1.0}$ (m) =	309
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.605	1	1	0.605
0.02	0.693	1	1	0.693
0.022	0.706	1	1	0.706
0.025	0.723	1	1	0.723
0.029	0.745	1	1	0.745
0.03	0.75	1	1	0.75
0.032	0.759	1	1	0.759
0.035	0.773	1	1	0.773
0.036	0.777	1	1	0.777
0.04	0.793	1	1	0.793
0.042	0.801	1	1	0.801
0.044	0.808	1	1	0.808
0.045	0.812	1	1	0.812
0.046	0.815	1	1	0.815
0.048	0.822	1	1	0.822
0.05	0.828	1	1	0.828
0.055	0.844	1	1	0.844
0.06	0.858	1	1	0.858
0.065	0.872	1	1	0.872
0.067	0.877	1	1	0.877
0.07	0.885	1	1	0.885
0.075	0.897	1	1	0.897
0.08	0.908	1	1	0.908
0.085	0.919	1	1	0.919
0.09	0.929	1	1	0.929
0.095	0.939	1	1	0.939
0.1	0.949	1	1	0.949
0.11	0.977	1	1	0.977
0.12	1.003	1	1	1.003
0.13	1.028	1	1	1.028
0.133	1.035	1	1	1.035
0.14	1.051	1	1	1.051
0.15	1.074	1	1	1.074
0.16	1.095	1	1	1.095
0.17	1.116	1	1	1.116
0.18	1.135	1	1	1.135
0.19	1.154	1	1	1.154
0.2	1.172	1	1	1.172
0.22	1.193	1	1	1.193
0.24	1.212	1	1	1.212
0.25	1.221	1	1	1.221

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.747	1.000	0.812	1.000	0.606	0.605	0.2%
0.2	1.876	1.000	0.628	1.000	1.178	1.172	0.5%
0.3	1.572	1.000	0.843	1.000	1.326	1.263	4.8%
1	0.590	1.200	1.620	1.000	1.148	1.146	0.1%

Max % Difference = 4.8%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.7187	1.000	1.000	0.719	0.605	*15.8%*
0.1	1.196	1.000	1.000	1.196	0.949	*20.7%*
0.2	1.531	1.000	1.000	1.531	1.172	*23.4%*
0.3	1.5677	1.000	1.000	1.568	1.263	*19.4%*
0.5	1.481	1.000	1.000	1.481	1.264	14.7%
1	1.0591	1.200	1.000	1.271	1.146	9.8%
2	0.614	1.200	1.000	0.737	0.711	3.5%
3	0.3917	1.200	1.000	0.470	0.464	1.3%
4	0.279	1.200	1.000	0.335	0.332	0.8%
5	0.2231	1.200	1.000	0.268	0.266	0.6%

Max % Difference = 14.7%

SITE DATA

Shear Wave Velocity, Vs_{30}:	250 m/s
Latitude:	37.777777
Longitude:	-122.237105
Depth to Vs = 1.0 km/s:	332 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Hayward fault zone (Northern section)

Fault ID:	353
Maximum Magnitude (MMax):	7.3
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	12.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.61 km
Rjb:	4.61 km
Rx:	4.61 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.396	1.000	1.000	0.396
0.02	0.402	1.000	1.000	0.402
0.022	0.405	1.000	1.000	0.405
0.025	0.410	1.000	1.000	0.410
0.029	0.416	1.000	1.000	0.416
0.03	0.418	1.000	1.000	0.418
0.032	0.422	1.000	1.000	0.422
0.035	0.429	1.000	1.000	0.429
0.036	0.431	1.000	1.000	0.431
0.04	0.439	1.000	1.000	0.439
0.042	0.443	1.000	1.000	0.443
0.044	0.448	1.000	1.000	0.448
0.045	0.450	1.000	1.000	0.450
0.046	0.452	1.000	1.000	0.452
0.048	0.457	1.000	1.000	0.457
0.05	0.461	1.000	1.000	0.461
0.055	0.473	1.000	1.000	0.473
0.06	0.485	1.000	1.000	0.485
0.065	0.497	1.000	1.000	0.497
0.067	0.502	1.000	1.000	0.502

0.07	0.510	1.000	1.000	0.510
0.075	0.522	1.000	1.000	0.522
0.08	0.536	1.000	1.000	0.536
0.085	0.550	1.000	1.000	0.550
0.09	0.563	1.000	1.000	0.563
0.095	0.576	1.000	1.000	0.576
0.1	0.589	1.000	1.000	0.589
0.11	0.613	1.000	1.000	0.613
0.12	0.634	1.000	1.000	0.634
0.13	0.654	1.000	1.000	0.654
0.133	0.660	1.000	1.000	0.660
0.14	0.671	1.000	1.000	0.671
0.15	0.687	1.000	1.000	0.687
0.16	0.702	1.000	1.000	0.702
0.17	0.716	1.000	1.000	0.716
0.18	0.729	1.000	1.000	0.729
0.19	0.741	1.000	1.000	0.741
0.2	0.752	1.000	1.000	0.752
0.22	0.765	1.000	1.000	0.765
0.24	0.777	1.000	1.000	0.777
0.25	0.782	1.000	1.000	0.782
0.26	0.785	1.000	1.000	0.785
0.28	0.790	1.000	1.000	0.790
0.29	0.792	1.000	1.000	0.792
0.3	0.794	1.000	1.000	0.794
0.32	0.796	1.000	1.000	0.796
0.34	0.796	1.000	1.000	0.796
0.35	0.796	1.000	1.000	0.796
0.36	0.796	1.000	1.000	0.796
0.38	0.794	1.000	1.000	0.794
0.4	0.792	1.000	1.000	0.792
0.42	0.790	1.000	1.000	0.790
0.44	0.788	1.000	1.000	0.788
0.45	0.787	1.000	1.000	0.787
0.46	0.786	1.000	1.000	0.786
0.48	0.783	1.000	1.000	0.783
0.5	0.781	1.000	1.000	0.781
0.55	0.758	1.000	1.020	0.774
0.6	0.738	1.000	1.040	0.768
0.65	0.719	1.000	1.060	0.762
0.667	0.713	1.000	1.067	0.761
0.7	0.701	1.000	1.080	0.758
0.75	0.685	1.000	1.100	0.753
0.8	0.665	1.000	1.120	0.745
0.85	0.646	1.000	1.140	0.737
0.9	0.629	1.000	1.160	0.729
0.95	0.612	1.000	1.180	0.722
1	0.596	1.000	1.200	0.715
1.1	0.564	1.000	1.200	0.676
1.2	0.534	1.000	1.200	0.641
1.3	0.508	1.000	1.200	0.609

1.4	0.483	1.000	1.200	0.580
1.5	0.461	1.000	1.200	0.553
1.6	0.437	1.000	1.200	0.524
1.7	0.415	1.000	1.200	0.499
1.8	0.396	1.000	1.200	0.475
1.9	0.378	1.000	1.200	0.454
2	0.362	1.000	1.200	0.435
2.2	0.329	1.000	1.200	0.394
2.4	0.300	1.000	1.200	0.360
2.5	0.287	1.000	1.200	0.344
2.6	0.275	1.000	1.200	0.330
2.8	0.254	1.000	1.200	0.304
3	0.235	1.000	1.200	0.282
3.2	0.218	1.000	1.200	0.262
3.4	0.203	1.000	1.200	0.244
3.5	0.196	1.000	1.200	0.235
3.6	0.190	1.000	1.200	0.228
3.8	0.178	1.000	1.200	0.213
4	0.167	1.000	1.200	0.201
4.2	0.158	1.000	1.200	0.190
4.4	0.150	1.000	1.200	0.180
4.6	0.142	1.000	1.200	0.170
4.8	0.135	1.000	1.200	0.162
5	0.128	1.000	1.200	0.154

To use above data in Excel, copy/paste:

```
0.01    0.396    1.000    1.000    0.396
0.02    0.402    1.000    1.000    0.402
```

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.605	1.000	1.000	0.605
0.02	0.693	1.000	1.000	0.693
0.022	0.706	1.000	1.000	0.706
0.025	0.723	1.000	1.000	0.723
0.029	0.745	1.000	1.000	0.745
0.03	0.750	1.000	1.000	0.750
0.032	0.759	1.000	1.000	0.759
0.035	0.773	1.000	1.000	0.773
0.036	0.777	1.000	1.000	0.777
0.04	0.793	1.000	1.000	0.793
0.042	0.801	1.000	1.000	0.801
0.044	0.808	1.000	1.000	0.808
0.045	0.812	1.000	1.000	0.812
0.046	0.815	1.000	1.000	0.815
0.048	0.822	1.000	1.000	0.822
0.05	0.828	1.000	1.000	0.828

0.055	0.844	1.000	1.000	0.844
0.06	0.858	1.000	1.000	0.858
0.065	0.872	1.000	1.000	0.872
0.067	0.877	1.000	1.000	0.877
0.07	0.885	1.000	1.000	0.885
0.075	0.897	1.000	1.000	0.897
0.08	0.908	1.000	1.000	0.908
0.085	0.919	1.000	1.000	0.919
0.09	0.929	1.000	1.000	0.929
0.095	0.939	1.000	1.000	0.939
0.1	0.949	1.000	1.000	0.949
0.11	0.977	1.000	1.000	0.977
0.12	1.003	1.000	1.000	1.003
0.13	1.028	1.000	1.000	1.028
0.133	1.035	1.000	1.000	1.035
0.14	1.051	1.000	1.000	1.051
0.15	1.074	1.000	1.000	1.074
0.16	1.095	1.000	1.000	1.095
0.17	1.116	1.000	1.000	1.116
0.18	1.135	1.000	1.000	1.135
0.19	1.154	1.000	1.000	1.154
0.2	1.172	1.000	1.000	1.172
0.22	1.193	1.000	1.000	1.193
0.24	1.212	1.000	1.000	1.212
0.25	1.221	1.000	1.000	1.221
0.26	1.230	1.000	1.000	1.230
0.28	1.247	1.000	1.000	1.247
0.29	1.255	1.000	1.000	1.255
0.3	1.263	1.000	1.000	1.263
0.32	1.263	1.000	1.000	1.263
0.34	1.263	1.000	1.000	1.263
0.35	1.263	1.000	1.000	1.263
0.36	1.263	1.000	1.000	1.263
0.38	1.263	1.000	1.000	1.263
0.4	1.263	1.000	1.000	1.263
0.42	1.264	1.000	1.000	1.264
0.44	1.264	1.000	1.000	1.264
0.45	1.264	1.000	1.000	1.264
0.46	1.264	1.000	1.000	1.264
0.48	1.264	1.000	1.000	1.264
0.5	1.264	1.000	1.000	1.264
0.55	1.230	1.000	1.020	1.255
0.6	1.200	1.000	1.040	1.248
0.65	1.173	1.000	1.060	1.243
0.667	1.164	1.000	1.067	1.242
0.7	1.148	1.000	1.080	1.240
0.75	1.125	1.000	1.100	1.238
0.8	1.085	1.000	1.120	1.215
0.85	1.048	1.000	1.140	1.195
0.9	1.014	1.000	1.160	1.177
0.95	0.984	1.000	1.180	1.161

1	0.955	1.000	1.200		1.146
1.1	0.895	1.000	1.200		1.074
1.2	0.843	1.000	1.200		1.011
1.3	0.797	1.000	1.200		0.957
1.4	0.758	1.000	1.200		0.909
1.5	0.723	1.000	1.200		0.867
1.6	0.691	1.000	1.200		0.829
1.7	0.663	1.000	1.200		0.795
1.8	0.637	1.000	1.200		0.765
1.9	0.614	1.000	1.200		0.737
2	0.593	1.000	1.200		0.711
2.2	0.536	1.000	1.200		0.643
2.4	0.489	1.000	1.200		0.587
2.5	0.469	1.000	1.200		0.562
2.6	0.450	1.000	1.200		0.540
2.8	0.416	1.000	1.200		0.499
3	0.387	1.000	1.200		0.464
3.2	0.359	1.000	1.200		0.431
3.4	0.335	1.000	1.200		0.402
3.5	0.324	1.000	1.200		0.388
3.6	0.313	1.000	1.200		0.376
3.8	0.294	1.000	1.200		0.353
4	0.277	1.000	1.200		0.332
4.2	0.264	1.000	1.200		0.317
4.4	0.252	1.000	1.200		0.302
4.6	0.241	1.000	1.200		0.289
4.8	0.231	1.000	1.200		0.277
5	0.222	1.000	1.200		0.266

To use above data in Excel, copy/paste:

```
0.01    0.605    1.000    1.000    0.605
0.02    0.693    1.000    1.000    0.693
```

Envelope Data

Period	SA
0.01	0.605
0.02	0.693
0.022	0.706
0.025	0.723
0.029	0.745
0.03	0.750
0.032	0.759
0.035	0.773
0.036	0.777
0.04	0.793
0.042	0.801
0.044	0.808
0.045	0.812
0.046	0.815
0.048	0.822

0.05	0.828
0.055	0.844
0.06	0.858
0.065	0.872
0.067	0.877
0.07	0.885
0.075	0.897
0.08	0.908
0.085	0.919
0.09	0.929
0.095	0.939
0.1	0.949
0.11	0.977
0.12	1.003
0.13	1.028
0.133	1.035
0.14	1.051
0.15	1.074
0.16	1.095
0.17	1.116
0.18	1.135
0.19	1.154
0.2	1.172
0.22	1.193
0.24	1.212
0.25	1.221
0.26	1.230
0.28	1.247
0.29	1.255
0.3	1.263
0.32	1.263
0.34	1.263
0.35	1.263
0.36	1.263
0.38	1.263
0.4	1.263
0.42	1.264
0.44	1.264
0.45	1.264
0.46	1.264
0.48	1.264
0.5	1.264
0.55	1.255
0.6	1.248
0.65	1.243
0.667	1.242
0.7	1.240
0.75	1.238
0.8	1.215
0.85	1.195

0.9	1.177
0.95	1.161
1	1.146
1.1	1.074
1.2	1.011
1.3	0.957
1.4	0.909
1.5	0.867
1.6	0.829
1.7	0.795
1.8	0.765
1.9	0.737
2	0.711
2.2	0.643
2.4	0.587
2.5	0.562
2.6	0.540
2.8	0.499
3	0.464
3.2	0.431
3.4	0.402
3.5	0.388
3.6	0.376
3.8	0.353
4	0.332
4.2	0.317
4.4	0.302
4.6	0.289
4.8	0.277
5	0.266

To use above data in Excel, copy/paste:

```
0.01    0.605
0.02    0.693
```

I-880 at 23rd and 29th Ave.
Liquefaction Evaluation
Seed et al. (2003) Procedure

Earthquake Magnitude M = 7.30 (MCE)
Peak Ground Acceleration: 0.71 (g) — MSF (Seed et, al., 2003) = 1.10
Vs,40 = 695 (fps) (S-CPT measurements)

Boring ID	USCS class from boring log	Depth to Sample (ft)	Layer Thickness (ft)	GS Elev	γ_m (pcf)	Blows foot, N	Sampler code	% finer than No200	USCS class lab	PI	GWT Elev. Ft	Assigned Class.	Sample Elev. (ft)	σ_v, psf	σ_v', psf	Sampler Correction	Rod Length, m	CR	FC, %	C_N	ER	$N_{1,60}$	Capped FC	C_{Fines}	$(N_1)_{60cs}$	f	Kσ	CRR	Rd	CSR	CSR*	FS_L	FS_L < 1	P_L	Liquefaction Susceptibility	Below GWT	Assessment		FS_L	P_L		Lookup Num	Vol. Strain (%)	Settlement (inches)	PI	Final Enginering Judgment	Liquefied Layer Thickness (ft)
URS-1	CL	2.0		14.3	120	NA	NA		CL		5	CL	12	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-1	CL	5.0		14.3	120	14	MC		CL		5	CL	9	600	600	0.8	3.0	0.80	0	1.70	75	19	5	1.03	20	0.70	1.00	0.214	0.99	0.460	0.418	0.5	Yes	1.00	No	No	No		-	-						No	0
URS-1	CL	10.0		14.3	120	8	SPT		CL		5	CL	4	1200	1156	1.0	4.6	0.85	0	1.32	75	11	5	1.04	12	0.66	1.00	0.098	0.99	0.473	0.430	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	15.0		14.3	120	9	MC		CL		5	CL	-1	1800	1444	0.8	6.1	0.95	0	1.18	75	10	5	1.04	11	0.65	1.00	0.084	0.97	0.560	0.509	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	20.0		14.3	120	8	MC		CL		5	CL	-6	2400	1732	0.8	7.6	0.95	0	1.07	75	8	5	1.05	9	0.64	1.00	0.069	0.95	0.608	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	25.0		14.3	120	12	MC		CL		5	CL	-11	3000	2020	0.8	9.1	0.95	0	0.99	75	11	5	1.04	12	0.66	1.00	0.085	0.92	0.630	0.573	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	30.0		14.3	120	18	MC		CL		5	CL	-16	3600	2308	0.8	10.7	1.00	0	0.93	75	17	5	1.03	17	0.69	0.97	0.124	0.87	0.632	0.590	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	35.0		14.3	120	20	MC		CL		5	CL	-21	4200	2596	0.8	12.2	1.00	0	0.88	75	18	5	1.03	18	0.69	0.94	0.127	0.82	0.617	0.598	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	40.0		14.3	120	12	MC		CL		5	CL	-26	4800	2884	0.8	13.7	1.00	0	0.83	75	10	5	1.05	10	0.65	0.90	0.069	0.77	0.593	0.601	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	SP-SM/CL	45.0	2.50	14.3	120	25	MC	10	SP-SM/CL		5	SP-SM/CL	-31	5400	3172	0.8	15.2	1.00	10	0.79	75	20	10	1.07	21	0.71	0.89	0.151	0.72	0.568	0.581	0.3	Yes	1.00	Yes	Yes	Yes		0.3	1.0		2158	2.32	0.7		Yes	2.5
URS-1	CL	50.0		14.3	120	19	MC		CL		5	CL	-36	6000	3460	0.8	16.8	1.00	0	0.76	75	14	5	1.04	15	0.67	0.85	0.093	0.68	0.545	0.582	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	CL	60.0		14.3	120	21	MC		CL		5	CL	-46	7200	4036	0.8	19.8	1.00	0	0.70	75	15	5	1.04	15	0.68	0.81	0.091	0.63	0.519	0.581	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-1	SP-SM	70.0	15.00	14.3	120	41	SPT	10.4	SP-SM		5	SP-SM	-56	8400	4612	1.0	22.9	1.00	10	0.66	75	34	10	1.06	36	0.78	0.84	0.404	0.61	0.518	0.560	0.8	Yes	0.58	Yes	Yes	Yes		0.8	0.6		3656	0.75	0.0		No	0
URS-1	SP	80.0	5.00	14.3	120	38	SPT	11.2	SP-SM		5	SP-SM	-66	9600	5188	1.0	25.9	1.00	11	0.62	75	29	11	1.06	31	0.76	0.80	0.283	0.61	0.526	0.595	0.5	Yes	0.98	Yes	Yes	Yes		0.5	1.0		3160	1.30	0.0		No	0
URS-1	SP	90.0	5.00	14.3	120	70	SPT	5	SP		5	SP	-76	10800	5764	1.0	29.0	1.00	5	0.59	75	52	5	1.02	53	0.80	0.82	0.600	0.61	0.533	0.592	1.1		0.00	Yes	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.7		Total=	2.5
URS-2	CL	10.0		18.1	120	18	MC		CL		5	CL	8.1	1200	1200	0.8	4.6	0.85	0	1.29	75	20	5	1.03	20	0.70	1.00	0.187	0.99	0.456	0.415	0.4	Yes	1.00	No	No	No		-	-						No	0
URS-2	CL	15.0		18.1	120	15	MC	59.8	CL		5	CL	3.1	1800	1681	0.8	6.1	0.95	60	1.09	75	16	35	1.25	19	0.70	1.00	0.158	0.97	0.481	0.437	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	20.0		18.1	120	8	MC		CL		5	CL	-1.9	2400	1969	0.8	7.6	0.95	0	1.01	75	8	5	1.05	8	0.64	1.00	0.064	0.95	0.535	0.487	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	25.0		18.1	120	11	MC		CL		5	CL	-6.9	3000	2257	0.8	9.1	0.95	0	0.94	75	10	5	1.05	10	0.65	0.98	0.073	0.92	0.564	0.525	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	30.0		18.1	120	8	MC		CL		5	CL	-11.9	3600	2545	0.8	10.7	1.00	0	0.89	75	7	5	1.06	7	0.64	0.94	0.057	0.87	0.573	0.557	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	32.0		18.1	120		Shelby		CL		5	CL	-13.9	3840	2661	1.0	11.3	1.00	0	0.87	75	0	5	0.00	0	0.60	0.91	0.033	0.86	0.571	0.569	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	35.0		18.1	120	15	MC		CL		5	CL	-16.9	4200	2833	0.8	12.2	1.00	0	0.84	75	13	5	1.04	13	0.67	0.91	0.085	0.82	0.565	0.567	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	CL	40.0		18.1	120	16	MC		CL		5	CL	-21.9	4800	3121	0.8	13.7	1.00	0	0.80	75	13	5	1.04	13	0.67	0.88	0.084	0.77	0.548	0.568	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-2	GC	45.0	5.00	18.1	120	28	MC	30	GC		5	GC	-26.9	5400	3409	0.8	15.2	1.00	30	0.77	75	21	30	1.19	26	0.73	0.88	0.205	0.72	0.528	0.547	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2655	1.72	1.0		Yes	5
URS-2	CL	50.0		18.1	120	15	MC		CL		5	CL	-31.9	6000	3697	0.8	16.8	1.00	0	0.74	75	11	5	1.04	12	0.66	0.83	0.070	0.68	0.510	0.562	0.1	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.0		Total=	5.0
URS-3	CH	2.0		17.9	120	NA	NA		CH		5	CH	15.9	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-3	CL	5.0		17.9	120	5	MC		CL		5	CL	12.9	600	600	0.8	3.0	0.80	0	1.70	75	7	5	1.06	7	0.64	1.00	0.084	0.99	0.460	0.418	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-3	GP-GM	10.0		17.9	120	29	MC	10	GP-GM		5	GP-GM	7.9	1200	1200	0.8	4.6	0.85	10	1.29	75	32	10	1.06	34	0.77	1.00	0.502	0.99	0.456	0.415	1.1		0.06	Yes	No	No		-	-						No	0
URS-3	CL	15.0		17.9	120	7	MC		CL		5	CL	2.9	1800	1669	0.8	6.1	0.95	0	1.09	75	7	5	1.05	8	0.64	1.00	0.065	0.97	0.485	0.441	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	20.0		17.9	120	27	SPT		CL		5	CL	-2.1	2400	1957	1.0	7.6	0.95	0	1.01	75	32	5	1.03	33	0.77	1.00	0.429	0.95	0.539	0.490	0.8	Yes	0.66	No	Yes	No		-	-						No	0
URS-3	SP-SM/CL	25.0	3.00	17.9	120	16	SPT	18.5	SC/CL		5	SC/CL	-7.1	3000	2245	1.0	9.1	0.95	19	0.94	75	18	19	1.13	20	0.70	0.98	0.154	0.92	0.567	0.525	0.3	Yes	1.00	Yes	Yes	Yes		0.3	1.0		2052	2.35	0.8		Yes	3
URS-3	CL	30.0		17.9	120	21	MC		CL		5	CL	-12.1	3600	2533	0.8	10.7	1.00	0	0.89	75	19	5	1.03	19	0.70	0.95	0.139	0.87	0.576	0.553	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	35.0		17.9	120	16	MC		CL		5	CL	-17.1	4200	2821	0.8	12.2	1.00	0	0.84	75	13	5	1.04	14	0.67	0.91	0.091	0.82	0.568	0.568	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SM	40.0	5.00	17.9	120	29	MC	27.5	SC		5	SC	-22.1	4800	3109	0.8	13.7	1.00	28	0.80	75	23	28	1.17	27	0.74	0.90	0.239	0.77	0.551	0.554	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2755	1.62	1.0		Yes	5
URS-3	CL	45.0		17.9	120	15	SPT		CL		5	CL	-27.1	5400	3397	1.0	15.2	1.00	0	0.77	75	14	5	1.04	15	0.67	0.86	0.093	0.72	0.530	0.562	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	50.0		17.9	120	23	MC		CL		5	CL	-32.1	6000	3685	0.8	16.8	1.00	0	0.74	75	17	5	1.03	18	0.69	0.84	0.110	0.68	0.512	0.554	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	60.0		17.9	120	21	MC		CL		5	CL	-42.1	7200	4261	0.8	19.8	1.00	0	0.69	75	14	5	1.04	15	0.67	0.80	0.087	0.63	0.491	0.561	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SP-SM	70.0		17.9	120	49	SPT	10	SP-SM		5	SP-SM	-52.1	8400	4837	1.0	22.9	1.00	10	0.64	75	39	10	1.05	41	0.80	0.85	0.600	0.61	0.494	0.530	1.2		0.02	Yes	Yes	No		-	-						No	0
URS-3	CL	80.0		17.9	120	13	SPT		CL		5	CL	-62.1	9600	5413	1.0	25.9	1.00	0	0.61	75	10	5	1.05	10	0.65	0.72	0.058	0.61	0.504	0.636	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	CL	90.0		17.9	120	23	MC		CL		5	CL	-72.1	10800	5989	0.8	29.0	1.00	0	0.58	75	13	5	1.04	14	0.67	0.71	0.073	0.61	0.513	0.658	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-3	SM	100.0		17.9	120	100	MC	45	SM		5	SM	-82.1	12000	6565	0.8	32.0	1.00	45	0.55	75	55	35	1.17	65	0.80	0.80	0.600	0.61	0.520	0.593	1.2		0.00	Yes	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.8		Total=	8.0
URS-4	CL	2.0		21.5	120		NA		CL		5	CL	19.5	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-4	CL	5.0		21.5	120	23	MC		CL		5	CL	16.5	600	600	0.8	3.0	0.80	0	1.70	75	31	5	1.03	32	0.76	1.00	0.547	0.99	0.460	0.418	1.2		0.06	No	No	No		-	-						No	0
URS-4	CL	10.0		21.5	120	12	MC		CL		5	CL	11.5	1200	1200	0.8	4.6	0.85	0	1.29	75	13	5	1.04	14	0.67	1.00	0.113	0.99	0.456	0.415	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-4	CL	15.0		21.5	120	11	MC		CL		5	CL	6.5	1800	1800	0.8	6.1	0.95	0	1.05	75	11	5	1.04	11	0.66	1.00	0.085	0.97	0.449	0.408	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-4	CL	20.0		21.5	120	13	MC		CL		5	CL	1.5	2400	2182	0.8	7.6	0.95	0	0.96	75	12	5	1.04	12	0.66	0.99	0.086	0.95	0.483	0.444	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	25.0		21.5	120	19	MC		CL		5	CL	-3.5	3000	2470	0.8	9.1	0.95	0	0.90	75	16	5	1.04	17	0.68	0.95	0.117	0.92	0.516	0.492	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	30.0		21.5	120	26	MC		CL		5	CL	-8.5	3600	2758	0.8	10.7	1.00	0	0.85	75	22	5	1.03	23	0.71	0.93	0.178	0.87	0.529	0.518	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CH	35.0		21.5	120	18	MC		CH		5	CH	-13.5	4200	3046	0.8	12.2	1.00	0	0.81	75	15	5	1.04	15	0.68	0.89	0.097	0.82	0.526	0.538	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	SM	40.0	5.00	21.5	120	22	SPT	23.4	SC		5	SC	-18.5	4800	3334	1.0	13.7	1.00	23	0.77	75	21	23	1.15	24	0.72	0.88	0.191	0.77	0.513	0.530	0.4	Yes	1.00	Yes	Yes	Yes		0.4	1.0		2453	1.88	1.1		Yes	5
URS-4	CL	45.0		21.5	120	28	MC		CL		5	CL	-23.5	5400	3622	0.8	15.2	1.00	0	0.74	75	21	5	1.03	21	0.71	0.85	0.149	0.72	0.497	0.529	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	50.0		21.5	120	28	MC		CL		5	CL	-28.5	6000	3910	0.8	16.8	1.00	0	0.72	75	20	5	1.03	21	0.70	0.83	0.137	0.68	0.483	0.526	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	SM	60.0	5.00	21.5	120	38	MC	26.1	SC		5	SC	-38.5	7200	4486	0.8	19.8	1.00	26	0.67	75	25	26	1.16	29	0.75	0.83	0.253	0.63	0.467	0.513	0.5	Yes	0.98	Yes	Yes	Yes		0.5	1.0		2951	1.34	0.0		No	0
URS-4	SP-SM	70.0		21.5	120	50	SPT	12	SP-SM		5	SP-SM	-48.5	8400	5062	1.0	22.9	1.00	12	0.63	75	39	12	1.06	42	0.80	0.84	0.600	0.61	0.472	0.511	1.3		0.01	Yes	Yes	No		-	-						No	0
URS-4	CL	80.0		21.5	120	12	SPT		CL		5	CL	-58.5	9600	5638	1.0	25.9	1.00	0	0.60	75	9	5	1.05	9	0.65	0.71	0.053	0.61	0.484	0.622	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	90.0		21.5	120	18	MC		CL		5	CL	-68.5	10800	6214	0.8	29.0	1.00	0	0.57	75	10	5	1.04	11	0.65	0.69	0.057	0.61	0.494	0.653	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-4	CL	100.0		21.5	120	27	MC		CL		5	CL	-78.5	12000	6790	0.8	32.0	1.00	0	0.54	75	15	5	1.04	15	0.68	0.69	0.078	0.61	0.503	0.667	0.2	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								1.1		Total=	5.0
URS-5	CL	1.0		16.5	120	NA	bag		CL		5	CL	15.5	120	120	Check	1.8	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-5	CL	5.0		16.5	120	18	MC		CL		5	CL	11.5	600	600	0.8	3.0	0.80	0	1.70	75	24	5	1.03	25	0.73	1.00	0.325	0.99	0.460	0.418	0.7	Yes	0.83	No	No	No		-	-						No	0
URS-5	GC	10.0		16.5	120	25	MC	45	GC		5	GC	6.5	1200	1200	0.8	4.6	0.85	45	1.29	75	27	35	1.20	33	0.77	1.00	0.481	0.99	0.456	0.415	1.1		0.03	Yes	No	No		-	-						No	0
URS-5	CL	15.0		16.5	120	3	SPT		CL		5	CL	1.5	1800	1582	1.0	6.1	0.95	0	1.12	75	4	5	1.08	4	0.62	1.00	0.052	0.97	0.511	0.465	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	20.0		16.5	120	7	SPT		CL		5	CL	-3.5	2400	1870	1.0	7.6	0.95	0	1.03	75	9	5	1.05	9	0.65	1.00	0.070	0.95	0.564	0.513	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	25.0		16.5	120	15	MC		CL		5	CL	-8.5	3000	2158	0.8	9.1	0.95	0	0.96	75	14	5	1.04	14	0.67	0.99	0.100	0.92	0.590	0.540	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	CL	30.0		16.5	120	19	MC		CL		5	CL	-13.5	3600	2446	0.8	10.7	1.00	0	0.90	75	17	5	1.03	18	0.69	0.96	0.126	0.87	0.596	0.567	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	SP/CL	35.0	2.50	16.5	120	20	MC	5	SP/CL		5	SP/CL	-18.5	4200	2734	0.8	12.2	1.00	5	0.86	75	17	5	1.03	18	0.69	0.92	0.121	0.82	0.586	0.577	0.2	Yes	1.00	Yes	Yes	Yes		0.2	1.0		1858	2.68	0.8		Yes	2.5
URS-5	CL	40.0		16.5	120	25	MC		CL		5	CL	-23.5	4800	3022	0.8	13.7	1.00	0	0.81	75	20	5	1.03	21	0.70	0.90	0.151	0.77	0.566	0.572	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-5	SP	45.0	5.00	16.5	120	32	SPT	13.2	SM		5	SM	-28.5	5400	3310	1.0	15.2	1.00	13	0.78	75	31	13	1.07	33	0.77	0.90	0.373	0.72	0.544	0.549	0.7	Yes	0.79	Yes	Yes	Yes		0.7	0.8		3355	1.00	0.0		no	0
URS-5	CL	50.0		16.5	120	14	MC		CL		5	CL	-33.5	6000	3598	0.8	16.8	1.00	0	0.75	75	10	5	1.04	11	0.65	0.83	0.067	0.68	0.525	0.573	0.1	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.8		Total=	2.5
URS-8	CH	2.0		19.9	120	NA	NA		CH		5	CH	17.9	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-8	CL	5.0		19.9	120	26	MC		CL		5	CL	14.9	600	600	0.8	3.0	0.80	0	1.70	75	35	5	1.03	36	0.78	1.00	0.600	0.99	0.460	0.418	1.3		0.00	No	No	No		-	-						No	0
URS-8	CL	10.0		19.9	120	12	MC		CL		5	CL	9.9	1200	1200	0.8	4.6	0.85	0	1.29	75	13	5	1.04	14	0.67	1.00	0.113	0.99	0.456	0.415	0.2	Yes	1.00	No	No	No		-	-						No	0
URS-8	CL	15.0		19.9	120	9	SPT		CL		5	CL	4.9	1800	1794	1.0	6.1	0.95	0	1.06	75	11	5	1.04	12	0.66	1.00	0.087	0.97	0.451	0.410	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	20.0		19.9	120	12	MC		CL		5	CL	-0.1	2400	2082	0.8	7.6	0.95	0	0.98	75	11	5	1.04	12	0.66	1.00	0.083	0.95	0.506	0.460	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	25.0		19.9	120	11	MC		CL		5	CL	-5.1	3000	2370	0.8	9.1	0.95	0	0.92	75	10	5	1.05	10	0.65	0.96	0.071	0.92	0.537	0.508	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	30.0		19.9	120	19	MC		CL		5	CL	-10.1	3600	2658	0.8	10.7	1.00	0	0.87	75	16	5	1.04	17	0.69	0.93	0.116	0.87	0.548	0.536	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CH	35.0		19.9	120	14	MC		CH		5	CH	-15.1	4200	2946	0.8	12.2	1.00	0	0.82	75	12	5	1.04	12	0.66	0.89	0.077	0.82	0.544	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	SP	40.0	5.00	19.9	120	32	MC	16.6	SC		5	SC	-20.1	4800	3234	0.8	13.7	1.00	17	0.79	75	25	17	1.10	28	0.74	0.89	0.244	0.77	0.529	0.538	0.5	Yes	1.00	Yes	Yes	Yes		0.5	1.0		2854	1.51	0.9		Yes	5
URS-8	CL	45.0		19.9	120	12	SPT		CL		5	CL	-25.1	5400	3522	1.0	15.2	1.00	0	0.75	75	11	5	1.04	12	0.66	0.84	0.072	0.72	0.511	0.553	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	50.0		19.9	120	55	MC		CL		5	CL	-30.1	6000	3810	0.8	16.8	1.00	0	0.72	75	40	5	1.03	41	0.80	0.89	0.600	0.68	0.495	0.507	1.2		0.03	No	Yes	No		-	-						No	0
URS-8	CL/SP	60.0		19.9	120	47	MC	15	CL/SP		5	CL/SP	-40.1	7200	4386	0.8	19.8	1.00	15	0.68	75	32	15	1.08	34	0.77	0.85	0.372	0.63	0.477	0.512	0.8	Yes	0.58	No	Yes	No		-	-						No	0
URS-8	CL	70.0		19.9	120	14	SPT		CL		5	CL	-50.1	8400	4962	1.0	22.9	1.00	0	0.63	75	11	5	1.04	12	0.66	0.75	0.065	0.61	0.482	0.586	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	80.0		19.9	120	35	MC		CL		5	CL	-60.1	9600	5538	0.8	25.9	1.00	0	0.60	75	21	5	1.03	22	0.71	0.76	0.135	0.61	0.493	0.593	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	90.0		19.9	120	22	SPT		CL		5	CL	-70.1	10800	6114	1.0	29.0	1.00	0	0.57	75	16	5	1.04	16	0.68	0.71	0.087	0.61	0.502	0.640	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-8	CL	100.0		19.9	120	30	SPT		CL		5	CL	-80.1	12000	6690	1.0	32.0	1.00	0	0.55	75	21	5	1.03	21	0.71	0.71	0.123	0.61	0.510	0.651	0.2	Yes	1.00	No	Yes	No		-	-						No	0
																																				Estimated Settlement of Entire Boring Depth (inches) =								0.9		Total=	5.0
URS-9	CH	2.0		17.3	120	NA	NA		CH		5	CH	15.3	240	240	Check	2.1	0.75	0	1.70	75	#####	5	#####	######	######	1.00	#VALUE!	1.00	0.462	0.420	#######	#######	######	No	No	#VALUE!		#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-9	CL	5.0		17.3	120	16	MC		CL		5	CL	12.3	600	600	0.8	3.0	0.80	0	1.70	75	22	5	1.03	22	0.71	1.00	0.264	0.99	0.460	0.418	0.6	Yes	0.98	No	No	No		-	-						No	0
URS-9	CL	10.0		17.3	120	22	MC		CL		5	CL	7.3	1200	1200	0.8	4.6	0.85	0	1.29	75	24	5	1.03	25	0.72	1.00	0.261	0.99	0.456	0.415	0.6	Yes	0.98	No	No	No		-	-						No	0
URS-9	CL	15.0		17.3	120	18	MC		CL		5	CL	2.3	1800	1632	0.8	6.1	0.95	0	1.11	75	19	5	1.03	20	0.70	1.00	0.161	0.97	0.496	0.451	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	20.0		17.3	120	12	MC		CL		5	CL	-2.7	2400	1920	0.8	7.6	0.95	0	1.02	75	12	5	1.04	12	0.66	1.00	0.088	0.95	0.549	0.499	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	25.0		17.3	120	13	MC		CL		5	CL	-7.7	3000	2208	0.8	9.1	0.95	0	0.95	75	12	5	1.04	12	0.66	0.99	0.085	0.92	0.577	0.532	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	30.0		17.3	120	17	MC		CL		5	CL	-12.7	3600	2496	0.8	10.7	1.00	0	0.90	75	15	5	1.04	16	0.68	0.95	0.108	0.87	0.584	0.560	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	35.0		17.3	120	8	MC		CL		5	CL	-17.7	4200	2784	0.8	12.2	1.00	0	0.85	75	7	5	1.06	7	0.64	0.90	0.055	0.82	0.576	0.578	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	SP-SM	40.0		17.3	120	35	SPT	10.6	SP-SM		5	SP-SM	-22.7	4800	3072	1.0	13.7	1.00	11	0.81	75	35	11	1.06	37	0.79	0.92	0.512	0.77	0.557	0.549	0.9	Yes	0.27	Yes	Yes	Yes		0.9	0.3		3755	0.64	0.0		No	0
URS-9	SP-SM	45.0		17.3	120	38	SPT	10.6	SP-SM		5	SP-SM	-27.7	5400	3360	1.0	15.2	1.00	11	0.77	75	37	11	1.06	39	0.79	0.91	0.555	0.72	0.536	0.536	1.0		0.11	Yes	Yes	No		-	-						No	0
URS-9	CH	50.0		17.3	120	15	MC		CH		5	CH	-32.7	6000	3648	0.8	16.8	1.00	0	0.74	75	11	5	1.04	12	0.66	0.83	0.071	0.68	0.517	0.567	0.1	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	60.0		17.3	120	40	MC		CL		5	CL	-42.7	7200	4224	0.8	19.8	1.00	0	0.69	75	28	5	1.03	28	0.74	0.84	0.238	0.63	0.496	0.539	0.5	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	70.0		17.3	120	27	MC		CL		5	CL	-52.7	8400	4800	0.8	22.9	1.00	0	0.65	75	17	5	1.03	18	0.69	0.78	0.106	0.61	0.498	0.583	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	80.0		17.3	120	40	MC		CL		5	CL	-62.7	9600	5376	0.8	25.9	1.00	0	0.61	75	24	5	1.03	25	0.73	0.77	0.176	0.61	0.508	0.596	0.3	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	90.0		17.3	120	28	SPT		CL		5	CL	-72.7	10800	5952	1.0	29.0	1.00	0	0.58	75	20	5	1.03	21	0.70	0.74	0.125	0.61	0.516	0.637	0.2	Yes	1.00	No	Yes	No		-	-						No	0
URS-9	CL	100.0		17.3	120	38	MC		CL		5	CL	-82.7	12000	6528	0.8	32.0	1.00	0	0.55	75	21	5	1.03	22	0.71	0.72	0.129	0.61	0.523	0.660	0.2	Yes	1.00	No	Yes	No		-	-						No	0

I-880 at 23rd and 29th Ave.
Liquefaction Evaluation
Seed et al. (2003) Procedure

Earthquake Magnitude M = 7.30 (MCE)
Peak Ground Acceleration: 0.71 (g)
Vs,40 = 695 (fps) (S-CPT measurements)
MSF (Seed et, al., 2003) = 1.10

Boring ID	USCS class from boring log	Depth to Sample (ft)	Layer Thickness (ft)	GS Elev	γ_m (pcf)	Blows foot, N	Sampler code	% finer than No200	USCS class lab	PI	GWT Elev. Ft	Assigned Class.	Sample Elev. (ft)	σ_v, psf	σ_v', psf	Sampler Correction	Rod Length, m	CR	FC, %	C_N	ER	$N_{1,60}$	Capped FC	C_{Fines}	$(N_1)_{60cs}$	f	Kσ	CRR	Rd	CSR	CSR*	FS_L	FS_L < 1	P_L	Liquefaction Susceptibility	Below GWT	Assessment	FS_L	P_L	Lookup Num	Vol. Strain (%)	Settlement (inches)	PI	Final Enginering Judgment	Liquefied Layer Thickness (ft)
																																				Estimated Settlement of Entire Boring Depth (inches) =							0.0		Total=	0.0
URS-11	CL	1.0		13.4	120	NA	NA		CL		5	CL	12.4	120	120	Check	1.8	0.75	0	1.70	75	#####	5	#####	#####	#####	1.00	#VALUE!	1.00	0.462	0.420	#####	#####	#####	No	No	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!
URS-11	CH	5.0		13.4	120	21	MC		CH		5	CH	8.4	600	600	0.8	3.0	0.80	0	1.70	75	29	5	1.03	29	0.75	1.00	0.444	0.99	0.460	0.418	1.0	Yes	0.29	No	No	No	-	-					No	0
URS-11	CL	10.0		13.4	120	14	MC		CL		5	CL	3.4	1200	1100	0.8	4.6	0.85	0	1.35	75	16	5	1.04	17	0.68	1.00	0.144	0.99	0.497	0.452	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	SC	15.0		13.4	120	36	SPT	16.9	SC		5	SC	-1.6	1800	1388	1.0	6.1	0.95	17	1.20	75	51	17	1.08	56	0.80	1.00	0.600	0.97	0.583	0.530	1.0		0.00	Yes	Yes	No	-	-					No	0
URS-11	CL	20.0		13.4	120	15	MC		CL		5	CL	-6.6	2400	1676	0.8	7.6	0.95	0	1.09	75	16	5	1.04	16	0.68	1.00	0.123	0.95	0.629	0.572	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	25.0		13.4	120	3	SPT		CH		5	CH	-11.6	3000	1964	1.0	9.1	0.95	0	1.01	75	4	5	1.09	4	0.62	1.00	0.047	0.92	0.648	0.589	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	27.0		13.4	120		Shelby		CH		5	CH	-13.6	3240	2079	1.0	9.8	0.95	0	0.98	75	0	5	0.00	0	0.60	1.00	0.035	0.90	0.650	0.591	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	30.0		13.4	120	13	MC		CH		5	CH	-16.6	3600	2252	0.8	10.7	1.00	0	0.94	75	12	5	1.04	13	0.66	0.98	0.088	0.87	0.647	0.601	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	35.0		13.4	120	10	MC		CH		5	CH	-21.6	4200	2540	0.8	12.2	1.00	0	0.89	75	9	5	1.05	9	0.65	0.94	0.066	0.82	0.631	0.612	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	40.0		13.4	120	12	MC		CL		5	CL	-26.6	4800	2828	0.8	13.7	1.00	0	0.84	75	10	5	1.04	11	0.65	0.90	0.070	0.77	0.605	0.609	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	45.0		13.4	120	15	SPT		CL		5	CL	-31.6	5400	3116	1.0	15.2	1.00	0	0.80	75	15	5	1.04	16	0.68	0.88	0.100	0.72	0.578	0.595	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	50.0		13.4	120	17	MC		CL		5	CL	-36.6	6000	3404	0.8	16.8	1.00	0	0.77	75	13	5	1.04	14	0.67	0.85	0.083	0.68	0.554	0.590	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	60.0		13.4	120	21	SPT		CL		5	CL	-46.6	7200	3980	1.0	19.8	1.00	0	0.71	75	19	5	1.03	19	0.70	0.83	0.122	0.63	0.526	0.579	0.2	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	70.0		13.4	120	20	MC		CL		5	CL	-56.6	8400	4556	0.8	22.9	1.00	0	0.66	75	13	5	1.04	14	0.67	0.78	0.078	0.61	0.524	0.615	0.1	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	80.0		13.4	120	38	MC		CL		5	CL	-66.6	9600	5132	0.8	25.9	1.00	0	0.62	75	24	5	1.03	24	0.72	0.78	0.169	0.61	0.532	0.619	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	90.0		13.4	120	41	MC		CL		5	CL	-76.6	10800	5708	0.8	29.0	1.00	0	0.59	75	24	5	1.03	25	0.73	0.76	0.171	0.61	0.538	0.643	0.3	Yes	1.00	No	Yes	No	-	-					No	0
URS-11	CL	100.0		13.4	120	36	SPT		CL		5	CL	-86.6	12000	6284	1.0	32.0	1.00	0	0.56	75	25	5	1.03	26	0.73	0.75	0.181	0.61	0.543	0.662	0.3	Yes	1.00	No	Yes	No	-	-					No	0
																																			Estimated Settlement of Entire Boring Depth (inches) =							0.0		Total=	0.0

Note:
1. Highlight cell is assumed value

Final Enginering Judgment is based on:
1.N160cs: if N160cs>35, no liquification problem
2.Induced settlement: if induced settlement is limited and the liquefied layer is deep, no liquefaction problem

Foundation Design Data Sheet - 29th Avenue Off Ramp									
Support No.		Design Method	Pile Type	Finished Grade Elevation (ft)	Cut Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles per Support
						B	L		
Abut 1		WSD	24 inch CIDH	23	17.75	10	58	1	18
Abutment 1 RW	Left	LFRD	24 inch CIDH	23	17.75	10	41	1	11
	Right	LFRD	24 inch CIDH	24	17.75	10	32	1	8
Bent 2	Left	LFRD	72 inch CIDH	21.5	19.5	N/A	N/A	1	1
	Right	LFRD	72 inch CIDH	23	19.5	N/A	N/A	1	1
Bent 3	Left	LFRD	72 inch CIDH	20.25	18.25	N/A	N/A	1	1
	Center	LFRD	72 inch CIDH	21	18.25	N/A	N/A	1	1
	Right	LFRD	72 inch CIDH	22.5	18.25	N/A	N/A	1	1

Foundation Design Loads - 29th Avenue Off Ramp

	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
Support No.	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut 1	2096	134	1681	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 1 RW Left	1457	142	1357	1968	185	N/A	N/A	1357	208	N/A	N/A
Abut 1 RW Right	1078	137	1000	1457	191	N/A	N/A	1000	213	N/A	N/A
Bent 2	1378	N/A	1002	2183	N/A	N/A	N/A	1002	N/A	0	N/A
Bent 3	1098	N/A	720	1365	N/A	N/A	N/A	720	N/A	0	N/A

29th OC - Abutment Loading

Total Load Per Pile Group

Location	Max Service Loading		Max Strength Loading		Max Seismic Loading	
	Axial (k)	Lateral (k)	Axial (k)	Lateral (k)	Axial (k)	Lateral (k)
Abutment 1	1947	314	N/A	N/A	N/A	N/A
Abutment 1 RW Left	506	99	661	149	453	111
Abutment 1 RW Right	685	134	895	203	613	147
Abutment 8	2032	260	N/A	N/A	N/A	N/A
Abutment 8 RW Left	703	138	928	207	639	147
Abutment 8 RW Right	573	102	746	156	518	112

WSD Foundations Design Recommendations								
Support	Pile	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) pier Support (Compression)		LRFD Service-1 Limit State Total Load (kips) Per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	24" CIDH	17.5	2096	1681	134	270	-30 (a) -12 (c) -11 (d)	-30

Notes:

1. Design tip elevations are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load, respectively.
2. The speciifed tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (very soft, liquefiable, scourable, etc.), if any, which do not contribute to the design resistance.
4. Design tip elvation for Lateral Load is typically provided by SD.

LRFD Foundations Design Recommendations									
Support	Pile Type	Cut-off Elevation (ft)	LRFD Service-1 Limit State Load (kips) per Support	Required Factored Nominal Resistnace				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
				Strength Limit		Extrememe Event			
				Comp. (ϕ = 0.7)	Tension (ϕ = 0.7)	Comp. (ϕ = 1.0)	Tension (ϕ = 1.0)		
Abut 1 RW - Left	24" CIDH	17.5	1457	264	N/A	208	30	-29 (a-I) N/A (b-I) -21 (a-II) 9 (b-II) -13 (c) -11 (d)	-29
Abut 1 RW - Right	24" CIDH	17.5	1078	273	N/A	213	38	-30 (a-I) N/A (b-I) -21 (a-II) 8 (b-II) -13 (c) -17 (d)	-30
Bent 2 Left	72" CIDH	19.5	1378	3119	N/A	1002	N/A	-102 (a-I) N/A (b-I) -40 (a-II) N/A (b-II) -48 (c) -57 (d)	-102
Bent 2 Right	72" CIDH	19.5	1378	3119	N/A	1002	N/A	-102 (a-I) N/A (b-I) -40 (a-II) N/A (b-II) -48 (c) -57 (d)	-102
Bent 3 Left	72" CIDH	18.25	1098	1950	N/A	720	N/A	-72 (a-I) N/A (b-I) -29 (a-II) N/A (b-II) -45 (c) -50 (d)	-72
Bent 3 Center	72" CIDH	18.25	1098	1950	N/A	720	N/A	-72 (a-I) N/A (b-I) -29 (a-II) N/A (b-II) -45 (c) -50 (d)	-72
Bent 3 Right	72" CIDH	18.25	1098	1950	N/A	720	N/A	-72 (a-I) N/A (b-I) -29 (a-II) N/A (b-II) -45 (c) -50 (d)	-72

Notes:

1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension Strength (Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, (d) Lateral Load.
2. The speciifed tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (very soft, liquefiable, scourable, etc.), if any, which do not contribute to the design resistance.
4. Design tip elvation for Lateral Load is typically provided by SD.

29th AVE. Off Ramp Abut1

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	23.00
Bottom of footing elevation / Pile top elevation (feet)	17.75
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-42.25

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

											Cohesive Soil						Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	5.25	0.0	0	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.79	0.79	125.00	656.25	0.00	656.25	0.00	0.00	0.00	16
14.696	2.116	17	6.25	1.0	12	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	781.25	0.00	781.25	0.00	0.00	0.00	15
14.696	2.116	16	7.25	2.0	24	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.76	0.76	125.00	906.25	0.00	906.25	0.69	6.91	6.91	14
14.696	2.116	15	8.25	3.0	36	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.74	0.74	125.00	1031.25	0.00	1031.25	0.76	6.74	13.65	13
14.696	2.116	14	9.25	4.0	48	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.73	0.73	125.00	1156.25	0.00	1156.25	0.84	6.57	20.22	12
14.696	2.116	13	10.25	5.0	60	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.71	0.71	125.00	1281.25	0.00	1281.25	0.91	6.39	26.61	11
14.696	2.116	12	11.25	6.0	72	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.70	0.70	125.00	1406.25	0.00	1406.25	0.98	6.22	32.83	10
14.696	2.116	11	12.25	7.0	84	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1531.25	0.00	1531.25	1.05	6.05	38.88	9
14.696	2.116	10	13.25	8.0	96	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1656.25	15.60	1640.65	1.10	5.87	44.75	8
14.696	2.116	9	14.25	9.0	108	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.66	0.66	125.00	1781.25	78.00	1703.25	1.12	5.70	50.45	7
14.696	2.116	8	15.25	10.0	120	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.65	0.65	125.00	1906.25	140.40	1765.85	1.14	5.53	55.98	6
14.696	2.116	7	16.25	11.0	132	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	2031.25	202.80	1828.45	1.16	5.36	61.34	5
14.696	2.116	6	17.25	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2156.25	265.20	1891.05	1.18	5.18	66.52	4
14.696	2.116	5	18.25	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2281.25	327.60	1953.65	1.20	5.18	71.71	3
14.696	2.116	4	19.25	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2406.25	390.00	2016.25	1.22	5.18	76.89	2
14.696	2.116	3	20.25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2531.25	452.40	2078.85	1.24	5.18	82.07	1
14.696	2.116	2	21.25	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2656.25	514.80	2141.45	1.25	5.18	87.26	0
14.696	2.116	1	22.25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2781.25	577.20	2204.05	1.27	5.18	92.44	-1
14.696	2.116	0	23.25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2906.25	639.60	2266.65	1.28	5.18	97.62	-2
14.696	2.116	-1	24.25	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3031.25	702.00	2329.25	1.29	5.18	102.81	-3
14.696	2.116	-2	25.25	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3156.25	764.40	2391.85	1.31	5.18	107.99	-4
14.696	2.116	-3	26.25	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3281.25	826.80	2454.45	1.39	5.18	113.18	-5
14.696	2.116	-4	27.25	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.58	0.58	125.00	3406.25	889.20	2517.05	1.47	5.18	118.36	-6
14.696	2.116	-5	28.25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.60	0.60	125.00	3531.25	951.60	2579.65	1.54	5.18	123.54	-7
14.696	2.116	-6	29.25	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.61	0.61	125.00	3656.25	1014.00	2642.25	1.62	5.18	128.73	-8
14.696	2.116	-7	30.25	25.0	300	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12.5	0.63	0.63	125.00	3781.25	1076.40	2704.85	1.70	5.25	133.98	-9
15.696	2.260	-8	31.25	26.0	312	1.55	10.75	0.685	0	0.55	0.55	0.851	5.91	13	0.64	0.64	125.00	3906.25	1138.80	2767.45	1.78	5.35	139.32	-10
16.696	2.404	-9	32.25	27.0	324	1.58	10.94	0.655	0	0.55	0.55	0.867	6.02	13.5	0.66	0.66	125.00	4031.25	1201.20	2830.05	1.86	5.44	144.77	-11
17.696	2.548	-10	33.25	28.0	336	1.60	11.14	0.629	0	0.55	0.55	0.882	6.13	14	0.67	0.67	125.00	4156.25	1263.60	2892.65	1.94	5.54	150.31	-12
18.696	2.692	-11	34.25	29.0	348	1.63	11.33	0.606	0	0.55	0.55	0.898	6.23	14.5	0.68	0.68	125.00	4281.25	1326.00	2955.25	2.02	5.64	155.95	-13
19.696	2.836	-12	35.25	30.0	360	1.66	11.53	0.585	0	0.55	0.55	0.913	6.34	15	0.70	0.70	125.00	4406.25	1388.40	3017.85	2.10	5.74	161.69	-14
20.696	2.980	-13	36.25	31.0	372	1.69	11.72	0.567	0	0.55	0.55	0.929	6.45	15.5	0.69	0.69	125.00	4531.25	1450.80	3080.45	2.11	5.83	167.52	-15
21.696	3.124	-14	37.25	32.0	384	1.72	11.92	0.549	0	0.55	0.55	0.944	6.56	16	0.67	0.67	125.00	4656.25	1513.20	3143.05	2.12	5.93	173.45	-16
22.696	3.268	-15	38.25	33.0	396	1.74	12.12	0.534	0	0.55	0.55	0.960	6.66	16.5	0.66	0.66	125.00	4781.25	1575.60	3205.65	2.13	6.03	179.48	-17
23.696	3.412	-16	39.25	34.0	408	1.77	12.31	0.520	0	0.55	0.55	0.975	6.77	17	0.65	0.65	125.00	4906.25	1638.00	3268.25	2.13	6.13	185.61	-18
24.696	3.556	-17	40.25	35.0	420	1.80	12.51	0.506	0	0.55	0.55	0.991	6.88	17.5	0.64	0.64	125.00	5031.25	1700.40	3330.85	2.14	6.22	191.83	-19
25.696	3.700	-18	41.25	36.0	432	1.83	12.70	0.494	0	0.55	0.55	1.006	6.99	18	0.63	0.63	125.00	5156.25	1762.80	3393.45	2.14	6.32	198.16	-20
26.696	3.844	-19	42.25	37.0	444	1.86	12.90	0.483	0	0.55	0.55	1.022	7.09	18.5	0.62	0.62	125.00	5281.25	1825.20	3456.05	2.15	6.42	204.57	-21
27.696	3.988	-20	43.25	38.0	456	1.89	13.09	0.473	0	0.55	0.55	1.037	7.20	19	0.61	0.61	125.00	5406.25	1887.60	3518.65	2.15	6.52	211.09	-22
28.696	4.132	-21	44.25	39.0	468	1.91	13.29	0.463	0	0.55	0.55	1.053	7.31	19.5	0.60	0.60	125.00	5531.25	1950.00	3581.25	2.15	6.61	217.70	-23
29.696	4.276	-22	45.25	40.0	480	1.94	13.49	0.454	0	0.55	0.55	1.068	7.42	20	0.59	0.59	125.00	5656.25	2012.40	3643.85	2.15	6.71	224.41	-24
30.696	4.420	-23	46.25	41.0	492	1.97	13.68	0.446	0	0.55	0.55	1.084	7.52	20.5	0.58	0.58	125.00	5781.25	2074.80	3706.45	2.15	6.81	231.22	-25
31.696	4.564	-24	47.25	42.0	504	2.00	13.88	0.438	0	0.55	0.55	1.099	7.63	21	0.57	0.57	125.00	5906.25	2137.20	3769.05	2.15	6.91	238.13	-26
32.696	4.708	-25	48.25	43.0	516	2.03	14.07	0.430	0	0.55	0.55	1.114	7.74	21.5	0.56	0.56	125.00	6031.25	2199.60	3831.65	2.15	7.00	245.13	-27
33.696	4.852	-26	49.25	44.0	528	2.05	14.27	0.423	0	0.55	0.55	1.130	7.85	22	0.55	0.55	125.00	6156.25	2262.00	3894.25	2.14	7.10	252.23	-28
34.696	4.996	-27	50.25	45.0	540	2.08	14.46	0.417	0	0.55	0.55	1.145	7.95	22.5	0.54	0.54	125.00	6281.25	2324.40	3956.85	2.14	7.20	259.43	-29
35.696	5.140	-28	51.25	46.0	552	2.11	14.66	0.411	0	0.55	0.55	1.161	8.06	23	0.53	0.53	125.00	6406.25	2386.80	4019.45	2.14	7.29	266.72	-30
36.696	5.284	-29	52.25	47.0	564	2.14	14.85	0.405	0	0.55	0.55	1.176	8.17	23.5	0.52	0.52	125.00	6531.25	2449.20	4082.05	2.13	7.39	274.11	-31
37.696	5.428	-30	53.25	48.0	576	2.17	15.05	0.399	0	0.55	0.55	1.192	8.28	24	0.51	0.51	125.00	6656.25	2511.60	4144.65	2.13	7.49	281.60	-32
38.696	5.572	-31	54.25	49.0	588	2.20	15.25	0.394	0	0.55	0.55	1.207	8.39	24.5	0.50	0.50	125.00	6781.25	2574.00	4207.25	2.12	7.59	289.19	-33
39.696	5.716	-32	55.25	50.0	600	2.22	15.44	0.389	0	0.55	0.55	1.223	8.49	25	0.49	0.49	125.00	6906.25	2636.40	4269.85	2.11	7.68	296.87	-34
40.696	5.860	-33	56.25	51.0	612	2.25	15.64	0.384	0	0.55	0.55	1.238	8.60	25.5	0.49	0.49	125.00	7031.25	2698.80	4332.45	2.10	7.78	304.65	-35
41.696	6.004	-34	57.25	52.0	624	2.28	15.83	0.380	0	0.55	0.55	1.254	8.71	26	0.48	0.48	125.00	7156.25	2761.20	4395.05	2.09	7.88	312.53	-36
42.696	6.148	-35	58.25	53.0	636	2.31	16.03	0.375	0	0.55	0.55	1.269	8.82	26.5	0.47	0.47	125.00	7281.25	2823.60	4457.65	2.08	7.98	320.51	-37
43.696	6.292	-36	59.25	54.0	648	2.34	16.22	0.371	0	0.55	0.55	1.285	8.92	27	0.46	0.46	125.00	7406.25	2886.00	4520.25	2.07	8.07	328.58	-38
44.696	6.436	-37	60.25	55.0	660	2.36	16.42	0.367	0	0.55	0.55	1.300	9.03	27.5	0.45	0.45	125.00	7531.25	2948.40	4582.85	2.06	8.17	336.75	-39
45.696	6.580	-38	61.25	56.0	672	2.39	16.62	0.364	0	0.55	0.55	1.316	9.14	28	0.44	0.44	125.00	7656.25	3010.80	4645.45	2.05	8.27	345.02	-40
46.696	6.724	-39	62.25	57.0	684	2.42	16.81	0.360	0	0.55	0.55	1.331	9.25	28.5	0.43	0.43	125.00	7781.25	3073.20	4708.05	2.04	8.37	353.39	-41
47.696	6.868	-40	63.25	58.0	696	2.45	17.01	0.357	0	0.55	0.55	1.347	9.35	29	0.42	0.42	125.00	7906.25	3135.60	4770.65	2.02	8.46	361.85	-42
48.696	7.012	-41	64.25	59.0	708	2.48	17.20	0.353	0	0.55	0.55	1.362	9.46	29.5	0.42	0.42	125.00	8031.25	3198.00	4833.25	2.01	8.56	370.41	-43
49.696	7.156	-42	65.25	60.0	720	2.51	17.40	0.350	0	0.55	0.55	1.378	9.57	30	0.41	0.41	125.00	8156.25	3260.40	4895.85	1.99	8.66	379.07	-44
50.696	7.300	-43	66.25	61.0	732	2.53	17.59	0.347	0	0.55	0.55	1.393	9.68	30.5	0.40	0.40	125.00	8281.25	3322.80	4958.45	1.98	8.75	387.82	-45
51.696	7.444	-44	67.25	62.0	744	2.56	17.79	0.344	0	0.55	0.55	1.409	9.78	31	0.39	0.39	125.00	8406.25	3385.20	5021.05	1.96	8.85	396.67	-46
52.696	7.588	-45	68.25	63.0	756	2.59	17.98	0.341	0	0.55	0.55	1.424	9.89	31.5	0.38	0.38	125.00	8531.25	3447.60	5083.65	1.94	8.95	405.62	-47
53.696	7.732	-46	69.25	64.0	768	2.62	18.18	0.339	0	0.55	0.55	1.440	10.00	32	0.37	0.37	125.00	8656.25	3510.00	5146.25	1.93	9.05	414.67	-48
54.696	7.876	-47	70.25	65.0	780	2.65	18.38	0.336	0	0.55	0.55	1.455	10.11	32.5	0.37	0.37	125.00	8781.25	3572.40	5208.85	1.91	9.14	423.81	-49
55.696	8.020	-48	71.25	66.0	792	2.67	18.57	0.333	0	0.55	0.55	1.471	10.21	33	0.36	0.36	125.00	8906.25	3634.80	5271.45	1.89	9.24	433.06	-50
56.696	8.164	-49	72.25	67.0	804	2.70	18.77	0.331	0	0.55	0.55	1.486	10.32	33.5	0.35	0.35	125.00	9031.25	3697.20	5334.05	1.87	9.34	442.39	-51
57.696	8.308	-50	73.25	68.0	816	2.73	18.96	0.329	0	0.55	0.55	1.502	10.43	34	0.34	0.34	125.00	9156.25	3759.60	5396.65	1.85	9.44	451.83	-52
58.696	8.452	-51	74.25	69.0	828	2.76	19.16	0.326	0	0.55	0.55	1.517	10.54	34.5	0.33	0.33	125.00	9281.25	3822.00	5459.25	1.83	9.53	461.36	-53
59.696	8.596	-52	75.25	70.0	840	2.79	19.35	0.324	0	0.55	0.55	1.533	10.64	35	0.33	0.33	125.00	9406.25	3884.40	5521.85	1.80	9.63	471.00	-54
60.696	8.740	-53	76.25	71.0	852	2.82	19.55	0.322	0	0.55	0.55	1.548	10.75	35.5	0.32	0.32	125.00	9531.25	3946.80	5584.45	1.78	9.73	480.72	-55
61.696	8.884	-54	77.25	72.0	864	2.84	19.75	0.320	0	0.55	0.55	1.564	10.86	36	0.31	0.31	125.00	9656.25	4009.20	5647.05	1.76	9.83	490.55	-56
62.696	9.028	-55	78.25	73.0	876	2.87	19.94	0.318	0	0.55	0.55	1.579	10.97	36.5	0.30	0.30	125.00	9781.25	4071.60	5709.65	1.73	9.92	500.47	-57
63.696	9.172	-56	79.25	74.0	888	2.90	20.14	0.316	0	0.55	0.55	1.595	11.07	37	0.30	0.30	125.00	9906.25	4134.00	5772.25	1.71	10.02	510.49	-58
64.696	9.316	-57	80.25	75.0	900	2.93	20.33	0.314	0	0.55	0.55	1.610	11.18	37.5	0.29	0.29	125.00	10031.25	4196.40	5834.85	1.68	10.12	520.61	-59
65.696	9.460	-58	81.25	76.0	912	2.96	20.53	0.312	0	0.55	0.55	1.626	11.29	38	0.28	0.28	125.00	10156.25	4258.80	5897.45	1.66	10.22	530.83	-60
66.696	9.604	-59	82.25	77.0	924	2.98	20.72	0.311	0	0.55	0.55	1.641	11.40	38.5	0.27	0.27	125.00	10281.25	4321.20	5960.05	1.63	10.31	541.14	-61
67.696	9.748	-60	83.25	78.0	936	3.01	20.92	0.309	0	0.55	0.55	1.657	11.51	39	0.27	0.27	125.00	10406.25	4383.60	6022.65	1.60	10.41	551.55	-62
68.696	9.892	-61	84.25	79.0	948	3.04	21.11	0.307	0	0.55	0.55	1.672	11.61	39.5	0.26	0.26	125.00	10531.25	4446.00	6085.25	1.57	10.51	562.06	-63
69.696	10.036	-62	85.25	80.0	960	3.07	21.31	0.306	0	0.55	0.55	1.688	11.72	40	0.25	0.25	125.00	10656.25	4508.40	6147.85	1.54	10.60	572.66	-64
70.696	10.180	-63	86.25	81.0	972	3.10	21.51	0.304	0	0.55	0.55	1.703	11.83	40.5	0.24	0.25	125.00	10781.25	4570.80	6210.45	1.55	10.70	583.36	-65
71.696	10.324	-64	87.25	82.0	984	3.12	21.70	0.303	0	0.55	0.55	1.719	11.94	41	0.24	0.25	125.00	10906.25	4633.20	6273.05	1.57	10.80	594.16	-66
72.696	10.468	-65	88.25	83.0	996	3.15	21.90	0.301	0	0.55	0.55	1.734	12.04	41.5	0.23	0.25	125.00	11031.25	4695.60	6335.65	1.58	10.90	605.06	-67
73.696	10.612	-66	89.25	84.0	1008	3.18	22.09	0.300	0	0.55	0.55	1.750	12.15	42	0.22	0.25	125.00	11156.25	4758.00	6398.25	1.60	10.99	616.05	-68
74.696	10.756	-67	90.25	85.0	1020	3.21	22.29	0.298	0	0.55	0.55	1.765	12.26	42.5	0.22	0.25	125.00	11281.25	4820.40	6460.85	1.62	11.09	627.14	-69
75.696	10.900	-68	91.25	86.0	1032	3.24	22.48	0.297	0	0.55	0.55	1.781	12.37	43	0.21	0.25	125.00	11406.25	4882.80	6523.45	1.63	11.19	638.33	-70
76.696	11.044	-69	92.25	87.0	1044	3.27	22.68	0.296	0	0.55	0.55	1.796	12.47	43.5	0.20	0.25	125.00	11531.25	4945.20	6586.05	1.65	11.29	649.62	-71
77.696	11.188	-70	93.25	88.0	1056	3.29	22.88	0.294	0	0.55	0.55	1.812	12.58	44	0.19	0.25	125.00	11656.25	5007.60	6648.65	1.66	11.38	661.00	-72
78.696	11.332	-71	94.25	89.0	1068	3.32	23.07	0.293	0	0.55	0.55	1.827	12.69	44.5	0.19	0.25	125.00	11781.25	5070.00	6711.25	1.68	11.48	672.48	-73
79.696	11.476	-72	95.25	90.0	1080	3.35	23.27	0.292	0	0.55	0.55	1.843	12.80	45	0.18	0.25	125.00	11906.25	5132.40	6773.85	1.69	11.58	684.06	-74
80.696	11.620	-73	96.25	91.0	1092	3.38	23.46	0.291	0	0.55	0.55	1.858	12.90	45.5	0.17	0.25	125.00	12031.25	5194.80	6836.45	1.71	11.68	695.73	-75
81.696	11.764	-74	97.25	92.0	1104	3.41	23.66	0.290	0	0.55	0.55	1.874	13.01	46	0.17	0.25	125.00	12156.25	5257.20	6899.05	1.72	11.77	707.51	-76
82.696	11.908	-75	98.25	93.0	1116	3.43	23.85	0.288	0	0.55	0.55	1.889	13.12	46.5	0.16	0.25	125.00	12281.25	5319.60	6961.65	1.74	11.87	719.38	-77
83.696	12.052	-76	99.25	94.0	1128	3.46	24.05	0.287	0	0.55	0.55	1.905	13.23	47	0.15	0.25	125.00	12406.25	5382.00	7024.25	1.76	11.97	731.34	-78
84.696	12.196	-77	100.25	95.0	1140	3.49	24.24	0.286	0	0.55	0.55	1.920	13.33	47.5	0.15	0.25	125.00	12531.25	5444.40	7086.85	1.77	12.06	743.41	-79
85.696	12.340	-78	101.25	96.0	1152	3.52	24.44	0.285	0	0.55	0.55	1.936	13.44	48	0.14	0.25	125.00	12656.25	5506.80	7149.45	1.79	12.16	755.57	-80
86.696	12.484	-79	102.25	97.0	1164	3.55	24.64	0.284	0	0.55	0.55	1.951	13.55	48.5	0.13	0.25	125.00	12781.25	5569.20	7212.05	1.80	12.26	767.83	-81
87.696	12.628	-80	103.25	98.0	1176	3.58	24.83	0.283	0	0.55	0.55	1.967	13.66	49	0.13	0.25	125.00	12906.25	5631.60	7274.65	1.82	12.36	780.19	-82
88.696	12.772	-81	104.25	99.0	1188	3.60	25.03	0.282	0	0.55	0.55	1.982	13.76	49.5	0.12	0.25	125.00	13031.25	5694.00	7337.25	1.83	12.45	792.64	-83
89.696	12.916	-82	105.25	100.0	1200	3.63	25.22	0.281	0	0.55	0.55	1.998	13.87	50	0.11	0.25	125.00	13156.25	5756.40	7399.85	1.85	12.55	805.19	-84
90.696	13.060	-83	106.25	101.0	1212	3.66	25.42	0.280	0	0.55	0.55	2.013	13.98	50.5	0.11	0.25	125.00	13281.25	5818.80	7462.45	1.87	12.65	817.84	-85
91.696	13.204	-84	107.25	102.0	1224	3.69	25.61	0.279	0	0.55	0.55	2.029	14.09	51	0.10	0.25	125.00	13406.25	5881.20	7525.05	1.88	12.75	830.59	-86
92.696	13.348	-85	108.25	103.0	1236	3.72	25.81	0.278	0	0.55	0.55	2.044	14.20	51.5	0.09	0.25	125.00	13531.25	5943.60	7587.65	1.90	12.84	843.43	-87
93.696	13.492	-86	109.25	104.0	1248	3.74	26.01	0.278	0	0.55	0.55	2.060	14.30	52	0.09	0.25	125.00	13656.25	6006.00	7650.25	1.91	12.94	856.37	-88
94.696	13.636	-87	110.25	105.0	1260	3.77	26.20	0.277	0	0.55	0.55	2.075	14.41	52.5	0.08	0.25	125.00	13781.25	6068.40	7712.85	1.93	13.04	869.41	-89
95.696	13.780	-88	111.25	106.0	1272	3.80	26.40	0.276	0	0.55	0.55	2.091	14.52	53	0.07	0.25	125.00	13906.25	6130.80	7775.45	1.94	13.14	882.54	-90
96.696	13.924	-89	112.25	107.0	1284	3.83	26.59	0.275	0	0.55	0.55	2.106	14.63	53.5	0.07	0.25	125.00	14031.25	6193.20	7838.05	1.96	13.23	895.78	-91
97.696	14.068	-90	113.25	108.0	1296	3.86	26.79	0.274	0	0.55	0.55	2.122	14.73	54	0.06	0.25	125.00	14156.25	6255.60	7900.65	1.98	13.33	909.11	-92
98.696	14.212	-91	114.25	109.0	1308	3.89	26.98	0.273	0	0.55	0.55	2.137	14.84	54.5	0.05	0.25	125.00	14281.25	6318.00	7963.25	1.99	13.43	922.54	-93
99.696	14.356	-92	115.25	110.0	1320	3.91	27.18	0.273	0	0.55	0.55	2.153	14.95	55	0.05	0.25	125.00	14406.25	6380.40	8025.85	2.01	13.52	936.06	-94
100.696	14.500	-93	116.25	111.0	1332	3.94	27.37	0.272	0	0.55	0.55	2.168	15.06	55.5	0.04	0.25	125.00	14531.25	6442.80	8088.45	2.02	13.62	949.68	-95
101.696	14.644	-94	117.25	112.0	1344	3.97	27.57	0.271	0	0.55	0.55	2.184	15.16	56	0.04	0.25	125.00	14656.25	6505.20	8151.05	2.04	13.72	963.40	-96
102.696	14.788	-95	118.25	113.0	1356	4.00	27.77	0.270	0	0.55	0.55	2.199	15.27	56.5	0.03	0.25	125.00	14781.25	6567.60	8213.65	2.05	13.82	977.22	-97
103.696	14.932	-96	119.25	114.0	1368	4.03	27.96	0.270	0	0.55	0.55	2.215	15.38	57	0.02	0.25	125.00	14906.25	6630.00	8276.25	2.07	13.91	991.13	-98
104.696	15.076	-97	120.25	115.0	1380	4.05	28.16	0.269	0	0.55	0.55	2.230	15.49	57.5	0.02	0.25	125.00	15031.25	6692.40	8338.85	2.08	14.01	1005.15	-99
105.696	15.220	-98	121.25	116.0	1392	4.08	28.35	0.268	0	0.55	0.55	2.246	15.59	58	0.01	0.25	125.00	15156.25	6754.80	8401.45	2.10	14.11	1019.25	-100
106.696	15.364	-99	122.25	117.0	1404	4.11	28.55	0.268	0	0.55	0.55	2.261	15.70	58.5	0.00	0.25	125.00	15281.25	6817.20	8464.05	2.12	14.21	1033.46	-101
107.696	15.508	-100	123.25	118.0	1416	4.14	28.74	0.267	0	0.55	0.55	2.277	15.81	59	0.00	0.25	125.00	15406.25	6879.60	8526.65	2.13	14.30	1047.76	-102
108.696	15.652	-101	124.25	119.0	1428	4.17	28.94	0.266	0	0.55	0.55	2.292	15.92	59.5	-0.01	0.25	125.00	15531.25	6942.00	8589.25	2.15	14.40	1062.17	-103
109.696	15.796	-102	125.25	120.0	1440	4.20	29.14	0.266	0	0.55	0.55	2.307	16.02	60	-0.01	0.25	125.00	15656.25	7004.40	8651.85	2.16	14.50	1076.66	-104
110.696	15.940	-103	126.25	121.0	1452	4.22	29.33	0.265	0	0.55	0.55	2.323	16.13	60.5	-0.02	0.25	125.00	15781.25	7066.80	8714.45	2.18	14.60	1091.26	-105
111.696	16.084	-104	127.25	122.0	1464	4.25	29.53	0.264	0	0.55	0.55	2.338	16.24	61	-0.03	0.25	125.00	15906.25	7129.20	8777.05	2.19	14.69	1105.95	-106
112.696	16.228	-105	128.25	123.0	1476	4.28	29.72	0.264	0	0.55	0.55	2.354	16.35	61.5	-0.03	0.25	125.00	16031.25	7191.60	8839.65	2.21	14.79	1120.74	-107
113.696	16.372	-106	129.25	124.0	1488	4.31	29.92	0.263	0	0.55	0.55	2.369	16.45	62	-0.04	0.25	125.00	16156.25	7254.00	8902.25	2.23	14.89	1135.63	-108
114.696	16.516	-107	130.25	125.0	1500	4.34	30.11	0.263	0	0.55	0.55	2.385	16.56	62.5	-0.04	0.25	125.00	16281.25	7316.40	8964.85	2.24	14.99	1150.62	-109
115.696	16.660	-108	131.25	126.0	1512	4.36	30.31	0.262	0	0.55	0.55	2.400	16.67	63	-0.05	0.25	125.00	16406.25	7378.80	9027.45	2.26	15.08	1165.70	-110
116.696	16.804	-109	132.25	127.0	1524	4.39	30.50	0.261	0	0.55	0.55	2.416	16.78	63.5	-0.06	0.25	125.00	16531.25	7441.20	9090.05	2.27	15.18	1180.88	-111
117.696	16.948	-110	133.25	128.0	1536	4.42	30.70	0.261	0	0.55	0.55	2.431	16.89	64	-0.06	0.25	125.00	16656.25	7503.60	9152.65	2.29	15.28	1196.16	-112
118.696	17.092	-111	134.25	129.0	1548	4.45	30.90	0.260	0	0.55	0.55	2.447	16.99	64.5	-0.07	0.25	125.00	16781.25	7566.00	9215.25	2.30	15.37	1211.53	-113
119.696	17.236	-112	135.25	130.0	1560	4.48	31.09	0.260	0	0.55	0.55	2.462	17.10	65	-0.07	0.25	125.00	16906.25	7628.40	9277.85	2.32	15.47	1227.00	-114
120.696	17.380	-113	136.25	131.0	1572	4.51	31.29	0.259	0	0.55	0.55	2.478	17.21	65.5	-0.08	0.25	125.00	17031.25	7690.80	9340.45	2.34	15.57	1242.57	-115
121.696	17.524	-114	137.25	132.0	1584	4.53	31.48	0.259	0	0.55	0.55	2.493	17.32	66	-0.08	0.25	125.00	17156.25	7753.20	9403.05	2.35	15.67	1258.24	-116
122.696	17.668	-115	138.25	133.0	1596	4.56	31.68	0.258	0	0.55	0.55	2.509	17.42	66.5	-0.09	0.25	125.00	17281.25	7815.60	9465.65	2.37	15.76	1274.00	-117
123.696	17.812	-116	139.25	134.0	1608	4.59	31.87	0.258	0	0.55	0.55	2.524	17.53	67	-0.10	0.25	125.00	17406.25	7878.00	9528.25	2.38	15.86	1289.86	-118
124.696	17.956	-117	140.25	135.0	1620	4.62	32.07	0.257	0	0.55	0.55	2.540	17.64	67.5	-0.10	0.25	125.00	17531.25	7940.40	9590.85	2.40	15.96	1305.82	-119
125.696	18.100	-118	141.25	136.0	1632	4.65	32.27	0.257	0	0.55	0.55	2.555	17.75	68	-0.11	0.25	125.00	17656.25	8002.80	9653.45	2.41	16.06	1321.88	-120
126.696	18.244	-119	142.25	137.0	1644	4.67	32.46	0.256	0	0.55	0.55	2.571	17.85	68.5	-0.11	0.25	125.00	17781.25	8065.20	9716.05	2.43	16.15	1338.03	-121
127.696	18.388	-120	143.25	138.0	1656	4.70	32.66	0.256	0	0.55	0.55	2.586	17.96	69	-0.12	0.25	125.00	17906.25	8127.60	9778.65	2.44	16.25	1354.28	-122
128.696	18.532	-121	144.25	139.0	1668	4.73	32.85	0.255	0	0.55	0.55	2.602	18.07	69.5	-0.12	0.25	125.00	18031.25	8190.00	9841.25	2.46	16.35	1370.63	-123
129.696	18.676	-122	145.25	140.0	1680	4.76	33.05	0.255	0	0.55	0.55	2.617	18.18	70	-0.13	0.25	125.00	18156.25	8252.40	9903.85	2.48	16.45	1387.08	-124
130.696	18.820	-123	146.25	141.0	1692	4.79	33.24	0.254	0	0.55	0.55	2.633	18.28	70.5	-0.14	0.25	125.00	18281.25	8314.80	9966.45	2.49	16.54	1403.62	-125

29th AVE. Off Ramp Abut1 RW Left

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	23.00
Bottom of footing elevation / Pile top elevation (feet)	17.75
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-42.25

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	2.0	feet
	24	inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	5.25	0.0	0	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.79	0.79	125.00	656.25	0.00	656.25	0.00	0.00	0.00	16
14.696	2.116	17	6.25	1.0	12	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	781.25	0.00	781.25	0.00	0.00	0.00	15
14.696	2.116	16	7.25	2.0	24	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.76	0.76	125.00	906.25	0.00	906.25	0.69	6.91	6.91	14
14.696	2.116	15	8.25	3.0	36	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.74	0.74	125.00	1031.25	0.00	1031.25	0.76	6.74	13.65	13
14.696	2.116	14	9.25	4.0	48	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.73	0.73	125.00	1156.25	0.00	1156.25	0.84	6.57	20.22	12
14.696	2.116	13	10.25	5.0	60	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.71	0.71	125.00	1281.25	0.00	1281.25	0.91	6.39	26.61	11
14.696	2.116	12	11.25	6.0	72	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.70	0.70	125.00	1406.25	0.00	1406.25	0.98	6.22	32.83	10
14.696	2.116	11	12.25	7.0	84	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1531.25	0.00	1531.25	1.05	6.05	38.88	9
14.696	2.116	10	13.25	8.0	96	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1656.25	15.60	1640.65	1.10	5.87	44.75	8
14.696	2.116	9	14.25	9.0	108	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.66	0.66	125.00	1781.25	78.00	1703.25	1.12	5.70	50.45	7
14.696	2.116	8	15.25	10.0	120	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.65	0.65	125.00	1906.25	140.40	1765.85	1.14	5.53	55.98	6
14.696	2.116	7	16.25	11.0	132	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	2031.25	202.80	1828.45	1.16	5.36	61.34	5
14.696	2.116	6	17.25	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2156.25	265.20	1891.05	1.18	5.18	66.52	4
14.696	2.116	5	18.25	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2281.25	327.60	1953.65	1.20	5.18	71.71	3
14.696	2.116	4	19.25	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2406.25	390.00	2016.25	1.22	5.18	76.89	2
14.696	2.116	3	20.25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2531.25	452.40	2078.85	1.24	5.18	82.07	1
14.696	2.116	2	21.25	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2656.25	514.80	2141.45	1.25	5.18	87.26	0
14.696	2.116	1	22.25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2781.25	577.20	2204.05	1.27	5.18	92.44	-1
14.696	2.116	0	23.25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2906.25	639.60	2266.65	1.28	5.18	97.62	-2
14.696	2.116	-1	24.25	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3031.25	702.00	2329.25	1.29	5.18	102.81	-3
14.696	2.116	-2	25.25	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3156.25	764.40	2391.85	1.31	5.18	107.99	-4
14.696	2.116	-3	26.25	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3281.25	826.80	2454.45	1.39	5.18	113.18	-5
14.696	2.116	-4	27.25	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.58	0.58	125.00	3406.25	889.20	2517.05	1.47	5.18	118.36	-6
14.696	2.116	-5	28.25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.60	0.60	125.00	3531.25	951.60	2579.65	1.54	5.18	123.54	-7
14.696	2.116	-6	29.25	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.61	0.61	125.00	3656.25	1014.00	2642.25	1.62	5.18	128.73	-8
14.696	2.116	-7	30.25	25.0	300	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12.5	0.63	0.63	125.00	3781.25	1076.40	2704.85	1.70	5.25	133.98	-9
15.696	2.260	-8	31.25	26.0	312	1.55	10.75	0.685	0	0.55	0.55	0.851	5.91	13	0.64	0.64	125.00	3906.25	1138.80	2767.45	1.78	5.35	139.32	-10
16.696	2.404	-9	32.25	27.0	324	1.58	10.94	0.655	0	0.55	0.55	0.867	6.02	13.5	0.66	0.66	125.00	4031.25	1201.20	2830.05	1.86	5.44	144.77	-11
17.696	2.548	-10	33.25	28.0	336	1.60	11.14	0.629	0	0.55	0.55	0.882	6.13	14	0.67	0.67	125.00	4156.25	1263.60	2892.65	1.94	5.54	150.31	-12
18.696	2.692	-11	34.25	29.0	348	1.63	11.33	0.606	0	0.55	0.55	0.898	6.23	14.5	0.68	0.68	125.00	4281.25	1326.00	2955.25	2.02	5.64	155.95	-13
19.696	2.836	-12	35.25	30.0	360	1.66	11.53	0.585	0	0.55	0.55	0.913	6.34	15	0.70	0.70	125.00	4406.25	1388.40	3017.85	2.10	5.74	161.69	-14
20.696	2.980	-13	36.25	31.0	372	1.69	11.72	0.567	0	0.55	0.55	0.929	6.45	15.5	0.69	0.69	125.00	4531.25	1450.80	3080.45	2.11	5.83	167.52	-15
21.696	3.124	-14	37.25	32.0	384	1.72	11.92	0.549	0	0.55	0.55	0.944	6.56	16	0.67	0.67	125.00	4656.25	1513.20	3143.05	2.12	5.93	173.45	-16
22.696	3.268	-15	38.25	33.0	396	1.74	12.12	0.534	0	0.55	0.55	0.960	6.66	16.5	0.66	0.66	125.00	4781.25	1575.60	3205.65	2.13	6.03	179.48	-17
23.696	3.412	-16	39.25	34.0	408	1.77	12.31	0.520	0	0.55	0.55	0.975	6.77	17	0.65	0.65	125.00	4906.25	1638.00	3268.25	2.13	6.13	185.61	-18
24.696	3.556	-17	40.25	35.0	420	1.80	12.51	0.506	0	0.55	0.55	0.991	6.88	17.5	0.64	0.64	125.00	5031.25	1700.40	3330.85	2.14	6.22	191.83	-19
25.696	3.700	-18	41.25	36.0	432	1.83	12.70	0.494	0	0.55	0.55	1.006	6.99	18	0.63	0.63	125.00	5156.25	1762.80	3393.45	2.14	6.32	198.16	-20
26.696	3.844	-19	42.25	37.0	444	1.86	12.90	0.483	0	0.55	0.55	1.022	7.09	18.5	0.62	0.62	125.00	5281.25	1825.20	3456.05	2.15	6.42	204.57	-21
27.696	3.988	-20	43.25	38.0	456	1.89	13.09	0.473	0	0.55	0.55	1.037	7.20	19	0.61	0.61	125.00	5406.25	1887.60	3518.65	2.15	6.52	211.09	-22
28.696	4.132	-21	44.25	39.0	468	1.91	13.29	0.463	0	0.55	0.55	1.053	7.31	19.5	0.60	0.60	125.00	5531.25	1950.00	3581.25	2.15	6.61	217.70	-23
29.696	4.276	-22	45.25	40.0	480	1.94	13.49	0.454	0	0.55	0.55	1.068	7.42	20	0.59	0.59	125.00	5656.25	2012.40	3643.85	2.15	6.71	224.41	-24
30.696	4.420	-23	46.25	41.0	492	1.97	13.68	0.446	0	0.55	0.55	1.084	7.52	20.5	0.58	0.58	125.00	5781.25	2074.80	3706.45	2.15	6.81	231.22	-25
31.696	4.564	-24	47.25	42.0	504	2.00	13.88	0.438	0	0.55	0.55	1.099	7.63	21	0.57	0.57	125.00	5906.25	2137.20	3769.05	2.15	6.91	238.13	-26
32.696	4.708	-25	48.25	43.0	516	2.03	14.07	0.430	0	0.55	0.55	1.114	7.74	21.5	0.56	0.56	125.00	6031.25	2199.60	3831.65	2.15	7.00	245.13	-27
33.696	4.852	-26	49.25	44.0	528	2.05	14.27	0.423	0	0.55	0.55	1.130	7.85	22	0.55	0.55	125.00	6156.25	2262.00	3894.25	2.14	7.10	252.23	-28
34.696	4.996	-27	50.25	45.0	540	2.08	14.46	0.417	0	0.55	0.55	1.145	7.95	22.5	0.54	0.54	125.00	6281.25	2324.40	3956.85	2.14	7.20	259.43	-29
35.696	5.140	-28	51.25	46.0	552	2.11	14.66	0.411	0	0.55	0.55	1.161	8.06	23	0.53	0.53	125.00	6406.25	2386.80	4019.45	2.14	7.29	266.72	-30
36.696	5.284	-29	52.25	47.0	564	2.14	14.85	0.405	0	0.55	0.55	1.176	8.17	23.5	0.52	0.52	125.00	6531.25	2449.20	4082.05	2.13	7.39	274.11	-31
37.696	5.428	-30	53.25	48.0	576	2.17	15.05	0.399	0	0.55	0.55	1.192	8.28	24	0.51	0.51	125.00	6656.25	2511.60	4144.65	2.13	7.49	281.60	-32
38.696	5.572	-31	54.25	49.0	588	2.20	15.25	0.394	0	0.55	0.55	1.207	8.39	24.5	0.50	0.50	125.00	6781.25	2574.00	4207.25	2.12	7.59	289.19	-33
39.696	5.716	-32	55.25	50.0	600	2.22	15.44	0.389	0	0.55	0.55	1.223	8.49	25	0.49	0.49	125.00	6906.25	2636.40	4269.85	2.11	7.68	296.87	-34
40.696	5.860	-33	56.25	51.0	612	2.25	15.64	0.384	0	0.55	0.55	1.238	8.60	25.5	0.49	0.49	125.00	7031.25	2698.80	4332.45	2.10	7.78	304.65	-35
41.696	6.004	-34	57.25	52.0	624	2.28	15.83	0.380	0	0.55	0.55	1.254	8.71	26	0.48	0.48	125.00	7156.25	2761.20	4395.05	2.09	7.88	312.53	-36
42.696	6.148	-35	58.25	53.0	636	2.31	16.03	0.375	0	0.55	0.55	1.269	8.82	26.5	0.47	0.47	125.00	7281.25	2823.60	4457.65	2.08	7.98	320.51	-37
43.696	6.292	-36	59.25	54.0	648	2.34	16.22	0.371	0	0.55	0.55	1.285	8.92	27	0.46	0.46	125.00	7406.25	2886.00	4520.25	2.07	8.07	328.58	-38
44.696	6.436	-37	60.25	55.0	660	2.36	16.42	0.367	0	0.55	0.55	1.300	9.03	27.5	0.45	0.45	125.00	7531.25	2948.40	4582.85	2.06	8.17	336.75	-39
45.696	6.580	-38	61.25	56.0	672	2.39	16.62	0.364	0	0.55	0.55	1.316	9.14	28	0.44	0.44	125.00	7656.25	3010.80	4645.45	2.05	8.27	345.02	-40
46.696	6.724	-39	62.25	57.0	684	2.42	16.81	0.360	0	0.55	0.55	1.331	9.25	28.5	0.43	0.43	125.00	7781.25	3073.20	4708.05	2.04	8.37	353.39	-41
47.696	6.868	-40	63.25	58.0	696	2.45	17.01	0.357	0	0.55	0.55	1.347	9.35	29	0.42	0.42	125.00	7906.25	3135.60	4770.65	2.02	8.46	361.85	-42
48.696	7.012	-41	64.25	59.0	708	2.48	17.20	0.353	0	0.55	0.55	1.362	9.46	29.5	0.42	0.42	125.00	8031.25	3198.00	4833.25	2.01	8.56	370.41	-43
49.696	7.156	-42	65.25	60.0	720	2.51	17.40	0.350	0	0.55	0.55	1.378	9.57	30	0.41	0.41	125.00	8156.25	3260.40	4895.85	1.99	8.66	379.07	-44
50.696	7.300	-43	66.25	61.0	732	2.53	17.59	0.347	0	0.55	0.55	1.393	9.68	30.5	0.40	0.40	125.00	8281.25	3322.80	4958.45	1.98	8.75	387.82	-45
51.696	7.444	-44	67.25	62.0	744	2.56	17.79	0.344	0	0.55	0.55	1.409	9.78	31	0.39	0.39	125.00	8406.25	3385.20	5021.05	1.96	8.85	396.67	-46
52.696	7.588	-45	68.25	63.0	756	2.59	17.98	0.341	0	0.55	0.55	1.424	9.89	31.5	0.38	0.38	125.00	8531.25	3447.60	5083.65	1.94	8.95	405.62	-47
53.696	7.732	-46	69.25	64.0	768	2.62	18.18	0.339	0	0.55	0.55	1.440	10.00	32	0.37	0.37	125.00	8656.25	3510.00	5146.25	1.93	9.05	414.67	-48
54.696	7.876	-47	70.25	65.0	780	2.65	18.38	0.336	0	0.55	0.55	1.455	10.11	32.5	0.37	0.37	125.00	8781.25	3572.40	5208.85	1.91	9.14	423.81	-49
55.696	8.020	-48	71.25	66.0	792	2.67	18.57	0.333	0	0.55	0.55	1.471	10.21	33	0.36	0.36	125.00	8906.25	3634.80	5271.45	1.89	9.24	433.06	-50
56.696	8.164	-49	72.25	67.0	804	2.70	18.77	0.331	0	0.55	0.55	1.486	10.32	33.5	0.35	0.35	125.00	9031.25	3697.20	5334.05	1.87	9.34	442.39	-51
57.696	8.308	-50	73.25	68.0	816	2.73	18.96	0.329	0	0.55	0.55	1.502	10.43	34	0.34	0.34	125.00	9156.25	3759.60	5396.65	1.85	9.44	451.83	-52
58.696	8.452	-51	74.25	69.0	828	2.76	19.16	0.326	0	0.55	0.55	1.517	10.54	34.5	0.33	0.33	125.00	9281.25	3822.00	5459.25	1.83	9.53	461.36	-53
59.696	8.596	-52	75.25	70.0	840	2.79	19.35	0.324	0	0.55	0.55	1.533	10.64	35	0.33	0.33	125.00	9406.25	3884.40	5521.85	1.80	9.63	471.00	-54
60.696	8.740	-53	76.25	71.0	852	2.82	19.55	0.322	0	0.55	0.55	1.548	10.75	35.5	0.32	0.32	125.00	9531.25	3946.80	5584.45	1.78	9.73	480.72	-55
61.696	8.884	-54	77.25	72.0	864	2.84	19.75	0.320	0	0.55	0.55	1.564	10.86	36	0.31	0.31	125.00	9656.25	4009.20	5647.05	1.76	9.83	490.55	-56
62.696	9.028	-55	78.25	73.0	876	2.87	19.94	0.318	0	0.55	0.55	1.579	10.97	36.5	0.30	0.30	125.00	9781.25	4071.60	5709.65	1.73	9.92	500.47	-57
63.696	9.172	-56	79.25	74.0	888	2.90	20.14	0.316	0	0.55	0.55	1.595	11.07	37	0.30	0.30	125.00	9906.25	4134.00	5772.25	1.71	10.02	510.49	-58
64.696	9.316	-57	80.25	75.0	900	2.93	20.33	0.314	0	0.55	0.55	1.610	11.18	37.5	0.29	0.29	125.00	10031.25	4196.40	5834.85	1.68	10.12	520.61	-59
65.696	9.460	-58	81.25	76.0	912	2.96	20.53	0.312	0	0.55	0.55	1.626	11.29	38	0.28	0.28	125.00	10156.25	4258.80	5897.45	1.66	10.22	530.83	-60
66.696	9.604	-59	82.25	77.0	924	2.98	20.72	0.311	0	0.55	0.55	1.641	11.40	38.5	0.27	0.27	125.00	10281.25	4321.20	5960.05	1.63	10.31	541.14	-61
67.696	9.748	-60	83.25	78.0	936	3.01	20.92	0.309	0	0.55	0.55	1.657	11.51	39	0.27	0.27	125.00	10406.25	4383.60	6022.65	1.60	10.41	551.55	-62
68.696	9.892	-61	84.25	79.0	948	3.04	21.11	0.307	0	0.55	0.55	1.672	11.61	39.5	0.26	0.26	125.00	10531.25	4446.00	6085.25	1.57	10.51	562.06	-63
69.696	10.036	-62	85.25	80.0	960	3.07	21.31	0.306	0	0.55	0.55	1.688	11.72	40	0.25	0.25	125.00	10656.25	4508.40	6147.85	1.54	10.60	572.66	-64
70.696	10.180	-63	86.25	81.0	972	3.10	21.51	0.304	0	0.55	0.55	1.703	11.83	40.5	0.24	0.25	125.00	10781.25	4570.80	6210.45	1.55	10.70	583.36	-65
71.696	10.324	-64	87.25	82.0	984	3.12	21.70	0.303	0	0.55	0.55	1.719	11.94	41	0.24	0.25	125.00	10906.25	4633.20	6273.05	1.57	10.80	594.16	-66
72.696	10.468	-65	88.25	83.0	996	3.15	21.90	0.301	0	0.55	0.55	1.734	12.04	41.5	0.23	0.25	125.00	11031.25	4695.60	6335.65	1.58	10.90	605.06	-67
73.696	10.612	-66	89.25	84.0	1008	3.18	22.09	0.300	0	0.55	0.55	1.750	12.15	42	0.22	0.25	125.00	11156.25	4758.00	6398.25	1.60	10.99	616.05	-68
74.696	10.756	-67	90.25	85.0	1020	3.21	22.29	0.298	0	0.55	0.55	1.765	12.26	42.5	0.22	0.25	125.00	11281.25	4820.40	6460.85	1.62	11.09	627.14	-69
75.696	10.900	-68	91.25	86.0	1032	3.24	22.48	0.297	0	0.55	0.55	1.781	12.37	43	0.21	0.25	125.00	11406.25	4882.80	6523.45	1.63	11.19	638.33	-70
76.696	11.044	-69	92.25	87.0	1044	3.27	22.68	0.296	0	0.55	0.55	1.796	12.47	43.5	0.20	0.25	125.00	11531.25	4945.20	6586.05	1.65	11.29	649.62	-71
77.696	11.188	-70	93.25	88.0	1056	3.29	22.88	0.294	0	0.55	0.55	1.812	12.58	44	0.19	0.25	125.00	11656.25	5007.60	6648.65	1.66	11.38	661.00	-72
78.696	11.332	-71	94.25	89.0	1068	3.32	23.07	0.293	0	0.55	0.55	1.827	12.69	44.5	0.19	0.25	125.00	11781.25	5070.00	6711.25	1.68	11.48	672.48	-73
79.696	11.476	-72	95.25	90.0	1080	3.35	23.27	0.292	0	0.55	0.55	1.843	12.80	45	0.18	0.25	125.00	11906.25	5132.40	6773.85	1.69	11.58	684.06	-74
80.696	11.620	-73	96.25	91.0	1092	3.38	23.46	0.291	0	0.55	0.55	1.858	12.90	45.5	0.17	0.25	125.00	12031.25	5194.80	6836.45	1.71	11.68	695.73	-75
81.696	11.764	-74	97.25	92.0	1104	3.41	23.66	0.290	0	0.55	0.55	1.874	13.01	46	0.17	0.25	125.00	12156.25	5257.20	6899.05	1.72	11.77	707.51	-76
82.696	11.908	-75	98.25	93.0	1116	3.43	23.85	0.288	0	0.55	0.55	1.889	13.12	46.5	0.16	0.25	125.00	12281.25	5319.60	6961.65	1.74	11.87	719.38	-77
83.696	12.052	-76	99.25	94.0	1128	3.46	24.05	0.287	0	0.55	0.55	1.905	13.23	47	0.15	0.25	125.00	12406.25	5382.00	7024.25	1.76	11.97	731.34	-78
84.696	12.196	-77	100.25	95.0	1140	3.49	24.24	0.286	0	0.55	0.55	1.920	13.33	47.5	0.15	0.25	125.00	12531.25	5444.40	7086.85	1.77	12.06	743.41	-79
85.696	12.340	-78	101.25	96.0	1152	3.52	24.44	0.285	0	0.55	0.55	1.936	13.44	48	0.14	0.25	125.00	12656.25	5506.80	7149.45	1.79	12.16	755.57	-80
86.696	12.484	-79	102.25	97.0	1164	3.55	24.64	0.284	0	0.55	0.55	1.951	13.55	48.5	0.13	0.25	125.00	12781.25	5569.20	7212.05	1.80	12.26	767.83	-81
87.696	12.628	-80	103.25	98.0	1176	3.58	24.83	0.283	0	0.55	0.55	1.967	13.66	49	0.13	0.25	125.00	12906.25	5631.60	7274.65	1.82	12.36	780.19	-82
88.696	12.772	-81	104.25	99.0	1188	3.60	25.03	0.282	0	0.55	0.55	1.982	13.76	49.5	0.12	0.25	125.00	13031.25	5694.00	7337.25	1.83	12.45	792.64	-83
89.696	12.916	-82	105.25	100.0	1200	3.63	25.22	0.281	0	0.55	0.55	1.998	13.87	50	0.11	0.25	125.00	13156.25	5756.40	7399.85	1.85	12.55	805.19	-84
90.696	13.060	-83	106.25	101.0	1212	3.66	25.42	0.280	0	0.55	0.55	2.013	13.98	50.5	0.11	0.25	125.00	13281.25	5818.80	7462.45	1.87	12.65	817.84	-85
91.696	13.204	-84	107.25	102.0	1224	3.69	25.61	0.279	0	0.55	0.55	2.029	14.09	51	0.10	0.25	125.00	13406.25	5881.20	7525.05	1.88	12.75	830.59	-86
92.696	13.348	-85	108.25	103.0	1236	3.72	25.81	0.278	0	0.55	0.55	2.044	14.20	51.5	0.09	0.25	125.00	13531.25	5943.60	7587.65	1.90	12.84	843.43	-87
93.696	13.492	-86	109.25	104.0	1248	3.74	26.01	0.278	0	0.55	0.55	2.060	14.30	52	0.09	0.25	125.00	13656.25	6006.00	7650.25	1.91	12.94	856.37	-88
94.696	13.636	-87	110.25	105.0	1260	3.77	26.20	0.277	0	0.55	0.55	2.075	14.41	52.5	0.08	0.25	125.00	13781.25	6068.40	7712.85	1.93	13.04	869.41	-89
95.696	13.780	-88	111.25	106.0	1272	3.80	26.40	0.276	0	0.55	0.55	2.091	14.52	53	0.07	0.25	125.00	13906.25	6130.80	7775.45	1.94	13.14	882.54	-90
96.696	13.924	-89	112.25	107.0	1284	3.83	26.59	0.275	0	0.55	0.55	2.106	14.63	53.5	0.07	0.25	125.00	14031.25	6193.20	7838.05	1.96	13.23	895.78	-91
97.696	14.068	-90	113.25	108.0	1296	3.86	26.79	0.274	0	0.55	0.55	2.122	14.73	54	0.06	0.25	125.00	14156.25	6255.60	7900.65	1.98	13.33	909.11	-92
98.696	14.212	-91	114.25	109.0	1308	3.89	26.98	0.273	0	0.55	0.55	2.137	14.84	54.5	0.05	0.25	125.00	14281.25	6318.00	7963.25	1.99	13.43	922.54	-93
99.696	14.356	-92	115.25	110.0	1320	3.91	27.18	0.273	0	0.55	0.55	2.153	14.95	55	0.05	0.25	125.00	14406.25	6380.40	8025.85	2.01	13.52	936.06	-94
100.696	14.500	-93	116.25	111.0	1332	3.94	27.37	0.272	0	0.55	0.55	2.168	15.06	55.5	0.04	0.25	125.00	14531.25	6442.80	8088.45	2.02	13.62	949.68	-95
101.696	14.644	-94	117.25	112.0	1344	3.97	27.57	0.271	0	0.55	0.55	2.184	15.16	56	0.04	0.25	125.00	14656.25	6505.20	8151.05	2.04	13.72	963.40	-96
102.696	14.788	-95	118.25	113.0	1356	4.00	27.77	0.270	0	0.55	0.55	2.199	15.27	56.5	0.03	0.25	125.00	14781.25	6567.60	8213.65	2.05	13.82	977.22	-97
103.696	14.932	-96	119.25	114.0	1368	4.03	27.96	0.270	0	0.55	0.55	2.215	15.38	57	0.02	0.25	125.00	14906.25	6630.00	8276.25	2.07	13.91	991.13	-98
104.696	15.076	-97	120.25	115.0	1380	4.05	28.16	0.269	0	0.55	0.55	2.230	15.49	57.5	0.02	0.25	125.00	15031.25	6692.40	8338.85	2.08	14.01	1005.15	-99
105.696	15.220	-98	121.25	116.0	1392	4.08	28.35	0.268	0	0.55	0.55	2.246	15.59	58	0.01	0.25	125.00	15156.25	6754.80	8401.45	2.10	14.11	1019.25	-100
106.696	15.364	-99	122.25	117.0	1404	4.11	28.55	0.268	0	0.55	0.55	2.261	15.70	58.5	0.00	0.25	125.00	15281.25	6817.20	8464.05	2.12	14.21	1033.46	-101
107.696	15.508	-100	123.25	118.0	1416	4.14	28.74	0.267	0	0.55	0.55	2.277	15.81	59	0.00	0.25	125.00	15406.25	6879.60	8526.65	2.13	14.30	1047.76	-102
108.696	15.652	-101	124.25	119.0	1428	4.17	28.94	0.266	0	0.55	0.55	2.292	15.92	59.5	-0.01	0.25	125.00	15531.25	6942.00	8589.25	2.15	14.40	1062.17	-103
109.696	15.796	-102	125.25	120.0	1440	4.20	29.14	0.266	0	0.55	0.55	2.307	16.02	60	-0.01	0.25	125.00	15656.25	7004.40	8651.85	2.16	14.50	1076.66	-104
110.696	15.940	-103	126.25	121.0	1452	4.22	29.33	0.265	0	0.55	0.55	2.323	16.13	60.5	-0.02	0.25	125.00	15781.25	7066.80	8714.45	2.18	14.60	1091.26	-105
111.696	16.084	-104	127.25	122.0	1464	4.25	29.53	0.264	0	0.55	0.55	2.338	16.24	61	-0.03	0.25	125.00	15906.25	7129.20	8777.05	2.19	14.69	1105.95	-106
112.696	16.228	-105	128.25	123.0	1476	4.28	29.72	0.264	0	0.55	0.55	2.354	16.35	61.5	-0.03	0.25	125.00	16031.25	7191.60	8839.65	2.21	14.79	1120.74	-107
113.696	16.372	-106	129.25	124.0	1488	4.31	29.92	0.263	0	0.55	0.55	2.369	16.45	62	-0.04	0.25	125.00	16156.25	7254.00	8902.25	2.23	14.89	1135.63	-108
114.696	16.516	-107	130.25	125.0	1500	4.34	30.11	0.263	0	0.55	0.55	2.385	16.56	62.5	-0.04	0.25	125.00	16281.25	7316.40	8964.85	2.24	14.99	1150.62	-109
115.696	16.660	-108	131.25	126.0	1512	4.36	30.31	0.262	0	0.55	0.55	2.400	16.67	63	-0.05	0.25	125.00	16406.25	7378.80	9027.45	2.26	15.08	1165.70	-110
116.696	16.804	-109	132.25	127.0	1524	4.39	30.50	0.261	0	0.55	0.55	2.416	16.78	63.5	-0.06	0.25	125.00	16531.25	7441.20	9090.05	2.27	15.18	1180.88	-111
117.696	16.948	-110	133.25	128.0	1536	4.42	30.70	0.261	0	0.55	0.55	2.431	16.89	64	-0.06	0.25	125.00	16656.25	7503.60	9152.65	2.29	15.28	1196.16	-112
118.696	17.092	-111	134.25	129.0	1548	4.45	30.90	0.260	0	0.55	0.55	2.447	16.99	64.5	-0.07	0.25	125.00	16781.25	7566.00	9215.25	2.30	15.37	1211.53	-113
119.696	17.236	-112	135.25	130.0	1560	4.48	31.09	0.260	0	0.55	0.55	2.462	17.10	65	-0.07	0.25	125.00	16906.25	7628.40	9277.85	2.32	15.47	1227.00	-114
120.696	17.380	-113	136.25	131.0	1572	4.51	31.29	0.259	0	0.55	0.55	2.478	17.21	65.5	-0.08	0.25	125.00	17031.25	7690.80	9340.45	2.34	15.57	1242.57	-115
121.696	17.524	-114	137.25	132.0	1584	4.53	31.48	0.259	0	0.55	0.55	2.493	17.32	66	-0.08	0.25	125.00	17156.25	7753.20	9403.05	2.35	15.67	1258.24	-116
122.696	17.668	-115	138.25	133.0	1596	4.56	31.68	0.258	0	0.55	0.55	2.509	17.42	66.5	-0.09	0.25	125.00	17281.25	7815.60	9465.65	2.37	15.76	1274.00	-117
123.696	17.812	-116	139.25	134.0	1608	4.59	31.87	0.258	0	0.55	0.55	2.524	17.53	67	-0.10	0.25	125.00	17406.25	7878.00	9528.25	2.38	15.86	1289.86	-118
124.696	17.956	-117	140.25	135.0	1620	4.62	32.07	0.257	0	0.55	0.55	2.540	17.64	67.5	-0.10	0.25	125.00	17531.25	7940.40	9590.85	2.40	15.96	1305.82	-119
125.696	18.100	-118	141.25	136.0	1632	4.65	32.27	0.257	0	0.55	0.55	2.555	17.75	68	-0.11	0.25	125.00	17656.25	8002.80	9653.45	2.41	16.06	1321.88	-120
126.696	18.244	-119	142.25	137.0	1644	4.67	32.46	0.256	0	0.55	0.55	2.571	17.85	68.5	-0.11	0.25	125.00	17781.25	8065.20	9716.05	2.43	16.15	1338.03	-121
127.696	18.388	-120	143.25	138.0	1656	4.70	32.66	0.256	0	0.55	0.55	2.586	17.96	69	-0.12	0.25	125.00	17906.25	8127.60	9778.65	2.44	16.25	1354.28	-122
128.696	18.532	-121	144.25	139.0	1668	4.73	32.85	0.255	0	0.55	0.55	2.602	18.07	69.5	-0.12	0.25	125.00	18031.25	8190.00	9841.25	2.46	16.35	1370.63	-123
129.696	18.676	-122	145.25	140.0	1680	4.76	33.05	0.255	0	0.55	0.55	2.617	18.18	70	-0.13	0.25	125.00	18156.25	8252.40	9903.85	2.48	16.45	1387.08	-124
130.696	18.820	-123	146.25	141.0	1692	4.79	33.24	0.254	0	0.55	0.55	2.633	18.28	70.5	-0.14	0.25	125.00	18281.25	8314.80	9966.45	2.49	16.54	1403.62	-125

29th AVE. Off Ramp Abut1 RW Left

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	23.00
Bottom of footing elevation / Pile top elevation (feet)	17.75
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-42.25

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 2.0 feet
24 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	5.25	0.0	0	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.79	0.79	125.00	656.25	0.00	656.25	0.00	0.00	0.00	16
14.696	2.116	17	6.25	1.0	12	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.77	0.77	125.00	781.25	0.00	781.25	0.00	0.00	0.00	15
14.696	2.116	16	7.25	2.0	24	2.00	13.89	0.945	0	0.55	0.55	1.100	7.64	10	0.76	0.76	125.00	906.25	0.00	906.25	0.69	6.91	6.91	14
14.696	2.116	15	8.25	3.0	36	1.95	13.54	0.921	0	0.55	0.55	1.073	7.45	10	0.74	0.74	125.00	1031.25	0.00	1031.25	0.76	6.74	13.65	13
14.696	2.116	14	9.25	4.0	48	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.73	0.73	125.00	1156.25	0.00	1156.25	0.84	6.57	20.22	12
14.696	2.116	13	10.25	5.0	60	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.71	0.71	125.00	1281.25	0.00	1281.25	0.91	6.39	26.61	11
14.696	2.116	12	11.25	6.0	72	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.70	0.70	125.00	1406.25	0.00	1406.25	0.98	6.22	32.83	10
14.696	2.116	11	12.25	7.0	84	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.68	0.68	125.00	1531.25	0.00	1531.25	1.05	6.05	38.88	9
14.696	2.116	10	13.25	8.0	96	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.67	0.67	125.00	1656.25	15.60	1640.65	1.10	5.87	44.75	8
14.696	2.116	9	14.25	9.0	108	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.66	0.66	125.00	1781.25	78.00	1703.25	1.12	5.70	50.45	7
14.696	2.116	8	15.25	10.0	120	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.65	0.65	125.00	1906.25	140.40	1765.85	1.14	5.53	55.98	6
14.696	2.116	7	16.25	11.0	132	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.64	0.64	125.00	2031.25	202.80	1828.45	1.16	5.36	61.34	5
14.696	2.116	6	17.25	12.0	144	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2156.25	265.20	1891.05	1.18	5.18	66.52	4
14.696	2.116	5	18.25	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2281.25	327.60	1953.65	1.20	5.18	71.71	3
14.696	2.116	4	19.25	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2406.25	390.00	2016.25	1.22	5.18	76.89	2
14.696	2.116	3	20.25	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2531.25	452.40	2078.85	1.24	5.18	82.07	1
14.696	2.116	2	21.25	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2656.25	514.80	2141.45	1.25	5.18	87.26	0
14.696	2.116	1	22.25	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2781.25	577.20	2204.05	1.27	5.18	92.44	-1
14.696	2.116	0	23.25	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.57	0.57	125.00	2906.25	639.60	2266.65	1.28	5.18	97.62	-2
14.696	2.116	-1	24.25	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.56	0.56	125.00	3031.25	702.00	2329.25	1.29	5.18	102.81	-3
14.696	2.116	-2	25.25	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.55	0.55	125.00	3156.25	764.40	2391.85	1.31	5.18	107.99	-4
14.696	2.116	-3	26.25	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.56	0.56	125.00	3281.25	826.80	2454.45	1.39	5.18	113.18	-5
14.696	2.116	-4	27.25	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.58	0.58	125.00	3406.25	889.20	2517.05	1.47	5.18	118.36	-6
14.696	2.116	-5	28.25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.60	0.60	125.00	3531.25	951.60	2579.65	1.54	5.18	123.54	-7
14.696	2.116	-6	29.25	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.61	0.61	125.00	3656.25	1014.00	2642.25	1.62	5.18	128.73	-8
14.696	2.116	-7	30.25	25.0	300	1.52	10.55	0.718	0	0.55	0.55	0.836	5.80	12.5	0.63	0.63	125.00	3781.25	1076.40	2704.85	1.70	5.25	133.98	-9
15.696	2.260	-8	31.25	26.0	312	1.55	10.75	0.685	0	0.55	0.55	0.851	5.91	13	0.64	0.64	125.00	3906.25	1138.80	2767.45	1.78	5.35	139.32	-10
16.696	2.404	-9	32.25	27.0	324	1.58	10.94	0.655	0	0.55	0.55	0.867	6.02	13.5	0.66	0.66	125.00	4031.25	1201.20	2830.05	1.86	5.44	144.77	-11
17.696	2.548	-10	33.25	28.0	336	1.60	11.14	0.629	0	0.55	0.55	0.882	6.13	14	0.67	0.67	125.00	4156.25	1263.60	2892.65	1.94	5.54	150.31	-12
18.696	2.692	-11	34.25	29.0	348	1.63	11.33	0.606	0	0.55	0.55	0.898	6.23	14.5	0.68	0.68	125.00	4281.25	1326.00	2955.25	2.02	5.64	155.95	-13
19.696	2.836	-12	35.25	30.0	360	1.66	11.53	0.585	0	0.55	0.55	0.913	6.34	15	0.70	0.70	125.00	4406.25	1388.40	3017.85	2.10	5.74	161.69	-14
20.696	2.980	-13	36.25	31.0	372	1.69	11.72	0.567	0	0.55	0.55	0.929	6.45	15.5	0.69	0.69	125.00	4531.25	1450.80	3080.45	2.11	5.83	167.52	-15
21.696	3.124	-14	37.25	32.0	384	1.72	11.92	0.549	0	0.55	0.55	0.944	6.56	16	0.67	0.67	125.00	4656.25	1513.20	3143.05	2.12	5.93	173.45	-16
22.696	3.268	-15	38.25	33.0	396	1.74	12.12	0.534	0	0.55	0.55	0.960	6.66	16.5	0.66	0.66	125.00	4781.25	1575.60	3205.65	2.13	6.03	179.48	-17
23.696	3.412	-16	39.25	34.0	408	1.77	12.31	0.520	0	0.55	0.55	0.975	6.77	17	0.65	0.65	125.00	4906.25	1638.00	3268.25	2.13	6.13	185.61	-18
24.696	3.556	-17	40.25	35.0	420	1.80	12.51	0.506	0	0.55	0.55	0.991	6.88	17.5	0.64	0.64	125.00	5031.25	1700.40	3330.85	2.14	6.22	191.83	-19
25.696	3.700	-18	41.25	36.0	432	1.83	12.70	0.494	0	0.55	0.55	1.006	6.99	18	0.63	0.63	125.00	5156.25	1762.80	3393.45	2.14	6.32	198.16	-20
26.696	3.844	-19	42.25	37.0	444	1.86	12.90	0.483	0	0.55	0.55	1.022	7.09	18.5	0.62	0.62	125.00	5281.25	1825.20	3456.05	2.15	6.42	204.57	-21
27.696	3.988	-20	43.25	38.0	456	1.89	13.09	0.473	0	0.55	0.55	1.037	7.20	19	0.61	0.61	125.00	5406.25	1887.60	3518.65	2.15	6.52	211.09	-22
28.696	4.132	-21	44.25	39.0	468	1.91	13.29	0.463	0	0.55	0.55	1.053	7.31	19.5	0.60	0.60	125.00	5531.25	1950.00	3581.25	2.15	6.61	217.70	-23
29.696	4.276	-22	45.25	40.0	480	1.94	13.49	0.454	0	0.55	0.55	1.068	7.42	20	0.59	0.59	125.00	5656.25	2012.40	3643.85	2.15	6.71	224.41	-24
30.696	4.420	-23	46.25	41.0	492	1.97	13.68	0.446	0	0.55	0.55	1.084	7.52	20.5	0.58	0.58	125.00	5781.25	2074.80	3706.45	2.15	6.81	231.22	-25
31.696	4.564	-24	47.25	42.0	504	2.00	13.88	0.438	0	0.55	0.55	1.099	7.63	21	0.57	0.57	125.00	5906.25	2137.20	3769.05	2.15	6.91	238.13	-26
32.696	4.708	-25	48.25	43.0	516	2.03	14.07	0.430	0	0.55	0.55	1.114	7.74	21.5	0.56	0.56	125.00	6031.25	2199.60	3831.65	2.15	7.00	245.13	-27
33.696	4.852	-26	49.25	44.0	528	2.05	14.27	0.423	0	0.55	0.55	1.130	7.85	22	0.55	0.55	125.00	6156.25	2262.00	3894.25	2.14	7.10	252.23	-28
34.696	4.996	-27	50.25	45.0	540	2.08	14.46	0.417	0	0.55	0.55	1.145	7.95	22.5	0.54	0.54	125.00	6281.25	2324.40	3956.85	2.14	7.20	259.43	-29
35.696	5.140	-28	51.25	46.0	552	2.11	14.66	0.411	0	0.55	0.55	1.161	8.06	23	0.53	0.53	125.00	6406.25	2386.80	4019.45	2.14	7.29	266.72	-30
36.696	5.284	-29	52.25	47.0	564	2.14	14.85	0.405	0	0.55	0.55	1.176	8.17	23.5	0.52	0.52	125.00	6531.25	2449.20	4082.05	2.13	7.39	274.11	-31
37.696	5.428	-30	53.25	48.0	576	2.17	15.05	0.399	0	0.55	0.55	1.192	8.28	24	0.51	0.51	125.00	6656.25	2511.60	4144.65	2.13	7.49	281.60	-32
38.696	5.572	-31	54.25	49.0	588	2.20	15.25	0.394	0	0.55	0.55	1.207	8.39	24.5	0.50	0.50	125.00	6781.25	2574.00	4207.25	2.12	7.59	289.19	-33
39.696	5.716	-32	55.25	50.0	600	2.22	15.44	0.389	0	0.55	0.55	1.223	8.49	25	0.49	0.49	125.00	6906.25	2636.40	4269.85	2.11	7.68	296.87	-34
40.696	5.860	-33	56.25	51.0	612	2.25	15.64	0.384	0	0.55	0.55	1.238	8.60	25.5	0.49	0.49	125.00	7031.25	2698.80	4332.45	2.10	7.78	304.65	-35
41.696	6.004	-34	57.25	52.0	624	2.28	15.83	0.380	0	0.55	0.55	1.254	8.71	26	0.48	0.48	125.00	7156.25	2761.20	4395.05	2.09	7.88	312.53	-36
42.696	6.148	-35	58.25	53.0	636	2.31	16.03	0.375	0	0.55	0.55	1.269	8.82	26.5	0.47	0.47	125.00	7281.25	2823.60	4457.65	2.08	7.98	320.51	-37
43.696	6.292	-36	59.25	54.0	648	2.34	16.22	0.371	0	0.55	0.55	1.285	8.92	27	0.46	0.46	125.00	7406.25	2886.00	4520.25	2.07	8.07	328.58	-38
44.696	6.436	-37	60.25	55.0	660	2.36	16.42	0.367	0	0.55	0.55	1.300	9.03	27.5	0.45	0.45	125.00	7531.25	2948.40	4582.85	2.06	8.17	336.75	-39
45.696	6.580	-38	61.25	56.0	672	2.39	16.62	0.364	0	0.55	0.55	1.316	9.14	28	0.44	0.44	125.00	7656.25	3010.80	4645.45	2.05	8.27	345.02	-40
46.696	6.724	-39	62.25	57.0	684	2.42	16.81	0.360	0	0.55	0.55	1.331	9.25	28.5	0.43	0.43	125.00	7781.25	3073.20	4708.05	2.04	8.37	353.39	-41
47.696	6.868	-40	63.25	58.0	696	2.45	17.01	0.357	0	0.55	0.55	1.347	9.35	29	0.42	0.42	125.00	7906.25	3135.60	4770.65	2.02	8.46	361.85	-42
48.696	7.012	-41	64.25	59.0	708	2.48	17.20	0.353	0	0.55	0.55	1.362	9.46	29.5	0.42	0.42	125.00	8031.25	3198.00	4833.25	2.01	8.56	370.41	-43
49.696	7.156	-42	65.25	60.0	720	2.51	17.40	0.350	0	0.55	0.55	1.378	9.57	30	0.41	0.41	125.00	8156.25	3260.40	4895.85	1.99	8.66	379.07	-44
50.696	7.300	-43	66.25	61.0	732	2.53	17.59	0.347	0	0.55	0.55	1.393	9.68	30.5	0.40	0.40	125.00	8281.25	3322.80	4958.45	1.98	8.75	387.82	-45
51.696	7.444	-44	67.25	62.0	744	2.56	17.79	0.344	0	0.55	0.55	1.409	9.78	31	0.39	0.39	125.00	8406.25	3385.20	5021.05	1.96	8.85	396.67	-46
52.696	7.588	-45	68.25	63.0	756	2.59	17.98	0.341	0	0.55	0.55	1.424	9.89	31.5	0.38	0.38	125.00	8531.25	3447.60	5083.65	1.94	8.95	405.62	-47
53.696	7.732	-46	69.25	64.0	768	2.62	18.18	0.339	0	0.55	0.55	1.440	10.00	32	0.37	0.37	125.00	8656.25	3510.00	5146.25	1.93	9.05	414.67	-48
54.696	7.876	-47	70.25	65.0	780	2.65	18.38	0.336	0	0.55	0.55	1.455	10.11	32.5	0.37	0.37	125.00	8781.25	3572.40	5208.85	1.91	9.14	423.81	-49
55.696	8.020	-48	71.25	66.0	792	2.67	18.57	0.333	0	0.55	0.55	1.471	10.21	33	0.36	0.36	125.00	8906.25	3634.80	5271.45	1.89	9.24	433.06	-50
56.696	8.164	-49	72.25	67.0	804	2.70	18.77	0.331	0	0.55	0.55	1.486	10.32	33.5	0.35	0.35	125.00	9031.25	3697.20	5334.05	1.87	9.34	442.39	-51
57.696	8.308	-50	73.25	68.0	816	2.73	18.96	0.329	0	0.55	0.55	1.502	10.43	34	0.34	0.34	125.00	9156.25	3759.60	5396.65	1.85	9.44	451.83	-52
58.696	8.452	-51	74.25	69.0	828	2.76	19.16	0.326	0	0.55	0.55	1.517	10.54	34.5	0.33	0.33	125.00	9281.25	3822.00	5459.25	1.83	9.53	461.36	-53
59.696	8.596	-52	75.25	70.0	840	2.79	19.35	0.324	0	0.55	0.55	1.533	10.64	35	0.33	0.33	125.00	9406.25	3884.40	5521.85	1.80	9.63	471.00	-54
60.696	8.740	-53	76.25	71.0	852	2.82	19.55	0.322	0	0.55	0.55	1.548	10.75	35.5	0.32	0.32	125.00	9531.25	3946.80	5584.45	1.78	9.73	480.72	-55
61.696	8.884	-54	77.25	72.0	864	2.84	19.75	0.320	0	0.55	0.55	1.564	10.86	36	0.31	0.31	125.00	9656.25	4009.20	5647.05	1.76	9.83	490.55	-56
62.696	9.028	-55	78.25	73.0	876	2.87	19.94	0.318	0	0.55	0.55	1.579	10.97	36.5	0.30	0.30	125.00	9781.25	4071.60	5709.65	1.73	9.92	500.47	-57
63.696	9.172	-56	79.25	74.0	888	2.90	20.14	0.316	0	0.55	0.55	1.595	11.07	37	0.30	0.30	125.00	9906.25	4134.00	5772.25	1.71	10.02	510.49	-58
64.696	9.316	-57	80.25	75.0	900	2.93	20.33	0.314	0	0.55	0.55	1.610	11.18	37.5	0.29	0.29	125.00	10031.25	4196.40	5834.85	1.68	10.12	520.61	-59
65.696	9.460	-58	81.25	76.0	912	2.96	20.53	0.312	0	0.55	0.55	1.626	11.29	38	0.28	0.28	125.00	10156.25	4258.80	5897.45	1.66	10.22	530.83	-60
66.696	9.604	-59	82.25	77.0	924	2.98	20.72	0.311	0	0.55	0.55	1.641	11.40	38.5	0.27	0.27	125.00	10281.25	4321.20	5960.05	1.63	10.31	541.14	-61
67.696	9.748	-60	83.25	78.0	936	3.01	20.92	0.309	0	0.55	0.55	1.657	11.51	39	0.27	0.27	125.00	10406.25	4383.60	6022.65	1.60	10.41	551.55	-62
68.696	9.892	-61	84.25	79.0	948	3.04	21.11	0.307	0	0.55	0.55	1.672	11.61	39.5	0.26	0.26	125.00	10531.25	4446.00	6085.25	1.57	10.51	562.06	-63
69.696	10.036	-62	85.25	80.0	960	3.07	21.31	0.306	0	0.55	0.55	1.688	11.72	40	0.25	0.25	125.00	10656.25	4508.40	6147.85	1.54	10.60	572.66	-64
70.696	10.180	-63	86.25	81.0	972	3.10	21.51	0.304	0	0.55	0.55	1.703	11.83	40.5	0.24	0.25	125.00	10781.25	4570.80	6210.45	1.55	10.70	583.36	-65
71.696	10.324	-64	87.25	82.0	984	3.12	21.70	0.303	0	0.55	0.55	1.719	11.94	41	0.24	0.25	125.00	10906.25	4633.20	6273.05	1.57	10.80	594.16	-66
72.696	10.468	-65	88.25	83.0	996	3.15	21.90	0.301	0	0.55	0.55	1.734	12.04	41.5	0.23	0.25	125.00	11031.25	4695.60	6335.65	1.58	10.90	605.06	-67
73.696	10.612	-66	89.25	84.0	1008	3.18	22.09	0.300	0	0.55	0.55	1.750	12.15	42	0.22	0.25	125.00	11156.25	4758.00	6398.25	1.60	10.99	616.05	-68
74.696	10.756	-67	90.25	85.0	1020	3.21	22.29	0.298	0	0.55	0.55	1.765	12.26	42.5	0.22	0.25	125.00	11281.25	4820.40	6460.85	1.62	11.09	627.14	-69
75.696	10.900	-68	91.25	86.0	1032	3.24	22.48	0.297	0	0.55	0.55	1.781	12.37	43	0.21	0.25	125.00	11406.25	4882.80	6523.45	1.63	11.19	638.33	-70
76.696	11.044	-69	92.25	87.0	1044	3.27	22.68	0.296	0	0.55	0.55	1.796	12.47	43.5	0.20	0.25	125.00	11531.25	4945.20	6586.05	1.65	11.29	649.62	-71
77.696	11.188	-70	93.25	88.0	1056	3.29	22.88	0.294	0	0.55	0.55	1.812	12.58	44	0.19	0.25	125.00	11656.25	5007.60	6648.65	1.66	11.38	661.00	-72
78.696	11.332	-71	94.25	89.0	1068	3.32	23.07	0.293	0	0.55	0.55	1.827	12.69	44.5	0.19	0.25	125.00	11781.25	5070.00	6711.25	1.68	11.48	672.48	-73
79.696	11.476	-72	95.25	90.0	1080	3.35	23.27	0.292	0	0.55	0.55	1.843	12.80	45	0.18	0.25	125.00	11906.25	5132.40	6773.85	1.69	11.58	684.06	-74
80.696	11.620	-73	96.25	91.0	1092	3.38	23.46	0.291	0	0.55	0.55	1.858	12.90	45.5	0.17	0.25	125.00	12031.25	5194.80	6836.45	1.71	11.68	695.73	-75
81.696	11.764	-74	97.25	92.0	1104	3.41	23.66	0.290	0	0.55	0.55	1.874	13.01	46	0.17	0.25	125.00	12156.25	5257.20	6899.05	1.72	11.77	707.51	-76
82.696	11.908	-75	98.25	93.0	1116	3.43	23.85	0.288	0	0.55	0.55	1.889	13.12	46.5	0.16	0.25	125.00	12281.25	5319.60	6961.65	1.74	11.87	719.38	-77
83.696	12.052	-76	99.25	94.0	1128	3.46	24.05	0.287	0	0.55	0.55	1.905	13.23	47	0.15	0.25	125.00	12406.25	5382.00	7024.25	1.76	11.97	731.34	-78
84.696	12.196	-77	100.25	95.0	1140	3.49	24.24	0.286	0	0.55	0.55	1.920	13.33	47.5	0.15	0.25	125.00	12531.25	5444.40	7086.85	1.77	12.06	743.41	-79
85.696	12.340	-78	101.25	96.0	1152	3.52	24.44	0.285	0	0.55	0.55	1.936	13.44	48	0.14	0.25	125.00	12656.25	5506.80	7149.45	1.79	12.16	755.57	-80
86.696	12.484	-79	102.25	97.0	1164	3.55	24.64	0.284	0	0.55	0.55	1.951	13.55	48.5	0.13	0.25	125.00	12781.25	5569.20	7212.05	1.80	12.26	767.83	-81
87.696	12.628	-80	103.25	98.0	1176	3.58	24.83	0.283	0	0.55	0.55	1.967	13.66	49	0.13	0.25	125.00	12906.25	5631.60	7274.65	1.82	12.36	780.19	-82
88.696	12.772	-81	104.25	99.0	1188	3.60	25.03	0.282	0	0.55	0.55	1.982	13.76	49.5	0.12	0.25	125.00	13031.25	5694.00	7337.25	1.83	12.45	792.64	-83
89.696	12.916	-82	105.25	100.0	1200	3.63	25.22	0.281	0	0.55	0.55	1.998	13.87	50	0.11	0.25	125.00	13156.25	5756.40	7399.85	1.85	12.55	805.19	-84
90.696	13.060	-83	106.25	101.0	1212	3.66	25.42	0.280	0	0.55	0.55	2.013	13.98	50.5	0.11	0.25	125.00	13281.25	5818.80	7462.45	1.87	12.65	817.84	-85
91.696	13.204	-84	107.25	102.0	1224	3.69	25.61	0.279	0	0.55	0.55	2.029	14.09	51	0.10	0.25	125.00	13406.25	5881.20	7525.05	1.88	12.75	830.59	-86
92.696	13.348	-85	108.25	103.0	1236	3.72	25.81	0.278	0	0.55	0.55	2.044	14.20	51.5	0.09	0.25	125.00	13531.25	5943.60	7587.65	1.90	12.84	843.43	-87
93.696	13.492	-86	109.25	104.0	1248	3.74	26.01	0.278	0	0.55	0.55	2.060	14.30	52	0.09	0.25	125.00	13656.25	6006.00	7650.25	1.91	12.94	856.37	-88
94.696	13.636	-87	110.25	105.0	1260	3.77	26.20	0.277	0	0.55	0.55	2.075	14.41	52.5	0.08	0.25	125.00	13781.25	6068.40	7712.85	1.93	13.04	869.41	-89
95.696	13.780	-88	111.25	106.0	1272	3.80	26.40	0.276	0	0.55	0.55	2.091	14.52	53	0.07	0.25	125.00	13906.25	6130.80	7775.45	1.94	13.14	882.54	-90
96.696	13.924	-89	112.25	107.0	1284	3.83	26.59	0.275	0	0.55	0.55	2.106	14.63	53.5	0.07	0.25	125.00	14031.25	6193.20	7838.05	1.96	13.23	895.78	-91
97.696	14.068	-90	113.25	108.0	1296	3.86	26.79	0.274	0	0.55	0.55	2.122	14.73	54	0.06	0.25	125.00	14156.25	6255.60	7900.65	1.98	13.33	909.11	-92
98.696	14.212	-91	114.25	109.0	1308	3.89	26.98	0.273	0	0.55	0.55	2.137	14.84	54.5	0.05	0.25	125.00	14281.25	6318.00	7963.25	1.99	13.43	922.54	-93
99.696	14.356	-92	115.25	110.0	1320	3.91	27.18	0.273	0	0.55	0.55	2.153	14.95	55	0.05	0.25	125.00	14406.25	6380.40	8025.85	2.01	13.52	936.06	-94
100.696	14.500	-93	116.25	111.0	1332	3.94	27.37	0.272	0	0.55	0.55	2.168	15.06	55.5	0.04	0.25	125.00	14531.25	6442.80	8088.45	2.02	13.62	949.68	-95
101.696	14.644	-94	117.25	112.0	1344	3.97	27.57	0.271	0	0.55	0.55	2.184	15.16	56	0.04	0.25	125.00	14656.25	6505.20	8151.05	2.04	13.72	963.40	-96
102.696	14.788	-95	118.25	113.0	1356	4.00	27.77	0.270	0	0.55	0.55	2.199	15.27	56.5	0.03	0.25	125.00	14781.25	6567.60	8213.65	2.05	13.82	977.22	-97
103.696	14.932	-96	119.25	114.0	1368	4.03	27.96	0.270	0	0.55	0.55	2.215	15.38	57	0.02	0.25	125.00	14906.25	6630.00	8276.25	2.07	13.91	991.13	-98
104.696	15.076	-97	120.25	115.0	1380	4.05	28.16	0.269	0	0.55	0.55	2.230	15.49	57.5	0.02	0.25	125.00	15031.25	6692.40	8338.85	2.08	14.01	1005.15	-99
105.696	15.220	-98	121.25	116.0	1392	4.08	28.35	0.268	0	0.55	0.55	2.246	15.59	58	0.01	0.25	125.00	15156.25	6754.80	8401.45	2.10	14.11	1019.25	-100
106.696	15.364	-99	122.25	117.0	1404	4.11	28.55	0.268	0	0.55	0.55	2.261	15.70	58.5	0.00	0.25	125.00	15281.25	6817.20	8464.05	2.12	14.21	1033.46	-101
107.696	15.508	-100	123.25	118.0	1416	4.14	28.74	0.267	0	0.55	0.55	2.277	15.81	59	0.00	0.25	125.00	15406.25	6879.60	8526.65	2.13	14.30	1047.76	-102
108.696	15.652	-101	124.25	119.0	1428	4.17	28.94	0.266	0	0.55	0.55	2.292	15.92	59.5	-0.01	0.25	125.00	15531.25	6942.00	8589.25	2.15	14.40	1062.17	-103
109.696	15.796	-102	125.25	120.0	1440	4.20	29.14	0.266	0	0.55	0.55	2.307	16.02	60	-0.01	0.25	125.00	15656.25	7004.40	8651.85	2.16	14.50	1076.66	-104
110.696	15.940	-103	126.25	121.0	1452	4.22	29.33	0.265	0	0.55	0.55	2.323	16.13	60.5	-0.02	0.25	125.00	15781.25	7066.80	8714.45	2.18	14.60	1091.26	-105
111.696	16.084	-104	127.25	122.0	1464	4.25	29.53	0.264	0	0.55	0.55	2.338	16.24	61	-0.03	0.25	125.00	15906.25	7129.20	8777.05	2.19	14.69	1105.95	-106
112.696	16.228	-105	128.25	123.0	1476	4.28	29.72	0.264	0	0.55	0.55	2.354	16.35	61.5	-0.03	0.25	125.00	16031.25	7191.60	8839.65	2.21	14.79	1120.74	-107
113.696	16.372	-106	129.25	124.0	1488	4.31	29.92	0.263	0	0.55	0.55	2.369	16.45	62	-0.04	0.25	125.00	16156.25	7254.00	8902.25	2.23	14.89	1135.63	-108
114.696	16.516	-107	130.25	125.0	1500	4.34	30.11	0.263	0	0.55	0.55	2.385	16.56	62.5	-0.04	0.25	125.00	16281.25	7316.40	8964.85	2.24	14.99	1150.62	-109
115.696	16.660	-108	131.25	126.0	1512	4.36	30.31	0.262	0	0.55	0.55	2.400	16.67	63	-0.05	0.25	125.00	16406.25	7378.80	9027.45	2.26	15.08	1165.70	-110
116.696	16.804	-109	132.25	127.0	1524	4.39	30.50	0.261	0	0.55	0.55	2.416	16.78	63.5	-0.06	0.25	125.00	16531.25	7441.20	9090.05	2.27	15.18	1180.88	-111
117.696	16.948	-110	133.25	128.0	1536	4.42	30.70	0.261	0	0.55	0.55	2.431	16.89	64	-0.06	0.25	125.00	16656.25	7503.60	9152.65	2.29	15.28	1196.16	-112
118.696	17.092	-111	134.25	129.0	1548	4.45	30.90	0.260	0	0.55	0.55	2.447	16.99	64.5	-0.07	0.25	125.00	16781.25	7566.00	9215.25	2.30	15.37	1211.53	-113
119.696	17.236	-112	135.25	130.0	1560	4.48	31.09	0.260	0	0.55	0.55	2.462	17.10	65	-0.07	0.25	125.00	16906.25	7628.40	9277.85	2.32	15.47	1227.00	-114
120.696	17.380	-113	136.25	131.0	1572	4.51	31.29	0.259	0	0.55	0.55	2.478	17.21	65.5	-0.08	0.25	125.00	17031.25	7690.80	9340.45	2.34	15.57	1242.57	-115
121.696	17.524	-114	137.25	132.0	1584	4.53	31.48	0.259	0	0.55	0.55	2.493	17.32	66	-0.08	0.25	125.00	17156.25	7753.20	9403.05	2.35	15.67	1258.24	-116
122.696	17.668	-115	138.25	133.0	1596	4.56	31.68	0.258	0	0.55	0.55	2.509	17.42	66.5	-0.09	0.25	125.00	17281.25	7815.60	9465.65	2.37	15.76	1274.00	-117
123.696	17.812	-116	139.25	134.0	1608	4.59	31.87	0.258	0	0.55	0.55	2.524	17.53	67	-0.10	0.25	125.00	17406.25	7878.00	9528.25	2.38	15.86	1289.86	-118
124.696	17.956	-117	140.25	135.0	1620	4.62	32.07	0.257	0	0.55	0.55	2.540	17.64	67.5	-0.10	0.25	125.00	17531.25	7940.40	9590.85	2.40	15.96	1305.82	-119
125.696	18.100	-118	141.25	136.0	1632	4.65	32.27	0.257	0	0.55	0.55	2.555	17.75	68	-0.11	0.25	125.00	17656.25	8002.80	9653.45	2.41	16.06	1321.88	-120
126.696	18.244	-119	142.25	137.0	1644	4.67	32.46	0.256	0	0.55	0.55	2.571	17.85	68.5	-0.11	0.25	125.00	17781.25	8065.20	9716.05	2.43	16.15	1338.03	-121
127.696	18.388	-120	143.25	138.0	1656	4.70	32.66	0.256	0	0.55	0.55	2.586	17.96	69	-0.12	0.25	125.00	17906.25	8127.60	9778.65	2.44	16.25	1354.28	-122
128.696	18.532	-121	144.25	139.0	1668	4.73	32.85	0.255	0	0.55	0.55	2.602	18.07	69.5	-0.12	0.25	125.00	18031.25	8190.00	9841.25	2.46	16.35	1370.63	-123
129.696	18.676	-122	145.25	140.0	1680	4.76	33.05	0.255	0	0.55	0.55	2.617	18.18	70	-0.13	0.25	125.00	18156.25	8252.40	9903.85	2.48	16.45	1387.08	-124
130.696	18.820	-123	146.25	141.0	1692	4.79	33.24	0.254	0	0.55	0.55	2.633	18.28	70.5	-0.14	0.25	125.00	18281.25	8314.80	9966.45	2.49	16.54	1403.62	-125

29th AVE. Off Ramp Bent 2a

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	21.50
Bottom of footing elevation / Pile top elevation (feet)	19.50
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-160.50

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 6.0 feet
72 inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	20	2	0.0	0	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.87	0.87	125.00	250.00	0.00	250.00	0.00	0.00	0.00	14
14.696	2.116	19	3	1.0	12	2.15	14.93	1.016	0	0.55	0.00	0.000	0.00	10	0.84	0.84	125.00	375.00	0.00	375.00	0.00	0.00	0.00	13
14.696	2.116	18	4	2.0	24	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.82	0.82	125.00	500.00	0.00	500.00	0.00	0.00	0.00	12
14.696	2.116	17	5	3.0	36	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.80	0.80	125.00	625.00	0.00	625.00	0.00	0.00	0.00	11
14.696	2.116	16	6	4.0	48	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	750.00	0.00	750.00	0.00	0.00	0.00	10
14.696	2.116	15	7	5.0	60	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	875.00	0.00	875.00	0.00	0.00	0.00	9
14.696	2.116	14	8	6.0	72	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.74	19.70	19.70	8
14.696	2.116	13	9	7.0	84	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.82	19.18	38.88	7
14.696	2.116	12	10	8.0	96	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	18.66	57.54	6
14.696	2.116	11	11	9.0	108	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.70	0.70	125.00	1375.00	0.00	1375.00	0.96	18.14	75.68	5
14.696	2.116	10	12	10.0	120	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.69	0.69	125.00	1500.00	31.20	1468.80	1.01	17.62	93.31	4
14.696	2.116	9	13	11.0	132	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.67	0.67	125.00	1625.00	93.60	1531.40	1.03	17.11	110.41	3
14.696	2.116	8	14	12.0	144	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.66	0.66	125.00	1750.00	156.00	1594.00	1.06	16.59	127.00	2
14.696	2.116	7	15	13.0	156	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.65	0.65	125.00	1875.00	218.40	1656.60	1.08	16.07	143.07	1
14.696	2.116	6	16	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	2000.00	280.80	1719.20	1.10	15.55	158.62	-1
14.696	2.116	5	17	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2125.00	343.20	1781.80	1.12	15.55	174.17	-2
14.696	2.116	4	18	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2250.00	405.60	1844.40	1.14	15.55	189.72	-3
14.696	2.116	3	19	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2375.00	468.00	1907.00	1.16	15.55	205.27	-4
14.696	2.116	2	20	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2500.00	530.40	1969.60	1.18	15.55	220.82	-5
14.696	2.116	1	21	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	592.80	2032.20	1.19	15.55	236.37	-6
14.696	2.116	-1	22	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	655.20	2094.80	1.21	15.55	251.92	-7
14.696	2.116	-2	23	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.60	0.60	125.00	2875.00	717.60	2157.40	1.29	15.55	267.48	-8
14.696	2.116	-3	24	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.61	0.61	125.00	3000.00	780.00	2220.00	1.36	15.55	283.03	-9
14.696	2.116	-4	25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.63	0.63	125.00	3125.00	842.40	2282.60	1.44	15.55	298.58	-10
14.696	2.116	-5	26	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.65	0.65	125.00	3250.00	904.80	2345.20	1.52	15.55	314.13	-11
14.696	2.116	-6	27	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.66	0.66	125.00	3375.00	967.20	2407.80	1.60	15.55	329.68	-12
15.696	2.260	-7	28	26.0	312	1.50	10.42	0.664	0	0.55	0.55	0.825	5.73	13	0.68	0.68	125.00	3500.00	1029.60	2470.40	1.68	15.55	345.23	-13
16.696	2.404	-8	29	27.0	324	1.52	10.55	0.632	0	0.55	0.55	0.836	5.80	13.5	0.69	0.69	125.00	3625.00	1092.00	2533.00	1.76	15.75	360.98	-14
17.696	2.548	-9	30	28.0	336	1.55	10.75	0.607	0	0.55	0.55	0.851	5.91	14	0.71	0.71	125.00	3750.00	1154.40	2595.60	1.84	16.04	377.02	-15
18.696	2.692	-10	31	29.0	348	1.58	10.94	0.585	0	0.55	0.55	0.867	6.02	14.5	0.72	0.72	125.00	3875.00	1216.80	2658.20	1.92	16.33	393.36	-16
19.696	2.836	-11	32	30.0	360	1.60	11.14	0.565	0	0.55	0.55	0.882	6.13	15	0.73	0.73	125.00	4000.00	1279.20	2720.80	2.00	16.63	409.99	-17
20.696	2.980	-12	33	31.0	372	1.63	11.33	0.548	0	0.55	0.55	0.898	6.23	15.5	0.72	0.72	125.00	4125.00	1341.60	2783.40	2.01	16.92	426.90	-18
21.696	3.124	-13	34	32.0	384	1.66	11.53	0.531	0	0.55	0.55	0.913	6.34	16	0.71	0.71	125.00	4250.00	1404.00	2846.00	2.02	17.21	444.12	-19
22.696	3.268	-14	35	33.0	396	1.69	11.72	0.517	0	0.55	0.55	0.929	6.45	16.5	0.70	0.70	125.00	4375.00	1466.40	2908.60	2.04	17.50	461.62	-20
23.696	3.412	-15	36	34.0	408	1.72	11.92	0.503	0	0.55	0.55	0.944	6.56	17	0.69	0.69	125.00	4500.00	1528.80	2971.20	2.05	17.80	479.41	-21
24.696	3.556	-16	37	35.0	420	1.74	12.12	0.491	0	0.55	0.55	0.960	6.66	17.5	0.68	0.68	125.00	4625.00	1591.20	3033.80	2.05	18.09	497.50	-22
25.696	3.700	-17	38	36.0	432	1.77	12.31	0.479	0	0.55	0.55	0.975	6.77	18	0.67	0.67	125.00	4750.00	1653.60	3096.40	2.06	18.38	515.88	-23
26.696	3.844	-18	39	37.0	444	1.80	12.51	0.468	0	0.55	0.55	0.991	6.88	18.5	0.66	0.66	125.00	4875.00	1716.00	3159.00	2.07	18.67	534.55	-24
27.696	3.988	-19	40	38.0	456	1.83	12.70	0.459	0	0.55	0.55	1.006	6.99	19	0.64	0.64	125.00	5000.00	1778.40	3221.60	2.08	18.96	553.52	-25
28.696	4.132	-20	41	39.0	468	1.86	12.90	0.449	0	0.55	0.55	1.022	7.09	19.5	0.63	0.63	125.00	5125.00	1840.80	3284.20	2.08	19.26	572.77	-26
29.696	4.276	-21	42	40.0	480	1.89	13.09	0.441	0	0.55	0.55	1.037	7.20	20	0.62	0.62	125.00	5250.00	1903.20	3346.80	2.09	19.55	592.32	-27
30.696	4.420	-22	43	41.0	492	1.91	13.29	0.433	0	0.55	0.55	1.053	7.31	20.5	0.61	0.61	125.00	5375.00	1965.60	3409.40	2.09	19.84	612.16	-28
31.696	4.564	-23	44	42.0	504	1.94	13.49	0.425	0	0.55	0.55	1.068	7.42	21	0.60	0.60	125.00	5500.00	2028.00	3472.00	2.09	20.13	632.29	-29
32.696	4.708	-24	45	43.0	516	1.97	13.68	0.418	0	0.55	0.55	1.084	7.52	21.5	0.59	0.59	125.00	5625.00	2090.40	3534.60	2.09	20.42	652.71	-30
33.696	4.852	-25	46	44.0	528	2.00	13.88	0.412	0	0.55	0.55	1.099	7.63	22	0.58	0.58	125.00	5750.00	2152.80	3597.20	2.10	20.72	673.43	-31
34.696	4.996	-26	47	45.0	540	2.03	14.07	0.406	0	0.55	0.55	1.114	7.74	22.5	0.57	0.57	125.00	5875.00	2215.20	3659.80	2.10	21.01	694.44	-32
35.696	5.140	-27	48	46.0	552	2.05	14.27	0.400	0	0.55	0.55	1.130	7.85	23	0.56	0.56	125.00	6000.00	2277.60	3722.40	2.10	21.30	715.74	-33
36.696	5.284	-28	49	47.0	564	2.08	14.46	0.394	0	0.55	0.55	1.145	7.95	23.5	0.55	0.55	125.00	6125.00	2340.00	3785.00	2.09	21.59	737.33	-34
37.696	5.428	-29	50	48.0	576	2.11	14.66	0.389	0	0.55	0.55	1.161	8.06	24	0.54	0.54	125.00	6250.00	2402.40	3847.60	2.09	21.88	759.21	-35
38.696	5.572	-30	51	49.0	588	2.14	14.85	0.384	0	0.55	0.55	1.176	8.17	24.5	0.53	0.53	125.00	6375.00	2464.80	3910.20	2.09	22.18	781.39	-36
39.696	5.716	-31	52	50.0	600	2.17	15.05	0.379	0	0.55	0.55	1.192	8.28	25	0.52	0.52	125.00	6500.00	2527.20	3972.80	2.08	22.47	803.86	-37
40.696	5.860	-32	53	51.0	612	2.20	15.25	0.375	0	0.55	0.55	1.207	8.39	25.5	0.52	0.52	125.00	6625.00	2589.60	4035.40	2.08	22.76	826.61	-38
41.696	6.004	-33	54	52.0	624	2.22	15.44	0.370	0	0.55	0.55	1.223	8.49	26	0.51	0.51	125.00	6750.00	2652.00	4098.00	2.07	23.05	849.67	-39
42.696	6.148	-34	55	53.0	636	2.25	15.64	0.366	0	0.55	0.55	1.238	8.60	26.5	0.50	0.50	125.00	6875.00	2714.40	4160.60	2.07	23.34	873.01	-40
43.696	6.292	-35	56	54.0	648	2.28	15.83	0.362	0	0.55	0.55	1.254	8.71	27	0.49	0.49	125.00	7000.00	2776.80	4223.20	2.06	23.64	896.65	-41
44.696	6.436	-36	57	55.0	660	2.31	16.03	0.359	0	0.55	0.55	1.269	8.82	27.5	0.48	0.48	125.00	7125.00	2839.20	4285.80	2.05	23.93	920.58	-42
45.696	6.580	-37	58	56.0	672	2.34	16.22	0.355	0	0.55	0.55	1.285	8.92	28	0.47	0.47	125.00	7250.00	2901.60	4348.40	2.04	24.22	944.80	-43
46.696	6.724	-38	59	57.0	684	2.36	16.42	0.352	0	0.55	0.55	1.300	9.03	28.5	0.46	0.46	125.00	7375.00	2964.00	4411.00	2.03	24.51	969.31	-44
47.696	6.868	-39	60	58.0	696	2.39	16.62	0.348	0	0.55	0.55	1.316	9.14	29	0.45	0.45	125.00	7500.00	3026.40	4473.60	2.02	24.80	994.11	-45
48.696	7.012	-40	61	59.0	708	2.42	16.81	0.345	0	0.55	0.55	1.331	9.25	29.5	0.44	0.44	125.00	7625.00	3088.80	4536.20	2.01	25.10	1019.21	-46
49.696	7.156	-41	62	60.0	720	2.45	17.01	0.342	0	0.55	0.55	1.347	9.35	30	0.43	0.43	125.00	7750.00	3151.20	4598.80	2.00	25.39	1044.60	-47
50.696	7.300	-42	63	61.0	732	2.48	17.20	0.339	0	0.55	0.55	1.362	9.46	30.5	0.43	0.43	125.00	7875.00	3213.60	4661.40	1.99	25.68	1070.28	-48
51.696	7.444	-43	64	62.0	744	2.51	17.40	0.337	0	0.55	0.55	1.378	9.57	31	0.42	0.42	125.00	8000.00	3276.00	4724.00	1.97	25.97	1096.25	-49
52.696	7.588	-44	65	63.0	756	2.53	17.59	0.334	0	0.55	0.55	1.393	9.68	31.5	0.41	0.41	125.00	8125.00	3338.40	4786.60	1.96	26.26	1122.51	-50
53.696	7.732	-45	66	64.0	768	2.56	17.79	0.331	0	0.55	0.55	1.409	9.78	32	0.40	0.40	125.00	8250.00	3400.80	4849.20	1.95	26.56	1149.07	-51
54.696	7.876	-46	67	65.0	780	2.59	17.98	0.329	0	0.55	0.55	1.424	9.89	32.5	0.39	0.39	125.00	8375.00	3463.20	4911.80	1.93	26.85	1175.92	-52
55.696	8.020	-47	68	66.0	792	2.62	18.18	0.326	0	0.55	0.55	1.440	10.00	33	0.38	0.38	125.00	8500.00	3525.60	4974.40	1.91	27.14	1203.06	-53
56.696	8.164	-48	69	67.0	804	2.65	18.38	0.324	0	0.55	0.55	1.455	10.11	33.5	0.38	0.38	125.00	8625.00	3588.00	5037.00	1.90	27.43	1230.49	-54
57.696	8.308	-49	70	68.0	816	2.67	18.57	0.322	0	0.55	0.55	1.471	10.21	34	0.37	0.37	125.00	8750.00	3650.40	5099.60	1.88	27.72	1258.22	-55
58.696	8.452	-50	71	69.0	828	2.70	18.77	0.320	0	0.55	0.55	1.486	10.32	34.5	0.36	0.36	125.00	8875.00	3712.80	5162.20	1.86	28.02	1286.23	-56
59.696	8.596	-51	72	70.0	840	2.73	18.96	0.318	0	0.55	0.55	1.502	10.43	35	0.35	0.35	125.00	9000.00	3775.20	5224.80	1.84	28.31	1314.54	-57
60.696	8.740	-52	73	71.0	852	2.76	19.16	0.316	0	0.55	0.55	1.517	10.54	35.5	0.34	0.34	125.00	9125.00	3837.60	5287.40	1.82	28.60	1343.14	-58
61.696	8.884	-53	74	72.0	864	2.79	19.35	0.314	0	0.55	0.55	1.533	10.64	36	0.34	0.34	125.00	9250.00	3900.00	5350.00	1.80	28.89	1372.04	-59
62.696	9.028	-54	75	73.0	876	2.82	19.55	0.312	0	0.55	0.55	1.548	10.75	36.5	0.33	0.33	125.00	9375.00	3962.40	5412.60	1.78	29.18	1401.22	-60
63.696	9.172	-55	76	74.0	888	2.84	19.75	0.310	0	0.55	0.55	1.564	10.86	37	0.32	0.32	125.00	9500.00	4024.80	5475.20	1.76	29.48	1430.70	-61
64.696	9.316	-56	77	75.0	900	2.87	19.94	0.308	0	0.55	0.55	1.579	10.97	37.5	0.31	0.31	125.00	9625.00	4087.20	5537.80	1.73	29.77	1460.47	-62
65.696	9.460	-57	78	76.0	912	2.90	20.14	0.307	0	0.55	0.55	1.595	11.07	38	0.31	0.31	125.00	9750.00	4149.60	5600.40	1.71	30.06	1490.53	-63
66.696	9.604	-58	79	77.0	924	2.93	20.33	0.305	0	0.55	0.55	1.610	11.18	38.5	0.30	0.30	125.00	9875.00	4212.00	5663.00	1.69	30.35	1520.88	-64
67.696	9.748	-59	80	78.0	936	2.96	20.53	0.303	0	0.55	0.55	1.626	11.29	39	0.29	0.29	125.00	10000.00	4274.40	5725.60	1.66	30.65	1551.53	-65
68.696	9.892	-60	81	79.0	948	2.98	20.72	0.302	0	0.55	0.55	1.641	11.40	39.5	0.28	0.28	125.00	10125.00	4336.80	5788.20	1.64	30.94	1582.46	-66
69.696	10.036	-61	82	80.0	960	3.01	20.92	0.300	0	0.55	0.55	1.657	11.51	40	0.28	0.28	125.00	10250.00	4399.20	5850.80	1.61	31.23	1613.69	-67
70.696	10.180	-62	83	81.0	972	3.04	21.11	0.299	0	0.55	0.55	1.672	11.61	40.5	0.27	0.27	125.00	10375.00	4461.60	5913.40	1.58	31.52	1645.22	-68
71.696	10.324	-63	84	82.0	984	3.07	21.31	0.297	0	0.55	0.55	1.688	11.72	41	0.26	0.26	125.00	10500.00	4524.00	5976.00	1.56	31.81	1677.03	-69
72.696	10.468	-64	85	83.0	996	3.10	21.51	0.296	0	0.55	0.55	1.703	11.83	41.5	0.25	0.25	125.00	10625.00	4586.40	6038.60	1.53	32.11	1709.13	-70
73.696	10.612	-65	86	84.0	1008	3.12	21.70	0.294	0	0.55	0.55	1.719	11.94	42	0.25	0.25	125.00	10750.00	4648.80	6101.20	1.53	32.40	1741.53	-71
74.696	10.756	-66	87	85.0	1020	3.15	21.90	0.293	0	0.55	0.55	1.734	12.04	42.5	0.24	0.25	125.00	10875.00	4711.20	6163.80	1.54	32.69	1774.22	-72
75.696	10.900	-67	88	86.0	1032	3.18	22.09	0.292	0	0.55	0.55	1.750	12.15	43	0.23	0.25	125.00	11000.00	4773.60	6226.40	1.56	32.98	1807.20	-73
76.696	11.044	-68	89	87.0	1044	3.21	22.29	0.291	0	0.55	0.55	1.765	12.26	43.5	0.22	0.25	125.00	11125.00	4836.00	6289.00	1.57	33.27	1840.48	-74
77.696	11.188	-69	90	88.0	1056	3.24	22.48	0.289	0	0.55	0.55	1.781	12.37	44	0.22	0.25	125.00	11250.00	4898.40	6351.60	1.59	33.57	1874.04	-75
78.696	11.332	-70	91	89.0	1068	3.27	22.68	0.288	0	0.55	0.55	1.796	12.47	44.5	0.21	0.25	125.00	11375.00	4960.80	6414.20	1.60	33.86	1907.90	-76
79.696	11.476	-71	92	90.0	1080	3.29	22.88	0.287	0	0.55	0.55	1.812	12.58	45	0.20	0.25	125.00	11500.00	5023.20	6476.80	1.62	34.15	1942.05	-77
80.696	11.620	-72	93	91.0	1092	3.32	23.07	0.286	0	0.55	0.55	1.827	12.69	45.5	0.20	0.25	125.00	11625.00	5085.60	6539.40	1.63	34.44	1976.49	-78
81.696	11.764	-73	94	92.0	1104	3.35	23.27	0.285	0	0.55	0.55	1.843	12.80	46	0.19	0.25	125.00	11750.00	5148.00	6602.00	1.65	34.73	2011.22	-79
82.696	11.908	-74	95	93.0	1116	3.38	23.46	0.284	0	0.55	0.55	1.858	12.90	46.5	0.18	0.25	125.00	11875.00	5210.40	6664.60	1.67	35.03	2046.25	-80
83.696	12.052	-75	96	94.0	1128	3.41	23.66	0.283	0	0.55	0.55	1.874	13.01	47	0.17	0.25	125.00	12000.00	5272.80	6727.20	1.68	35.32	2081.57	-81
84.696	12.196	-76	97	95.0	1140	3.43	23.85	0.282	0	0.55	0.55	1.889	13.12	47.5	0.17	0.25	125.00	12125.00	5335.20	6789.80	1.70	35.61	2117.18	-82
85.696	12.340	-77	98	96.0	1152	3.46	24.05	0.281	0	0.55	0.55	1.905	13.23	48	0.16	0.25	125.00	12250.00	5397.60	6852.40	1.71	35.90	2153.08	-83
86.696	12.484	-78	99	97.0	1164	3.49	24.24	0.280	0	0.55	0.55	1.920	13.33	48.5	0.15	0.25	125.00	12375.00	5460.00	6915.00	1.73	36.19	2189.27	-84
87.696	12.628	-79	100	98.0	1176	3.52	24.44	0.279	0	0.55	0.55	1.936	13.44	49	0.15	0.25	125.00	12500.00	5522.40	6977.60	1.74	36.49	2225.76	-85
88.696	12.772	-80	101	99.0	1188	3.55	24.64	0.278	0	0.55	0.55	1.951	13.55	49.5	0.14	0.25	125.00	12625.00	5584.80	7040.20	1.76	36.78	2262.54	-86
89.696	12.916	-81	102	100.0	1200	3.58	24.83	0.277	0	0.55	0.55	1.967	13.66	50	0.13	0.25	125.00	12750.00	5647.20	7102.80	1.78	37.07	2299.61	-87
90.696	13.060	-82	103	101.0	1212	3.60	25.03	0.276	0	0.55	0.55	1.982	13.76	50.5	0.13	0.25	125.00	12875.00	5709.60	7165.40	1.79	37.36	2336.97	-88
91.696	13.204	-83	104	102.0	1224	3.63	25.22	0.275	0	0.55	0.55	1.998	13.87	51	0.12	0.25	125.00	13000.00	5772.00	7228.00	1.81	37.65	2374.63	-89
92.696	13.348	-84	105	103.0	1236	3.66	25.42	0.274	0	0.55	0.55	2.013	13.98	51.5	0.11	0.25	125.00	13125.00	5834.40	7290.60	1.82	37.95	2412.57	-90
93.696	13.492	-85	106	104.0	1248	3.69	25.61	0.273	0	0.55	0.55	2.029	14.09	52	0.11	0.25	125.00	13250.00	5896.80	7353.20	1.84	38.24	2450.81	-91
94.696	13.636	-86	107	105.0	1260	3.72	25.81	0.273	0	0.55	0.55	2.044	14.20	52.5	0.10	0.25	125.00	13375.00	5959.20	7415.80	1.85	38.53	2489.34	-92
95.696	13.780	-87	108	106.0	1272	3.74	26.01	0.272	0	0.55	0.55	2.060	14.30	53	0.09	0.25	125.00	13500.00	6021.60	7478.40	1.87	38.82	2528.16	-93
96.696	13.924	-88	109	107.0	1284	3.77	26.20	0.271	0	0.55	0.55	2.075	14.41	53.5	0.09	0.25	125.00	13625.00	6084.00	7541.00	1.89	39.11	2567.28	-94
97.696	14.068	-89	110	108.0	1296	3.80	26.40	0.270	0	0.55	0.55	2.091	14.52	54	0.08	0.25	125.00	13750.00	6146.40	7603.60	1.90	39.41	2606.68	-95
98.696	14.212	-90	111	109.0	1308	3.83	26.59	0.269	0	0.55	0.55	2.106	14.63	54.5	0.07	0.25	125.00	13875.00	6208.80	7666.20	1.92	39.70	2646.38	-96
99.696	14.356	-91	112	110.0	1320	3.86	26.79	0.269	0	0.55	0.55	2.122	14.73	55	0.07	0.25	125.00	14000.00	6271.20	7728.80	1.93	39.99	2686.37	-97
100.696	14.500	-92	113	111.0	1332	3.89	26.98	0.268	0	0.55	0.55	2.137	14.84	55.5	0.06	0.25	125.00	14125.00	6333.60	7791.40	1.95	40.28	2726.66	-98
101.696	14.644	-93	114	112.0	1344	3.91	27.18	0.267	0	0.55	0.55	2.153	14.95	56	0.06	0.25	125.00	14250.00	6396.00	7854.00	1.96	40.57	2767.23	-99
102.696	14.788	-94	115	113.0	1356	3.94	27.37	0.267	0	0.55	0.55	2.168	15.06	56.5	0.05	0.25	125.00	14375.00	6458.40	7916.60	1.98	40.87	2808.10	-100
103.696	14.932	-95	116	114.0	1368	3.97	27.57	0.266	0	0.55	0.55	2.184	15.16	57	0.04	0.25	125.00	14500.00	6520.80	7979.20	1.99	41.16	2849.26	-101
104.696	15.076	-96	117	115.0	1380	4.00	27.77	0.265	0	0.55	0.55	2.199	15.27	57.5	0.04	0.25	125.00	14625.00	6583.20	8041.80	2.01	41.45	2890.71	-102
105.696	15.220	-97	118	116.0	1392	4.03	27.96	0.265	0	0.55	0.55	2.215	15.38	58	0.03	0.25	125.00	14750.00	6645.60	8104.40	2.03	41.74	2932.45	-103
106.696	15.364	-98	119	117.0	1404	4.05	28.16	0.264	0	0.55	0.55	2.230	15.49	58.5	0.02	0.25	125.00	14875.00	6708.00	8167.00	2.04	42.03	2974.49	-104
107.696	15.508	-99	120	118.0	1416	4.08	28.35	0.263	0	0.55	0.55	2.246	15.59	59	0.02	0.25	125.00	15000.00	6770.40	8229.60	2.06	42.33	3016.81	-105
108.696	15.652	-100	121	119.0	1428	4.11	28.55	0.263	0	0.55	0.55	2.261	15.70	59.5	0.01	0.25	125.00	15125.00	6832.80	8292.20	2.07	42.62	3059.43	-106
109.696	15.796	-101	122	120.0	1440	4.14	28.74	0.262	0	0.55	0.55	2.277	15.81	60	0.01	0.25	125.00	15250.00	6895.20	8354.80	2.09	42.91	3102.34	-107
110.696	15.940	-102	123	121.0	1452	4.17	28.94	0.261	0	0.55	0.55	2.292	15.92	60.5	0.00	0.25	125.00	15375.00	6957.60	8417.40	2.10	43.20	3145.55	-108
111.696	16.084	-103	124	122.0	1464	4.20	29.14	0.261	0	0.55	0.55	2.307	16.02	61	-0.01	0.25	125.00	15500.00	7020.00	8480.00	2.12	43.50	3189.04	-109
112.696	16.228	-104	125	123.0	1476	4.22	29.33	0.260	0	0.55	0.55	2.323	16.13	61.5	-0.01	0.25	125.00	15625.00	7082.40	8542.60	2.14	43.79	3232.83	-110
113.696	16.372	-105	126	124.0	1488	4.25	29.53	0.260	0	0.55	0.55	2.338	16.24	62	-0.02	0.25	125.00	15750.00	7144.80	8605.20	2.15	44.08	3276.91	-111
114.696	16.516	-106	127	125.0	1500	4.28	29.72	0.259	0	0.55	0.55	2.354	16.35	62.5	-0.02	0.25	125.00	15875.00	7207.20	8667.80	2.17	44.37	3321.28	-112
115.696	16.660	-107	128	126.0	1512	4.31	29.92	0.259	0	0.55	0.55	2.369	16.45	63	-0.03	0.25	125.00	16000.00	7269.60	8730.40	2.18	44.66	3365.94	-113
116.696	16.804	-108	129	127.0	1524	4.34	30.11	0.258	0	0.55	0.55	2.385	16.56	63.5	-0.04	0.25	125.00	16125.00	7332.00	8793.00	2.20	44.96	3410.90	-114
117.696	16.948	-109	130	128.0	1536	4.36	30.31	0.258	0	0.55	0.55	2.400	16.67	64	-0.04	0.25	125.00	16250.00	7394.40	8855.60	2.21	45.25	3456.15	-115
118.696	17.092	-110	131	129.0	1548	4.39	30.50	0.257	0	0.55	0.55	2.416	16.78	64.5	-0.05	0.25	125.00	16375.00	7456.80	8918.20	2.23	45.54	3501.68	-116
119.696	17.236	-111	132	130.0	1560	4.42	30.70	0.256	0	0.55	0.55	2.431	16.89	65	-0.05	0.25	125.00	16500.00	7519.20	8980.80	2.25	45.83	3547.52	-117
120.696	17.380	-112	133	131.0	1572	4.45	30.90	0.256	0	0.55	0.55	2.447	16.99	65.5	-0.06	0.25	125.00	16625.00	7581.60	9043.40	2.26	46.12	3593.64	-118
121.696	17.524	-113	134	132.0	1584	4.48	31.09	0.255	0	0.55	0.55	2.462	17.10	66	-0.07	0.25	125.00	16750.00	7644.00	9106.00	2.28	46.42	3640.06	-119
122.696	17.668	-114	135	133.0	1596	4.51	31.29	0.255	0	0.55	0.55	2.478	17.21	66.5	-0.07	0.25	125.00	16875.00	7706.40	9168.60	2.29	46.71	3686.76	-120
123.696	17.812	-115	136	134.0	1608	4.53	31.48	0.255	0	0.55	0.55	2.493	17.32	67	-0.08	0.25	125.00	17000.00	7768.80	9231.20	2.31	47.00	3733.76	-121
124.696	17.956	-116	137	135.0	1620	4.56	31.68	0.254	0	0.55	0.55	2.509	17.42	67.5	-0.08	0.25	125.00	17125.00	7831.20	9293.80	2.32	47.29	3781.05	-122
125.696	18.100	-117	138	136.0	1632	4.59	31.87	0.254	0	0.55	0.55	2.524	17.53	68	-0.09	0.25	125.00	17250.00	7893.60	9356.40	2.34	47.58	3828.64	-123
126.696	18.244	-118	139	137.0	1644	4.62	32.07	0.253	0	0.55	0.55	2.540	17.64	68.5	-0.09	0.25	125.00	17375.00	7956.00	9419.00	2.35	47.88	3876.51	-124
127.696	18.388	-119	140	138.0	1656	4.65	32.27	0.253	0	0.55	0.55	2.555	17.75	69	-0.10	0.25	125.00	17500.00	8018.40	9481.60	2.37	48.17	3924.68	-125
128.696	18.532	-120	141	139.0	1668	4.67	32.46	0.252	0	0.55	0.55	2.571	17.85	69.5	-0.11	0.25	125.00	17625.00	8080.80	9544.20	2.39	48.46	3973.14	-126
129.696	18.676	-121	142	140.0	1680	4.70	32.66	0.252	0	0.55	0.55	2.586	17.96	70	-0.11	0.25	125.00	17750.00	8143.20	9606.80	2.40	48.75	4021.89	-127
130.696	18.820	-122	143	141.0	1692	4.73	32.85	0.251	0	0.55	0.55	2.602	18.07	70.5	-0.12	0.25	125.00	17875.00	8205.60	9669.40	2.42	49.04	4070.94	-128
131.696	18.964	-123	144	142.0	1704	4.76	33.05	0.251	0	0.55	0.55	2.617	18.18	71	-0.12	0.25	125.00	18000.00	8268.00	9732.00	2.43	49.34	4120.27	-129
132.696	19.108	-124	145	143.0	1716	4.79	33.24	0.251	0	0.55	0.55	2.633	18.28	71.5	-0.13	0.25	125.00	18125.00	8330.40	9794.60	2.45	49.63	4169.90	-130
133.696	19.252	-125	146	144.0	1728	4.82	33.44	0.250	0	0.55	0.55	2.648	18.39	72	-0.13	0.25	125.00	18250.00	8392.80	9857.20	2.46	49.92	4219.82	-131

29th AVE. Off Ramp Bent 2b

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	21.50	
Bottom of footing elevation / Pile top elevation (feet)	19.50	
GWT elevation (feet)	10.00	
Maximum tip elev for L/d < 30	-160.50	
Diameter	6.0	feet
	72	inches

Used alpha method for undrained and beta method for drained loading

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

										Cohesive Soil					Cohesionless Soil									
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	20	2	0.0	0	2.20	15.28	1.040	0	0.55	0.00	0.000	0.00	10	0.87	0.87	125.00	250.00	0.00	250.00	0.00	0.00	0.00	14
14.696	2.116	19	3	1.0	12	2.15	14.93	1.016	0	0.55	0.00	0.000	0.00	10	0.84	0.84	125.00	375.00	0.00	375.00	0.00	0.00	0.00	13
14.696	2.116	18	4	2.0	24	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.82	0.82	125.00	500.00	0.00	500.00	0.00	0.00	0.00	12
14.696	2.116	17	5	3.0	36	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.80	0.80	125.00	625.00	0.00	625.00	0.00	0.00	0.00	11
14.696	2.116	16	6	4.0	48	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	750.00	0.00	750.00	0.00	0.00	0.00	10
14.696	2.116	15	7	5.0	60	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	875.00	0.00	875.00	0.00	0.00	0.00	9
14.696	2.116	14	8	6.0	72	1.90	13.19	0.898	0	0.55	0.55	1.045	7.26	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.74	19.70	19.70	8
14.696	2.116	13	9	7.0	84	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.82	19.18	38.88	7
14.696	2.116	12	10	8.0	96	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	18.66	57.54	6
14.696	2.116	11	11	9.0	108	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.70	0.70	125.00	1375.00	0.00	1375.00	0.96	18.14	75.68	5
14.696	2.116	10	12	10.0	120	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.69	0.69	125.00	1500.00	31.20	1468.80	1.01	17.62	93.31	4
14.696	2.116	9	13	11.0	132	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.67	0.67	125.00	1625.00	93.60	1531.40	1.03	17.11	110.41	3
14.696	2.116	8	14	12.0	144	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.66	0.66	125.00	1750.00	156.00	1594.00	1.06	16.59	127.00	2
14.696	2.116	7	15	13.0	156	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.65	0.65	125.00	1875.00	218.40	1656.60	1.08	16.07	143.07	1
14.696	2.116	6	16	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	2000.00	280.80	1719.20	1.10	15.55	158.62	-1
14.696	2.116	5	17	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2125.00	343.20	1781.80	1.12	15.55	174.17	-2
14.696	2.116	4	18	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2250.00	405.60	1844.40	1.14	15.55	189.72	-3
14.696	2.116	3	19	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2375.00	468.00	1907.00	1.16	15.55	205.27	-4
14.696	2.116	2	20	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2500.00	530.40	1969.60	1.18	15.55	220.82	-5
14.696	2.116	1	21	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	592.80	2032.20	1.19	15.55	236.37	-6
14.696	2.116	-1	22	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	655.20	2094.80	1.21	15.55	251.92	-7
14.696	2.116	-2	23	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.60	0.60	125.00	2875.00	717.60	2157.40	1.29	15.55	267.48	-8
14.696	2.116	-3	24	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.61	0.61	125.00	3000.00	780.00	2220.00	1.36	15.55	283.03	-9
14.696	2.116	-4	25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.63	0.63	125.00	3125.00	842.40	2282.60	1.44	15.55	298.58	-10
14.696	2.116	-5	26	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.65	0.65	125.00	3250.00	904.80	2345.20	1.52	15.55	314.13	-11
14.696	2.116	-6	27	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.66	0.66	125.00	3375.00	967.20	2407.80	1.60	15.55	329.68	-12
15.696	2.260	-7	28	26.0	312	1.50	10.42	0.664	0	0.55	0.55	0.825	5.73	13	0.68	0.68	125.00	3500.00	1029.60	2470.40	1.68	15.55	345.23	-13
16.696	2.404	-8	29	27.0	324	1.52	10.55	0.632	0	0.55	0.55	0.836	5.80	13.5	0.69	0.69	125.00	3625.00	1092.00	2533.00	1.76	15.75	360.98	-14
17.696	2.548	-9	30	28.0	336	1.55	10.75	0.607	0	0.55	0.55	0.851	5.91	14	0.71	0.71	125.00	3750.00	1154.40	2595.60	1.84	16.04	377.02	-15
18.696	2.692	-10	31	29.0	348	1.58	10.94	0.585	0	0.55	0.55	0.867	6.02	14.5	0.72	0.72	125.00	3875.00	1216.80	2658.20	1.92	16.33	393.36	-16
19.696	2.836	-11	32	30.0	360	1.60	11.14	0.565	0	0.55	0.55	0.882	6.13	15	0.73	0.73	125.00	4000.00	1279.20	2720.80	2.00	16.63	409.99	-17
20.696	2.980	-12	33	31.0	372	1.63	11.33	0.548	0	0.55	0.55	0.898	6.23	15.5	0.72	0.72	125.00	4125.00	1341.60	2783.40	2.01	16.92	426.90	-18
21.696	3.124	-13	34	32.0	384	1.66	11.53	0.531	0	0.55	0.55	0.913	6.34	16	0.71	0.71	125.00	4250.00	1404.00	2846.00	2.02	17.21	444.12	-19
22.696	3.268	-14	35	33.0	396	1.69	11.72	0.517	0	0.55	0.55	0.929	6.45	16.5	0.70	0.70	125.00	4375.00	1466.40	2908.60	2.04	17.50	461.62	-20
23.696	3.412	-15	36	34.0	408	1.72	11.92	0.503	0	0.55	0.55	0.944	6.56	17	0.69	0.69	125.00	4500.00	1528.80	2971.20	2.05	17.80	479.41	-21
24.696	3.556	-16	37	35.0	420	1.74	12.12	0.491	0	0.55	0.55	0.960	6.66	17.5	0.68	0.68	125.00	4625.00	1591.20	3033.80	2.05	18.09	497.50	-22
25.696	3.700	-17	38	36.0	432	1.77	12.31	0.479	0	0.55	0.55	0.975	6.77	18	0.67	0.67	125.00	4750.00	1653.60	3096.40	2.06	18.38	515.88	-23
26.696	3.844	-18	39	37.0	444	1.80	12.51	0.468	0	0.55	0.55	0.991	6.88	18.5	0.66	0.66	125.00	4875.00	1716.00	3159.00	2.07	18.67	534.55	-24
27.696	3.988	-19	40	38.0	456	1.83	12.70	0.459	0	0.55	0.55	1.006	6.99	19	0.64	0.64	125.00	5000.00	1778.40	3221.60	2.08	18.96	553.52	-25
28.696	4.132	-20	41	39.0	468	1.86	12.90	0.449	0	0.55	0.55	1.022	7.09	19.5	0.63	0.63	125.00	5125.00	1840.80	3284.20	2.08	19.26	572.77	-26
29.696	4.276	-21	42	40.0	480	1.89	13.09	0.441	0	0.55	0.55	1.037	7.20	20	0.62	0.62	125.00	5250.00	1903.20	3346.80	2.09	19.55	592.32	-27
30.696	4.420	-22	43	41.0	492	1.91	13.29	0.433	0	0.55	0.55	1.053	7.31	20.5	0.61	0.61	125.00	5375.00	1965.60	3409.40	2.09	19.84	612.16	-28
31.696	4.564	-23	44	42.0	504	1.94	13.49	0.425	0	0.55	0.55	1.068	7.42	21	0.60	0.60	125.00	5500.00	2028.00	3472.00	2.09	20.13	632.29	-29
32.696	4.708	-24	45	43.0	516	1.97	13.68	0.418	0	0.55	0.55	1.084	7.52	21.5	0.59	0.59	125.00	5625.00	2090.40	3534.60	2.09	20.42	652.71	-30
33.696	4.852	-25	46	44.0	528	2.00	13.88	0.412	0	0.55	0.55	1.099	7.63	22	0.58	0.58	125.00	5750.00	2152.80	3597.20	2.10	20.72	673.43	-31
34.696	4.996	-26	47	45.0	540	2.03	14.07	0.406	0	0.55	0.55	1.114	7.74	22.5	0.57	0.57	125.00	5875.00	2215.20	3659.80	2.10	21.01	694.44	-32
35.696	5.140	-27	48	46.0	552	2.05	14.27	0.400	0	0.55	0.55	1.130	7.85	23	0.56	0.56	125.00	6000.00	2277.60	3722.40	2.10	21.30	715.74	-33
36.696	5.284	-28	49	47.0	564	2.08	14.46	0.394	0	0.55	0.55	1.145	7.95	23.5	0.55	0.55	125.00	6125.00	2340.00	3785.00	2.09	21.59	737.33	-34
37.696	5.428	-29	50	48.0	576	2.11	14.66	0.389	0	0.55	0.55	1.161	8.06	24	0.54	0.54	125.00	6250.00	2402.40	3847.60	2.09	21.88	759.21	-35
38.696	5.572	-30	51	49.0	588	2.14	14.85	0.384	0	0.55	0.55	1.176	8.17	24.5	0.53	0.53	125.00	6375.00	2464.80	3910.20	2.09	22.18	781.39	-36
39.696	5.716	-31	52	50.0	600	2.17	15.05	0.379	0	0.55	0.55	1.192	8.28	25	0.52	0.52	125.00	6500.00	2527.20	3972.80	2.08	22.47	803.86	-37
40.696	5.860	-32	53	51.0	612	2.20	15.25	0.375	0	0.55	0.55	1.207	8.39	25.5	0.52	0.52	125.00	6625.00	2589.60	4035.40	2.08	22.76	826.61	-38
41.696	6.004	-33	54	52.0	624	2.22	15.44	0.370	0	0.55	0.55	1.223	8.49	26	0.51	0.51	125.00	6750.00	2652.00	4098.00	2.07	23.05	849.67	-39
42.696	6.148	-34	55	53.0	636	2.25	15.64	0.366	0	0.55	0.55	1.238	8.60	26.5	0.50	0.50	125.00	6875.00	2714.40	4160.60	2.07	23.34	873.01	-40
43.696	6.292	-35	56	54.0	648	2.28	15.83	0.362	0	0.55	0.55	1.254	8.71	27	0.49	0.49	125.00	7000.00	2776.80	4223.20	2.06	23.64	896.65	-41
44.696	6.436	-36	57	55.0	660	2.31	16.03	0.359	0	0.55	0.55	1.269	8.82	27.5	0.48	0.48	125.00	7125.00	2839.20	4285.80	2.05	23.93	920.58	-42
45.696	6.580	-37	58	56.0	672	2.34	16.22	0.355	0	0.55	0.55	1.285	8.92	28	0.47	0.47	125.00	7250.00	2901.60	4348.40	2.04	24.22	944.80	-43
46.696	6.724	-38	59	57.0	684	2.36	16.42	0.352	0	0.55	0.55	1.300	9.03	28.5	0.46	0.46	125.00	7375.00	2964.00	4411.00	2.03	24.51	969.31	-44
47.696	6.868	-39	60	58.0	696	2.39	16.62	0.348	0	0.55	0.55	1.316	9.14	29	0.45	0.45	125.00	7500.00	3026.40	4473.60	2.02	24.80	994.11	-45
48.696	7.012	-40	61	59.0	708	2.42	16.81	0.345	0	0.55	0.55	1.331	9.25	29.5	0.44	0.44	125.00	7625.00	3088.80	4536.20	2.01	25.10	1019.21	-46
49.696	7.156	-41	62	60.0	720	2.45	17.01	0.342	0	0.55	0.55	1.347	9.35	30	0.43	0.43	125.00	7750.00	3151.20	4598.80	2.00	25.39	1044.60	-47
50.696	7.300	-42	63	61.0	732	2.48	17.20	0.339	0	0.55	0.55	1.362	9.46	30.5	0.43	0.43	125.00	7875.00	3213.60	4661.40	1.99	25.68	1070.28	-48
51.696	7.444	-43	64	62.0	744	2.51	17.40	0.337	0	0.55	0.55	1.378	9.57	31	0.42	0.42	125.00	8000.00	3276.00	4724.00	1.97	25.97	1096.25	-49
52.696	7.588	-44	65	63.0	756	2.53	17.59	0.334	0	0.55	0.55	1.393	9.68	31.5	0.41	0.41	125.00	8125.00	3338.40	4786.60	1.96	26.26	1122.51	-50
53.696	7.732	-45	66	64.0	768	2.56	17.79	0.331	0	0.55	0.55	1.409	9.78	32	0.40	0.40	125.00	8250.00	3400.80	4849.20	1.95	26.56	1149.07	-51
54.696	7.876	-46	67	65.0	780	2.59	17.98	0.329	0	0.55	0.55	1.424	9.89	32.5	0.39	0.39	125.00	8375.00	3463.20	4911.80	1.93	26.85	1175.92	-52
55.696	8.020	-47	68	66.0	792	2.62	18.18	0.326	0	0.55	0.55	1.440	10.00	33	0.38	0.38	125.00	8500.00	3525.60	4974.40	1.91	27.14	1203.06	-53
56.696	8.164	-48	69	67.0	804	2.65	18.38	0.324	0	0.55	0.55	1.455	10.11	33.5	0.38	0.38	125.00	8625.00	3588.00	5037.00	1.90	27.43	1230.49	-54
57.696	8.308	-49	70	68.0	816	2.67	18.57	0.322	0	0.55	0.55	1.471	10.21	34	0.37	0.37	125.00	8750.00	3650.40	5099.60	1.88	27.72	1258.22	-55
58.696	8.452	-50	71	69.0	828	2.70	18.77	0.320	0	0.55	0.55	1.486	10.32	34.5	0.36	0.36	125.00	8875.00	3712.80	5162.20	1.86	28.02	1286.23	-56
59.696	8.596	-51	72	70.0	840	2.73	18.96	0.318	0	0.55	0.55	1.502	10.43	35	0.35	0.35	125.00	9000.00	3775.20	5224.80	1.84	28.31	1314.54	-57
60.696	8.740	-52	73	71.0	852	2.76	19.16	0.316	0	0.55	0.55	1.517	10.54	35.5	0.34	0.34	125.00	9125.00	3837.60	5287.40	1.82	28.60	1343.14	-58
61.696	8.884	-53	74	72.0	864	2.79	19.35	0.314	0	0.55	0.55	1.533	10.64	36	0.34	0.34	125.00	9250.00	3900.00	5350.00	1.80	28.89	1372.04	-59
62.696	9.028	-54	75	73.0	876	2.82	19.55	0.312	0	0.55	0.55	1.548	10.75	36.5	0.33	0.33	125.00	9375.00	3962.40	5412.60	1.78	29.18	1401.22	-60
63.696	9.172	-55	76	74.0	888	2.84	19.75	0.310	0	0.55	0.55	1.564	10.86	37	0.32	0.32	125.00	9500.00	4024.80	5475.20	1.76	29.48	1430.70	-61
64.696	9.316	-56	77	75.0	900	2.87	19.94	0.308	0	0.55	0.55	1.579	10.97	37.5	0.31	0.31	125.00	9625.00	4087.20	5537.80	1.73	29.77	1460.47	-62
65.696	9.460	-57	78	76.0	912	2.90	20.14	0.307	0	0.55	0.55	1.595	11.07	38	0.31	0.31	125.00	9750.00	4149.60	5600.40	1.71	30.06	1490.53	-63
66.696	9.604	-58	79	77.0	924	2.93	20.33	0.305	0	0.55	0.55	1.610	11.18	38.5	0.30	0.30	125.00	9875.00	4212.00	5663.00	1.69	30.35	1520.88	-64
67.696	9.748	-59	80	78.0	936	2.96	20.53	0.303	0	0.55	0.55	1.626	11.29	39	0.29	0.29	125.00	10000.00	4274.40	5725.60	1.66	30.65	1551.53	-65
68.696	9.892	-60	81	79.0	948	2.98	20.72	0.302	0	0.55	0.55	1.641	11.40	39.5	0.28	0.28	125.00	10125.00	4336.80	5788.20	1.64	30.94	1582.46	-66
69.696	10.036	-61	82	80.0	960	3.01	20.92	0.300	0	0.55	0.55	1.657	11.51	40	0.28	0.28	125.00	10250.00	4399.20	5850.80	1.61	31.23	1613.69	-67
70.696	10.180	-62	83	81.0	972	3.04	21.11	0.299	0	0.55	0.55	1.672	11.61	40.5	0.27	0.27	125.00	10375.00	4461.60	5913.40	1.58	31.52	1645.22	-68
71.696	10.324	-63	84	82.0	984	3.07	21.31	0.297	0	0.55	0.55	1.688	11.72	41	0.26	0.26	125.00	10500.00	4524.00	5976.00	1.56	31.81	1677.03	-69
72.696	10.468	-64	85	83.0	996	3.10	21.51	0.296	0	0.55	0.55	1.703	11.83	41.5	0.25	0.25	125.00	10625.00	4586.40	6038.60	1.53	32.11	1709.13	-70
73.696	10.612	-65	86	84.0	1008	3.12	21.70	0.294	0	0.55	0.55	1.719	11.94	42	0.25	0.25	125.00	10750.00	4648.80	6101.20	1.53	32.40	1741.53	-71
74.696	10.756	-66	87	85.0	1020	3.15	21.90	0.293	0	0.55	0.55	1.734	12.04	42.5	0.24	0.25	125.00	10875.00	4711.20	6163.80	1.54	32.69	1774.22	-72
75.696	10.900	-67	88	86.0	1032	3.18	22.09	0.292	0	0.55	0.55	1.750	12.15	43	0.23	0.25	125.00	11000.00	4773.60	6226.40	1.56	32.98	1807.20	-73
76.696	11.044	-68	89	87.0	1044	3.21	22.29	0.291	0	0.55	0.55	1.765	12.26	43.5	0.22	0.25	125.00	11125.00	4836.00	6289.00	1.57	33.27	1840.48	-74
77.696	11.188	-69	90	88.0	1056	3.24	22.48	0.289	0	0.55	0.55	1.781	12.37	44	0.22	0.25	125.00	11250.00	4898.40	6351.60	1.59	33.57	1874.04	-75
78.696	11.332	-70	91	89.0	1068	3.27	22.68	0.288	0	0.55	0.55	1.796	12.47	44.5	0.21	0.25	125.00	11375.00	4960.80	6414.20	1.60	33.86	1907.90	-76
79.696	11.476	-71	92	90.0	1080	3.29	22.88	0.287	0	0.55	0.55	1.812	12.58	45	0.20	0.25	125.00	11500.00	5023.20	6476.80	1.62	34.15	1942.05	-77
80.696	11.620	-72	93	91.0	1092	3.32	23.07	0.286	0	0.55	0.55	1.827	12.69	45.5	0.20	0.25	125.00	11625.00	5085.60	6539.40	1.63	34.44	1976.49	-78
81.696	11.764	-73	94	92.0	1104	3.35	23.27	0.285	0	0.55	0.55	1.843	12.80	46	0.19	0.25	125.00	11750.00	5148.00	6602.00	1.65	34.73	2011.22	-79
82.696	11.908	-74	95	93.0	1116	3.38	23.46	0.284	0	0.55	0.55	1.858	12.90	46.5	0.18	0.25	125.00	11875.00	5210.40	6664.60	1.67	35.03	2046.25	-80
83.696	12.052	-75	96	94.0	1128	3.41	23.66	0.283	0	0.55	0.55	1.874	13.01	47	0.17	0.25	125.00	12000.00	5272.80	6727.20	1.68	35.32	2081.57	-81
84.696	12.196	-76	97	95.0	1140	3.43	23.85	0.282	0	0.55	0.55	1.889	13.12	47.5	0.17	0.25	125.00	12125.00	5335.20	6789.80	1.70	35.61	2117.18	-82
85.696	12.340	-77	98	96.0	1152	3.46	24.05	0.281	0	0.55	0.55	1.905	13.23	48	0.16	0.25	125.00	12250.00	5397.60	6852.40	1.71	35.90	2153.08	-83
86.696	12.484	-78	99	97.0	1164	3.49	24.24	0.280	0	0.55	0.55	1.920	13.33	48.5	0.15	0.25	125.00	12375.00	5460.00	6915.00	1.73	36.19	2189.27	-84
87.696	12.628	-79	100	98.0	1176	3.52	24.44	0.279	0	0.55	0.55	1.936	13.44	49	0.15	0.25	125.00	12500.00	5522.40	6977.60	1.74	36.49	2225.76	-85
88.696	12.772	-80	101	99.0	1188	3.55	24.64	0.278	0	0.55	0.55	1.951	13.55	49.5	0.14	0.25	125.00	12625.00	5584.80	7040.20	1.76	36.78	2262.54	-86
89.696	12.916	-81	102	100.0	1200	3.58	24.83	0.277	0	0.55	0.55	1.967	13.66	50	0.13	0.25	125.00	12750.00	5647.20	7102.80	1.78	37.07	2299.61	-87
90.696	13.060	-82	103	101.0	1212	3.60	25.03	0.276	0	0.55	0.55	1.982	13.76	50.5	0.13	0.25	125.00	12875.00	5709.60	7165.40	1.79	37.36	2336.97	-88
91.696	13.204	-83	104	102.0	1224	3.63	25.22	0.275	0	0.55	0.55	1.998	13.87	51	0.12	0.25	125.00	13000.00	5772.00	7228.00	1.81	37.65	2374.63	-89
92.696	13.348	-84	105	103.0	1236	3.66	25.42	0.274	0	0.55	0.55	2.013	13.98	51.5	0.11	0.25	125.00	13125.00	5834.40	7290.60	1.82	37.95	2412.57	-90
93.696	13.492	-85	106	104.0	1248	3.69	25.61	0.273	0	0.55	0.55	2.029	14.09	52	0.11	0.25	125.00	13250.00	5896.80	7353.20	1.84	38.24	2450.81	-91
94.696	13.636	-86	107	105.0	1260	3.72	25.81	0.273	0	0.55	0.55	2.044	14.20	52.5	0.10	0.25	125.00	13375.00	5959.20	7415.80	1.85	38.53	2489.34	-92
95.696	13.780	-87	108	106.0	1272	3.74	26.01	0.272	0	0.55	0.55	2.060	14.30	53	0.09	0.25	125.00	13500.00	6021.60	7478.40	1.87	38.82	2528.16	-93
96.696	13.924	-88	109	107.0	1284	3.77	26.20	0.271	0	0.55	0.55	2.075	14.41	53.5	0.09	0.25	125.00	13625.00	6084.00	7541.00	1.89	39.11	2567.28	-94
97.696	14.068	-89	110	108.0	1296	3.80	26.40	0.270	0	0.55	0.55	2.091	14.52	54	0.08	0.25	125.00	13750.00	6146.40	7603.60	1.90	39.41	2606.68	-95
98.696	14.212	-90	111	109.0	1308	3.83	26.59	0.269	0	0.55	0.55	2.106	14.63	54.5	0.07	0.25	125.00	13875.00	6208.80	7666.20	1.92	39.70	2646.38	-96
99.696	14.356	-91	112	110.0	1320	3.86	26.79	0.269	0	0.55	0.55	2.122	14.73	55	0.07	0.25	125.00	14000.00	6271.20	7728.80	1.93	39.99	2686.37	-97
100.696	14.500	-92	113	111.0	1332	3.89	26.98	0.268	0	0.55	0.55	2.137	14.84	55.5	0.06	0.25	125.00	14125.00	6333.60	7791.40	1.95	40.28	2726.66	-98
101.696	14.644	-93	114	112.0	1344	3.91	27.18	0.267	0	0.55	0.55	2.153	14.95	56	0.06	0.25	125.00	14250.00	6396.00	7854.00	1.96	40.57	2767.23	-99
102.696	14.788	-94	115	113.0	1356	3.94	27.37	0.267	0	0.55	0.55	2.168	15.06	56.5	0.05	0.25	125.00	14375.00	6458.40	7916.60	1.98	40.87	2808.10	-100
103.696	14.932	-95	116	114.0	1368	3.97	27.57	0.266	0	0.55	0.55	2.184	15.16	57	0.04	0.25	125.00	14500.00	6520.80	7979.20	1.99	41.16	2849.26	-101
104.696	15.076	-96	117	115.0	1380	4.00	27.77	0.265	0	0.55	0.55	2.199	15.27	57.5	0.04	0.25	125.00	14625.00	6583.20	8041.80	2.01	41.45	2890.71	-102
105.696	15.220	-97	118	116.0	1392	4.03	27.96	0.265	0	0.55	0.55	2.215	15.38	58	0.03	0.25	125.00	14750.00	6645.60	8104.40	2.03	41.74	2932.45	-103
106.696	15.364	-98	119	117.0	1404	4.05	28.16	0.264	0	0.55	0.55	2.230	15.49	58.5	0.02	0.25	125.00	14875.00	6708.00	8167.00	2.04	42.03	2974.49	-104
107.696	15.508	-99	120	118.0	1416	4.08	28.35	0.263	0	0.55	0.55	2.246	15.59	59	0.02	0.25	125.00	15000.00	6770.40	8229.60	2.06	42.33	3016.81	-105
108.696	15.652	-100	121	119.0	1428	4.11	28.55	0.263	0	0.55	0.55	2.261	15.70	59.5	0.01	0.25	125.00	15125.00	6832.80	8292.20	2.07	42.62	3059.43	-106
109.696	15.796	-101	122	120.0	1440	4.14	28.74	0.262	0	0.55	0.55	2.277	15.81	60	0.01	0.25	125.00	15250.00	6895.20	8354.80	2.09	42.91	3102.34	-107
110.696	15.940	-102	123	121.0	1452	4.17	28.94	0.261	0	0.55	0.55	2.292	15.92	60.5	0.00	0.25	125.00	15375.00	6957.60	8417.40	2.10	43.20	3145.55	-108
111.696	16.084	-103	124	122.0	1464	4.20	29.14	0.261	0	0.55	0.55	2.307	16.02	61	-0.01	0.25	125.00	15500.00	7020.00	8480.00	2.12	43.50	3189.04	-109
112.696	16.228	-104	125	123.0	1476	4.22	29.33	0.260	0	0.55	0.55	2.323	16.13	61.5	-0.01	0.25	125.00	15625.00	7082.40	8542.60	2.14	43.79	3232.83	-110
113.696	16.372	-105	126	124.0	1488	4.25	29.53	0.260	0	0.55	0.55	2.338	16.24	62	-0.02	0.25	125.00	15750.00	7144.80	8605.20	2.15	44.08	3276.91	-111
114.696	16.516	-106	127	125.0	1500	4.28	29.72	0.259	0	0.55	0.55	2.354	16.35	62.5	-0.02	0.25	125.00	15875.00	7207.20	8667.80	2.17	44.37	3321.28	-112
115.696	16.660	-107	128	126.0	1512	4.31	29.92	0.259	0	0.55	0.55	2.369	16.45	63	-0.03	0.25	125.00	16000.00	7269.60	8730.40	2.18	44.66	3365.94	-113
116.696	16.804	-108	129	127.0	1524	4.34	30.11	0.258	0	0.55	0.55	2.385	16.56	63.5	-0.04	0.25	125.00	16125.00	7332.00	8793.00	2.20	44.96	3410.90	-114
117.696	16.948	-109	130	128.0	1536	4.36	30.31	0.258	0	0.55	0.55	2.400	16.67	64	-0.04	0.25	125.00	16250.00	7394.40	8855.60	2.21	45.25	3456.15	-115
118.696	17.092	-110	131	129.0	1548	4.39	30.50	0.257	0	0.55	0.55	2.416	16.78	64.5	-0.05	0.25	125.00	16375.00	7456.80	8918.20	2.23	45.54	3501.68	-116
119.696	17.236	-111	132	130.0	1560	4.42	30.70	0.256	0	0.55	0.55	2.431	16.89	65	-0.05	0.25	125.00	16500.00	7519.20	8980.80	2.25	45.83	3547.52	-117
120.696	17.380	-112	133	131.0	1572	4.45	30.90	0.256	0	0.55	0.55	2.447	16.99	65.5	-0.06	0.25	125.00	16625.00	7581.60	9043.40	2.26	46.12	3593.64	-118
121.696	17.524	-113	134	132.0	1584	4.48	31.09	0.255	0	0.55	0.55	2.462	17.10	66	-0.07	0.25	125.00	16750.00	7644.00	9106.00	2.28	46.42	3640.06	-119
122.696	17.668	-114	135	133.0	1596	4.51	31.29	0.255	0	0.55	0.55	2.478	17.21	66.5	-0.07	0.25	125.00	16875.00	7706.40	9168.60	2.29	46.71	3686.76	-120
123.696	17.812	-115	136	134.0	1608	4.53	31.48	0.255	0	0.55	0.55	2.493	17.32	67	-0.08	0.25	125.00	17000.00	7768.80	9231.20	2.31	47.00	3733.76	-121
124.696	17.956	-116	137	135.0	1620	4.56	31.68	0.254	0	0.55	0.55	2.509	17.42	67.5	-0.08	0.25	125.00	17125.00	7831.20	9293.80	2.32	47.29	3781.05	-122
125.696	18.100	-117	138	136.0	1632	4.59	31.87	0.254	0	0.55	0.55	2.524	17.53	68	-0.09	0.25	125.00	17250.00	7893.60	9356.40	2.34	47.58	3828.64	-123
126.696	18.244	-118	139	137.0	1644	4.62	32.07	0.253	0	0.55	0.55	2.540	17.64	68.5	-0.09	0.25	125.00	17375.00	7956.00	9419.00	2.35	47.88	3876.51	-124
127.696	18.388	-119	140	138.0	1656	4.65	32.27	0.253	0	0.55	0.55	2.555	17.75	69	-0.10	0.25	125.00	17500.00	8018.40	9481.60	2.37	48.17	3924.68	-125
128.696	18.532	-120	141	139.0	1668	4.67	32.46	0.252	0	0.55	0.55	2.571	17.85	69.5	-0.11	0.25	125.00	17625.00	8080.80	9544.20	2.39	48.46	3973.14	-126
129.696	18.676	-121	142	140.0	1680	4.70	32.66	0.252	0	0.55	0.55	2.586	17.96	70	-0.11	0.25	125.00	17750.00	8143.20	9606.80	2.40	48.75	4021.89	-127
130.696	18.820	-122	143	141.0	1692	4.73	32.85	0.251	0	0.55	0.55	2.602	18.07	70.5	-0.12	0.25	125.00	17875.00	8205.60	9669.40	2.42	49.04	4070.94	-128
131.696	18.964	-123	144	142.0	1704	4.76	33.05	0.251	0	0.55	0.55	2.617	18.18	71	-0.12	0.25	125.00	18000.00	8268.00	9732.00	2.43	49.34	4120.27	-129
132.696	19.108	-124	145	143.0	1716	4.79	33.24	0.251	0	0.55	0.55	2.633	18.28	71.5	-0.13	0.25	125.00	18125.00	8330.40	9794.60	2.45	49.63	4169.90	-130
133.696	19.252	-125	146	144.0	1728	4.82	33.44	0.250	0	0.55	0.55	2.648	18.39	72	-0.13	0.25	125.00	18250.00	8392.80	9857.20	2.46	49.92	4219.82	-131

29th AVE. Off Ramp Bent 3a

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.25
Bottom of footing elevation / Pile top elevation (feet)	18.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-161.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter	6.0	feet
	72	inches

										Cohesive Soil							Cohesionless Soil							
Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	2	0.0	0	2.15	14.93	1.016	0	0.55	0.00	0.000	0.00	10	0.87	0.87	125.00	250.00	0.00	250.00	0.00	0.00	0.00	12
14.696	2.116	17	3	1.0	12	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.84	0.84	125.00	375.00	0.00	375.00	0.00	0.00	0.00	11
14.696	2.116	16	4	2.0	24	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.82	0.82	125.00	500.00	0.00	500.00	0.00	0.00	0.00	10
14.696	2.116	15	5	3.0	36	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.80	0.80	125.00	625.00	0.00	625.00	0.00	0.00	0.00	9
14.696	2.116	14	6	4.0	48	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	750.00	0.00	750.00	0.00	0.00	0.00	8
14.696	2.116	13	7	5.0	60	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	875.00	0.00	875.00	0.00	0.00	0.00	7
14.696	2.116	12	8	6.0	72	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.74	19.18	19.18	6
14.696	2.116	11	9	7.0	84	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.82	18.66	37.84	5
14.696	2.116	10	10	8.0	96	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	18.14	55.98	4
14.696	2.116	9	11	9.0	108	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.70	0.70	125.00	1375.00	46.80	1328.20	0.93	17.62	73.61	3
14.696	2.116	8	12	10.0	120	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1500.00	109.20	1390.80	0.96	17.11	90.71	2
14.696	2.116	7	13	11.0	132	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.67	0.67	125.00	1625.00	171.60	1453.40	0.98	16.59	107.30	1
14.696	2.116	6	14	12.0	144	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.66	0.66	125.00	1750.00	234.00	1516.00	1.00	16.07	123.37	0
14.696	2.116	5	15	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.65	0.65	125.00	1875.00	296.40	1578.60	1.03	15.55	138.92	-1
14.696	2.116	4	16	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	2000.00	358.80	1641.20	1.05	15.55	154.47	-2
14.696	2.116	3	17	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2125.00	421.20	1703.80	1.07	15.55	170.02	-3
14.696	2.116	2	18	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2250.00	483.60	1766.40	1.09	15.55	185.57	-4
14.696	2.116	1	19	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2375.00	546.00	1829.00	1.11	15.55	201.12	-5
14.696	2.116	0	20	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2500.00	608.40	1891.60	1.13	15.55	216.68	-6
14.696	2.116	-1	21	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	670.80	1954.20	1.15	15.55	232.23	-7
14.696	2.116	-2	22	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	733.20	2016.80	1.16	15.55	247.78	-8
14.696	2.116	-3	23	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.60	0.60	125.00	2875.00	795.60	2079.40	1.24	15.55	263.33	-9
14.696	2.116	-4	24	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.61	0.61	125.00	3000.00	858.00	2142.00	1.32	15.55	278.88	-10
14.696	2.116	-5	25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.63	0.63	125.00	3125.00	920.40	2204.60	1.39	15.55	294.43	-11
14.696	2.116	-6	26	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.65	0.65	125.00	3250.00	982.80	2267.20	1.47	15.55	309.98	-12
14.696	2.116	-7	27	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.66	0.66	125.00	3375.00	1045.20	2329.80	1.55	15.55	325.53	-13
15.696	2.260	-8	28	26.0	312	1.52	10.55	0.672	0	0.55	0.55	0.836	5.80	13	0.68	0.68	125.00	3500.00	1107.60	2392.40	1.63	15.75	341.28	-14
16.696	2.404	-9	29	27.0	324	1.55	10.75	0.644	0	0.55	0.55	0.851	5.91	13.5	0.69	0.69	125.00	3625.00	1170.00	2455.00	1.70	16.04	357.33	-15
17.696	2.548	-10	30	28.0	336	1.58	10.94	0.618	0	0.55	0.55	0.867	6.02	14	0.71	0.71	125.00	3750.00	1232.40	2517.60	1.78	16.33	373.66	-16
18.696	2.692	-11	31	29.0	348	1.60	11.14	0.596	0	0.55	0.55	0.882	6.13	14.5	0.72	0.72	125.00	3875.00	1294.80	2580.20	1.86	16.63	390.29	-17
19.696	2.836	-12	32	30.0	360	1.63	11.33	0.575	0	0.55	0.55	0.898	6.23	15	0.73	0.73	125.00	4000.00	1357.20	2642.80	1.94	16.92	407.21	-18
20.696	2.980	-13	33	31.0	372	1.66	11.53	0.557	0	0.55	0.55	0.913	6.34	15.5	0.72	0.72	125.00	4125.00	1419.60	2705.40	1.96	17.21	424.42	-19
21.696	3.124	-14	34	32.0	384	1.69	11.72	0.540	0	0.55	0.55	0.929	6.45	16	0.71	0.71	125.00	4250.00	1482.00	2768.00	1.97	17.50	441.92	-20
22.696	3.268	-15	35	33.0	396	1.72	11.92	0.525	0	0.55	0.55	0.944	6.56	16.5	0.70	0.70	125.00	4375.00	1544.40	2830.60	1.98	17.80	459.72	-21
23.696	3.412	-16	36	34.0	408	1.74	12.12	0.511	0	0.55	0.55	0.960	6.66	17	0.69	0.69	125.00	4500.00	1606.80	2893.20	1.99	18.09	477.80	-22
24.696	3.556	-17	37	35.0	420	1.77	12.31	0.499	0	0.55	0.55	0.975	6.77	17.5	0.68	0.68	125.00	4625.00	1669.20	2955.80	2.00	18.38	496.18	-23
25.696	3.700	-18	38	36.0	432	1.80	12.51	0.487	0	0.55	0.55	0.991	6.88	18	0.67	0.67	125.00	4750.00	1731.60	3018.40	2.01	18.67	514.85	-24
26.696	3.844	-19	39	37.0	444	1.83	12.70	0.476	0	0.55	0.55	1.006	6.99	18.5	0.66	0.66	125.00	4875.00	1794.00	3081.00	2.02	18.96	533.82	-25
27.696	3.988	-20	40	38.0	456	1.86	12.90	0.466	0	0.55	0.55	1.022	7.09	19	0.64	0.64	125.00	5000.00	1856.40	3143.60	2.03	19.26	553.07	-26
28.696	4.132	-21	41	39.0	468	1.89	13.09	0.456	0	0.55	0.55	1.037	7.20	19.5	0.63	0.63	125.00	5125.00	1918.80	3206.20	2.03	19.55	572.62	-27
29.696	4.276	-22	42	40.0	480	1.91	13.29	0.448	0	0.55	0.55	1.053	7.31	20	0.62	0.62	125.00	5250.00	1981.20	3268.80	2.04	19.84	592.46	-28
30.696	4.420	-23	43	41.0	492	1.94	13.49	0.439	0	0.55	0.55	1.068	7.42	20.5	0.61	0.61	125.00	5375.00	2043.60	3331.40	2.04	20.13	612.59	-29
31.696	4.564	-24	44	42.0	504	1.97	13.68	0.432	0	0.55	0.55	1.084	7.52	21	0.60	0.60	125.00	5500.00	2106.00	3394.00	2.05	20.42	633.01	-30
32.696	4.708	-25	45	43.0	516	2.00	13.88	0.424	0	0.55	0.55	1.099	7.63	21.5	0.59	0.59	125.00	5625.00	2168.40	3456.60	2.05	20.72	653.73	-31
33.696	4.852	-26	46	44.0	528	2.03	14.07	0.418	0	0.55	0.55	1.114	7.74	22	0.58	0.58	125.00	5750.00	2230.80	3519.20	2.05	21.01	674.74	-32
34.696	4.996	-27	47	45.0	540	2.05	14.27	0.411	0	0.55	0.55	1.130	7.85	22.5	0.57	0.57	125.00	5875.00	2293.20	3581.80	2.05	21.30	696.04	-33
35.696	5.140	-28	48	46.0	552	2.08	14.46	0.405	0	0.55	0.55	1.145	7.95	23	0.56	0.56	125.00	6000.00	2355.60	3644.40	2.05	21.59	717.63	-34
36.696	5.284	-29	49	47.0	564	2.11	14.66	0.399	0	0.55	0.55	1.161	8.06	23.5	0.55	0.55	125.00	6125.00	2418.00	3707.00	2.05	21.88	739.51	-35
37.696	5.428	-30	50	48.0	576	2.14	14.85	0.394	0	0.55	0.55	1.176	8.17	24	0.54	0.54	125.00	6250.00	2480.40	3769.60	2.05	22.18	761.69	-36
38.696	5.572	-31	51	49.0	588	2.17	15.05	0.389	0	0.55	0.55	1.192	8.28	24.5	0.53	0.53	125.00	6375.00	2542.80	3832.20	2.05	22.47	784.16	-37
39.696	5.716	-32	52	50.0	600	2.20	15.25	0.384	0	0.55	0.55	1.207	8.39	25	0.52	0.52	125.00	6500.00	2605.20	3894.80	2.04	22.76	806.92	-38
40.696	5.860	-33	53	51.0	612	2.22	15.44	0.379	0	0.55	0.55	1.223	8.49	25.5	0.52	0.52	125.00	6625.00	2667.60	3957.40	2.04	23.05	829.97	-39
41.696	6.004	-34	54	52.0	624	2.25	15.64	0.375	0	0.55	0.55	1.238	8.60	26	0.51	0.51	125.00	6750.00	2730.00	4020.00	2.03	23.34	853.31	-40
42.696	6.148	-35	55	53.0	636	2.28	15.83	0.371	0	0.55	0.55	1.254	8.71	26.5	0.50	0.50	125.00	6875.00	2792.40	4082.60	2.03	23.64	876.95	-41
43.696	6.292	-36	56	54.0	648	2.31	16.03	0.367	0	0.55	0.55	1.269	8.82	27	0.49	0.49	125.00	7000.00	2854.80	4145.20	2.02	23.93	900.88	-42
44.696	6.436	-37	57	55.0	660	2.34	16.22	0.363	0	0.55	0.55	1.285	8.92	27.5	0.48	0.48	125.00	7125.00	2917.20	4207.80	2.01	24.22	925.10	-43
45.696	6.580	-38	58	56.0	672	2.36	16.42	0.359	0	0.55	0.55	1.300	9.03	28	0.47	0.47	125.00	7250.00	2979.60	4270.40	2.01	24.51	949.61	-44
46.696	6.724	-39	59	57.0	684	2.39	16.62	0.356	0	0.55	0.55	1.316	9.14	28.5	0.46	0.46	125.00	7375.00	3042.00	4333.00	2.00	24.80	974.41	-45
47.696	6.868	-40	60	58.0	696	2.42	16.81	0.352	0	0.55	0.55	1.331	9.25	29	0.45	0.45	125.00	7500.00	3104.40	4395.60	1.99	25.10	999.51	-46
48.696	7.012	-41	61	59.0	708	2.45	17.01	0.349	0	0.55	0.55	1.347	9.35	29.5	0.44	0.44	125.00	7625.00	3166.80	4458.20	1.98	25.39	1024.90	-47
49.696	7.156	-42	62	60.0	720	2.48	17.20	0.346	0	0.55	0.55	1.362	9.46	30	0.43	0.43	125.00	7750.00	3229.20	4520.80	1.97	25.68	1050.58	-48
50.696	7.300	-43	63	61.0	732	2.51	17.40	0.343	0	0.55	0.55	1.378	9.57	30.5	0.43	0.43	125.00	7875.00	3291.60	4583.40	1.95	25.97	1076.55	-49
51.696	7.444	-44	64	62.0	744	2.53	17.59	0.340	0	0.55	0.55	1.393	9.68	31	0.42	0.42	125.00	8000.00	3354.00	4646.00	1.94	26.26	1102.82	-50
52.696	7.588	-45	65	63.0	756	2.56	17.79	0.338	0	0.55	0.55	1.409	9.78	31.5	0.41	0.41	125.00	8125.00	3416.40	4708.60	1.93	26.56	1129.37	-51
53.696	7.732	-46	66	64.0	768	2.59	17.98	0.335	0	0.55	0.55	1.424	9.89	32	0.40	0.40	125.00	8250.00	3478.80	4771.20	1.91	26.85	1156.22	-52
54.696	7.876	-47	67	65.0	780	2.62	18.18	0.332	0	0.55	0.55	1.440	10.00	32.5	0.39	0.39	125.00	8375.00	3541.20	4833.80	1.90	27.14	1183.36	-53
55.696	8.020	-48	68	66.0	792	2.65	18.38	0.330	0	0.55	0.55	1.455	10.11	33	0.38	0.38	125.00	8500.00	3603.60	4896.40	1.88	27.43	1210.79	-54
56.696	8.164	-49	69	67.0	804	2.67	18.57	0.328	0	0.55	0.55	1.471	10.21	33.5	0.38	0.38	125.00	8625.00	3666.00	4959.00	1.87	27.72	1238.52	-55
57.696	8.308	-50	70	68.0	816	2.70	18.77	0.325	0	0.55	0.55	1.486	10.32	34	0.37	0.37	125.00	8750.00	3728.40	5021.60	1.85	28.02	1266.54	-56
58.696	8.452	-51	71	69.0	828	2.73	18.96	0.323	0	0.55	0.55	1.502	10.43	34.5	0.36	0.36	125.00	8875.00	3790.80	5084.20	1.83	28.31	1294.85	-57
59.696	8.596	-52	72	70.0	840	2.76	19.16	0.321	0	0.55	0.55	1.517	10.54	35	0.35	0.35	125.00	9000.00	3853.20	5146.80	1.81	28.60	1323.45	-58
60.696	8.740	-53	73	71.0	852	2.79	19.35	0.319	0	0.55	0.55	1.533	10.64	35.5	0.34	0.34	125.00	9125.00	3915.60	5209.40	1.79	28.89	1352.34	-59
61.696	8.884	-54	74	72.0	864	2.82	19.55	0.317	0	0.55	0.55	1.548	10.75	36	0.34	0.34	125.00	9250.00	3978.00	5272.00	1.77	29.18	1381.52	-60
62.696	9.028	-55	75	73.0	876	2.84	19.75	0.315	0	0.55	0.55	1.564	10.86	36.5	0.33	0.33	125.00	9375.00	4040.40	5334.60	1.75	29.48	1411.00	-61
63.696	9.172	-56	76	74.0	888	2.87	19.94	0.313	0	0.55	0.55	1.579	10.97	37	0.32	0.32	125.00	9500.00	4102.80	5397.20	1.73	29.77	1440.77	-62
64.696	9.316	-57	77	75.0	900	2.90	20.14	0.311	0	0.55	0.55	1.595	11.07	37.5	0.31	0.31	125.00	9625.00	4165.20	5459.80	1.71	30.06	1470.83	-63
65.696	9.460	-58	78	76.0	912	2.93	20.33	0.309	0	0.55	0.55	1.610	11.18	38	0.31	0.31	125.00	9750.00	4227.60	5522.40	1.69	30.35	1501.18	-64
66.696	9.604	-59	79	77.0	924	2.96	20.53	0.308	0	0.55	0.55	1.626	11.29	38.5	0.30	0.30	125.00	9875.00	4290.00	5585.00	1.66	30.65	1531.83	-65
67.696	9.748	-60	80	78.0	936	2.98	20.72	0.306	0	0.55	0.55	1.641	11.40	39	0.29	0.29	125.00	10000.00	4352.40	5647.60	1.64	30.94	1562.77	-66
68.696	9.892	-61	81	79.0	948	3.01	20.92	0.305	0	0.55	0.55	1.657	11.51	39.5	0.28	0.28	125.00	10125.00	4414.80	5710.20	1.61	31.23	1594.00	-67
69.696	10.036	-62	82	80.0	960	3.04	21.11	0.303	0	0.55	0.55	1.672	11.61	40	0.28	0.28	125.00	10250.00	4477.20	5772.80	1.59	31.52	1625.52	-68
70.696	10.180	-63	83	81.0	972	3.07	21.31	0.301	0	0.55	0.55	1.688	11.72	40.5	0.27	0.27	125.00	10375.00	4539.60	5835.40	1.56	31.81	1657.33	-69
71.696	10.324	-64	84	82.0	984	3.10	21.51	0.300	0	0.55	0.55	1.703	11.83	41	0.26	0.26	125.00	10500.00	4602.00	5898.00	1.54	32.11	1689.44	-70
72.696	10.468	-65	85	83.0	996	3.12	21.70	0.299	0	0.55	0.55	1.719	11.94	41.5	0.25	0.25	125.00	10625.00	4664.40	5960.60	1.51	32.40	1721.83	-71
73.696	10.612	-66	86	84.0	1008	3.15	21.90	0.297	0	0.55	0.55	1.734	12.04	42	0.25	0.25	125.00	10750.00	4726.80	6023.20	1.51	32.69	1754.52	-72
74.696	10.756	-67	87	85.0	1020	3.18	22.09	0.296	0	0.55	0.55	1.750	12.15	42.5	0.24	0.25	125.00	10875.00	4789.20	6085.80	1.52	32.98	1787.50	-73
75.696	10.900	-68	88	86.0	1032	3.21	22.29	0.294	0	0.55	0.55	1.765	12.26	43	0.23	0.25	125.00	11000.00	4851.60	6148.40	1.54	33.27	1820.78	-74
76.696	11.044	-69	89	87.0	1044	3.24	22.48	0.293	0	0.55	0.55	1.781	12.37	43.5	0.22	0.25	125.00	11125.00	4914.00	6211.00	1.55	33.57	1854.34	-75
77.696	11.188	-70	90	88.0	1056	3.27	22.68	0.292	0	0.55	0.55	1.796	12.47	44	0.22	0.25	125.00	11250.00	4976.40	6273.60	1.57	33.86	1888.20	-76
78.696	11.332	-71	91	89.0	1068	3.29	22.88	0.291	0	0.55	0.55	1.812	12.58	44.5	0.21	0.25	125.00	11375.00	5038.80	6336.20	1.58	34.15	1922.35	-77
79.696	11.476	-72	92	90.0	1080	3.32	23.07	0.289	0	0.55	0.55	1.827	12.69	45	0.20	0.25	125.00	11500.00	5101.20	6398.80	1.60	34.44	1956.79	-78
80.696	11.620	-73	93	91.0	1092	3.35	23.27	0.288	0	0.55	0.55	1.843	12.80	45.5	0.20	0.25	125.00	11625.00	5163.60	6461.40	1.62	34.73	1991.53	-79
81.696	11.764	-74	94	92.0	1104	3.38	23.46	0.287	0	0.55	0.55	1.858	12.90	46	0.19	0.25	125.00	11750.00	5226.00	6524.00	1.63	35.03	2026.55	-80
82.696	11.908	-75	95	93.0	1116	3.41	23.66	0.286	0	0.55	0.55	1.874	13.01	46.5	0.18	0.25	125.00	11875.00	5288.40	6586.60	1.65	35.32	2061.87	-81
83.696	12.052	-76	96	94.0	1128	3.43	23.85	0.285	0	0.55	0.55	1.889	13.12	47	0.17	0.25	125.00	12000.00	5350.80	6649.20	1.66	35.61	2097.48	-82
84.696	12.196	-77	97	95.0	1140	3.46	24.05	0.284	0	0.55	0.55	1.905	13.23	47.5	0.17	0.25	125.00	12125.00	5413.20	6711.80	1.68	35.90	2133.38	-83
85.696	12.340	-78	98	96.0	1152	3.49	24.24	0.283	0	0.55	0.55	1.920	13.33	48	0.16	0.25	125.00	12250.00	5475.60	6774.40	1.69	36.19	2169.58	-84
86.696	12.484	-79	99	97.0	1164	3.52	24.44	0.282	0	0.55	0.55	1.936	13.44	48.5	0.15	0.25	125.00	12375.00	5538.00	6837.00	1.71	36.49	2206.06	-85
87.696	12.628	-80	100	98.0	1176	3.55	24.64	0.281	0	0.55	0.55	1.951	13.55	49	0.15	0.25	125.00	12500.00	5600.40	6899.60	1.72	36.78	2242.84	-86
88.696	12.772	-81	101	99.0	1188	3.58	24.83	0.280	0	0.55	0.55	1.967	13.66	49.5	0.14	0.25	125.00	12625.00	5662.80	6962.20	1.74	37.07	2279.91	-87
89.696	12.916	-82	102	100.0	1200	3.60	25.03	0.279	0	0.55	0.55	1.982	13.76	50	0.13	0.25	125.00	12750.00	5725.20	7024.80	1.76	37.36	2317.27	-88
90.696	13.060	-83	103	101.0	1212	3.63	25.22	0.278	0	0.55	0.55	1.998	13.87	50.5	0.13	0.25	125.00	12875.00	5787.60	7087.40	1.77	37.65	2354.93	-89
91.696	13.204	-84	104	102.0	1224	3.66	25.42	0.277	0	0.55	0.55	2.013	13.98	51	0.12	0.25	125.00	13000.00	5850.00	7150.00	1.79	37.95	2392.87	-90
92.696	13.348	-85	105	103.0	1236	3.69	25.61	0.276	0	0.55	0.55	2.029	14.09	51.5	0.11	0.25	125.00	13125.00	5912.40	7212.60	1.80	38.24	2431.11	-91
93.696	13.492	-86	106	104.0	1248	3.72	25.81	0.275	0	0.55	0.55	2.044	14.20	52	0.11	0.25	125.00	13250.00	5974.80	7275.20	1.82	38.53	2469.64	-92
94.696	13.636	-87	107	105.0	1260	3.74	26.01	0.275	0	0.55	0.55	2.060	14.30	52.5	0.10	0.25	125.00	13375.00	6037.20	7337.80	1.83	38.82	2508.47	-93
95.696	13.780	-88	108	106.0	1272	3.77	26.20	0.274	0	0.55	0.55	2.075	14.41	53	0.09	0.25	125.00	13500.00	6099.60	7400.40	1.85	39.11	2547.58	-94
96.696	13.924	-89	109	107.0	1284	3.80	26.40	0.273	0	0.55	0.55	2.091	14.52	53.5	0.09	0.25	125.00	13625.00	6162.00	7463.00	1.87	39.41	2586.99	-95
97.696	14.068	-90	110	108.0	1296	3.83	26.59	0.272	0	0.55	0.55	2.106	14.63	54	0.08	0.25	125.00	13750.00	6224.40	7525.60	1.88	39.70	2626.69	-96
98.696	14.212	-91	111	109.0	1308	3.86	26.79	0.271	0	0.55	0.55	2.122	14.73	54.5	0.07	0.25	125.00	13875.00	6286.80	7588.20	1.90	39.99	2666.68	-97
99.696	14.356	-92	112	110.0	1320	3.89	26.98	0.271	0	0.55	0.55	2.137	14.84	55	0.07	0.25	125.00	14000.00	6349.20	7650.80	1.91	40.28	2706.96	-98
100.696	14.500	-93	113	111.0	1332	3.91	27.18	0.270	0	0.55	0.55	2.153	14.95	55.5	0.06	0.25	125.00	14125.00	6411.60	7713.40	1.93	40.57	2747.53	-99
101.696	14.644	-94	114	112.0	1344	3.94	27.37	0.269	0	0.55	0.55	2.168	15.06	56	0.06	0.25	125.00	14250.00	6474.00	7776.00	1.94	40.87	2788.40	-100
102.696	14.788	-95	115	113.0	1356	3.97	27.57	0.268	0	0.55	0.55	2.184	15.16	56.5	0.05	0.25	125.00	14375.00	6536.40	7838.60	1.96	41.16	2829.56	-101
103.696	14.932	-96	116	114.0	1368	4.00	27.77	0.268	0	0.55	0.55	2.199	15.27	57	0.04	0.25	125.00	14500.00	6598.80	7901.20	1.98	41.45	2871.01	-102
104.696	15.076	-97	117	115.0	1380	4.03	27.96	0.267	0	0.55	0.55	2.215	15.38	57.5	0.04	0.25	125.00	14625.00	6661.20	7963.80	1.99	41.74	2912.75	-103
105.696	15.220	-98	118	116.0	1392	4.05	28.16	0.266	0	0.55	0.55	2.230	15.49	58	0.03	0.25	125.00	14750.00	6723.60	8026.40	2.01	42.03	2954.79	-104
106.696	15.364	-99	119	117.0	1404	4.08	28.35	0.266	0	0.55	0.55	2.246	15.59	58.5	0.02	0.25	125.00	14875.00	6786.00	8089.00	2.02	42.33	2997.11	-105
107.696	15.508	-100	120	118.0	1416	4.11	28.55	0.265	0	0.55	0.55	2.261	15.70	59	0.02	0.25	125.00	15000.00	6848.40	8151.60	2.04	42.62	3039.73	-106
108.696	15.652	-101	121	119.0	1428	4.14	28.74	0.264	0	0.55	0.55	2.277	15.81	59.5	0.01	0.25	125.00	15125.00	6910.80	8214.20	2.05	42.91	3082.64	-107
109.696	15.796	-102	122	120.0	1440	4.17	28.94	0.264	0	0.55	0.55	2.292	15.92	60	0.01	0.25	125.00	15250.00	6973.20	8276.80	2.07	43.20	3125.85	-108
110.696	15.940	-103	123	121.0	1452	4.20	29.14	0.263	0	0.55	0.55	2.307	16.02	60.5	0.00	0.25	125.00	15375.00	7035.60	8339.40	2.08	43.50	3169.34	-109
111.696	16.084	-104	124	122.0	1464	4.22	29.33	0.263	0	0.55	0.55	2.323	16.13	61	-0.01	0.25	125.00	15500.00	7098.00	8402.00	2.10	43.79	3213.13	-110
112.696	16.228	-105	125	123.0	1476	4.25	29.53	0.262	0	0.55	0.55	2.338	16.24	61.5	-0.01	0.25	125.00	15625.00	7160.40	8464.60	2.12	44.08	3257.21	-111
113.696	16.372	-106	126	124.0	1488	4.28	29.72	0.261	0	0.55	0.55	2.354	16.35	62	-0.02	0.25	125.00	15750.00	7222.80	8527.20	2.13	44.37	3301.58	-112
114.696	16.516	-107	127	125.0	1500	4.31	29.92	0.261	0	0.55	0.55	2.369	16.45	62.5	-0.02	0.25	125.00	15875.00	7285.20	8589.80	2.15	44.66	3346.24	-113
115.696	16.660	-108	128	126.0	1512	4.34	30.11	0.260	0	0.55	0.55	2.385	16.56	63	-0.03	0.25	125.00	16000.00	7347.60	8652.40	2.16	44.96	3391.20	-114
116.696	16.804	-109	129	127.0	1524	4.36	30.31	0.260	0	0.55	0.55	2.400	16.67	63.5	-0.04	0.25	125.00	16125.00	7410.00	8715.00	2.18	45.25	3436.45	-115
117.696	16.948	-110	130	128.0	1536	4.39	30.50	0.259	0	0.55	0.55	2.416	16.78	64	-0.04	0.25	125.00	16250.00	7472.40	8777.60	2.19	45.54	3481.99	-116
118.696	17.092	-111	131	129.0	1548	4.42	30.70	0.259	0	0.55	0.55	2.431	16.89	64.5	-0.05	0.25	125.00	16375.00	7534.80	8840.20	2.21	45.83	3527.82	-117
119.696	17.236	-112	132	130.0	1560	4.45	30.90	0.258	0	0.55	0.55	2.447	16.99	65	-0.05	0.25	125.00	16500.00	7597.20	8902.80	2.23	46.12	3573.94	-118
120.696	17.380	-113	133	131.0	1572	4.48	31.09	0.258	0	0.55	0.55	2.462	17.10	65.5	-0.06	0.25	125.00	16625.00	7659.60	8965.40	2.24	46.42	3620.36	-119
121.696	17.524	-114	134	132.0	1584	4.51	31.29	0.257	0	0.55	0.55	2.478	17.21	66	-0.07	0.25	125.00	16750.00	7722.00	9028.00	2.26	46.71	3667.07	-120
122.696	17.668	-115	135	133.0	1596	4.53	31.48	0.257	0	0.55	0.55	2.493	17.32	66.5	-0.07	0.25	125.00	16875.00	7784.40	9090.60	2.27	47.00	3714.07	-121
123.696	17.812	-116	136	134.0	1608	4.56	31.68	0.256	0	0.55	0.55	2.509	17.42	67	-0.08	0.25	125.00	17000.00	7846.80	9153.20	2.29	47.29	3761.36	-122
124.696	17.956	-117	137	135.0	1620	4.59	31.87	0.256	0	0.55	0.55	2.524	17.53	67.5	-0.08	0.25	125.00	17125.00	7909.20	9215.80	2.30	47.58	3808.94	-123
125.696	18.100	-118	138	136.0	1632	4.62	32.07	0.255	0	0.55	0.55	2.540	17.64	68	-0.09	0.25	125.00	17250.00	7971.60	9278.40	2.32	47.88	3856.82	-124
126.696	18.244	-119	139	137.0	1644	4.65	32.27	0.255	0	0.55	0.55	2.555	17.75	68.5	-0.09	0.25	125.00	17375.00	8034.00	9341.00	2.34	48.17	3904.98	-125
127.696	18.388	-120	140	138.0	1656	4.67	32.46	0.254	0	0.55	0.55	2.571	17.85	69	-0.10	0.25	125.00	17500.00	8096.40	9403.60	2.35	48.46	3953.44	-126
128.696	18.532	-121	141	139.0	1668	4.70	32.66	0.254	0	0.55	0.55	2.586	17.96	69.5	-0.11	0.25	125.00	17625.00	8158.80	9466.20	2.37	48.75	4002.20	-127
129.696	18.676	-122	142	140.0	1680	4.73	32.85	0.253	0	0.55	0.55	2.602	18.07	70	-0.11	0.25	125.00	17750.00	8221.20	9528.80	2.38	49.04	4051.24	-128
130.696	18.820	-123	143	141.0	1692	4.76	33.05	0.253	0	0.55	0.55	2.617	18.18	70.5	-0.12	0.25	125.00	17875.00	8283.60	9591.40	2.40	49.34	4100.58	-129
131.696	18.964	-124	144	142.0	1704	4.79	33.24	0.252	0	0.55	0.55	2.633	18.28	71	-0.12	0.25	125.00	18000.00	8346.00	9654.00	2.41	49.63	4150.20	-130
132.696	19.108	-125	145	143.0	1716	4.82	33.44	0.252	0	0.55	0.55	2.648	18.39	71.5	-0.13	0.25	125.00	18125.00	8408.40	9716.60	2.43	49.92	4200.12	-131
133.696	19.252	-126	146	144.0	1728	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	72	-0.13	0.25	125.00	18250.00	8470.80	9779.20	2.44	#N/A	#N/A	-132

29th AVE. Off Ramp Bent 3b

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.25
Bottom of footing elevation / Pile top elevation (feet)	18.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-161.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 6.0 feet
72 inches

Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	α (Cohesive Soil)	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Unit Wt. (pcf) (Cohesionless Soil)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	2	0.0	0	2.15	14.93	1.016	0	0.55	0.00	0.000	0.00	10	0.87	0.87	125.00	250.00	0.00	250.00	0.00	0.00	0.00	12
14.696	2.116	17	3	1.0	12	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.84	0.84	125.00	375.00	0.00	375.00	0.00	0.00	0.00	11
14.696	2.116	16	4	2.0	24	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.82	0.82	125.00	500.00	0.00	500.00	0.00	0.00	0.00	10
14.696	2.116	15	5	3.0	36	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.80	0.80	125.00	625.00	0.00	625.00	0.00	0.00	0.00	9
14.696	2.116	14	6	4.0	48	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	750.00	0.00	750.00	0.00	0.00	0.00	8
14.696	2.116	13	7	5.0	60	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	875.00	0.00	875.00	0.00	0.00	0.00	7
14.696	2.116	12	8	6.0	72	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.74	19.18	19.18	6
14.696	2.116	11	9	7.0	84	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.82	18.66	37.84	5
14.696	2.116	10	10	8.0	96	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	18.14	55.98	4
14.696	2.116	9	11	9.0	108	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.70	0.70	125.00	1375.00	46.80	1328.20	0.93	17.62	73.61	3
14.696	2.116	8	12	10.0	120	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1500.00	109.20	1390.80	0.96	17.11	90.71	2
14.696	2.116	7	13	11.0	132	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.67	0.67	125.00	1625.00	171.60	1453.40	0.98	16.59	107.30	1
14.696	2.116	6	14	12.0	144	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.66	0.66	125.00	1750.00	234.00	1516.00	1.00	16.07	123.37	0
14.696	2.116	5	15	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.65	0.65	125.00	1875.00	296.40	1578.60	1.03	15.55	138.92	-1
14.696	2.116	4	16	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	2000.00	358.80	1641.20	1.05	15.55	154.47	-2
14.696	2.116	3	17	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2125.00	421.20	1703.80	1.07	15.55	170.02	-3
14.696	2.116	2	18	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2250.00	483.60	1766.40	1.09	15.55	185.57	-4
14.696	2.116	1	19	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2375.00	546.00	1829.00	1.11	15.55	201.12	-5
14.696	2.116	0	20	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2500.00	608.40	1891.60	1.13	15.55	216.68	-6
14.696	2.116	-1	21	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	670.80	1954.20	1.15	15.55	232.23	-7
14.696	2.116	-2	22	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	733.20	2016.80	1.16	15.55	247.78	-8
14.696	2.116	-3	23	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.60	0.60	125.00	2875.00	795.60	2079.40	1.24	15.55	263.33	-9
14.696	2.116	-4	24	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.61	0.61	125.00	3000.00	858.00	2142.00	1.32	15.55	278.88	-10
14.696	2.116	-5	25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.63	0.63	125.00	3125.00	920.40	2204.60	1.39	15.55	294.43	-11
14.696	2.116	-6	26	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.65	0.65	125.00	3250.00	982.80	2267.20	1.47	15.55	309.98	-12
14.696	2.116	-7	27	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.66	0.66	125.00	3375.00	1045.20	2329.80	1.55	15.55	325.53	-13
15.696	2.260	-8	28	26.0	312	1.52	10.55	0.672	0	0.55	0.55	0.836	5.80	13	0.68	0.68	125.00	3500.00	1107.60	2392.40	1.63	15.75	341.28	-14
16.696	2.404	-9	29	27.0	324	1.55	10.75	0.644	0	0.55	0.55	0.851	5.91	13.5	0.69	0.69	125.00	3625.00	1170.00	2455.00	1.70	16.04	357.33	-15
17.696	2.548	-10	30	28.0	336	1.58	10.94	0.618	0	0.55	0.55	0.867	6.02	14	0.71	0.71	125.00	3750.00	1232.40	2517.60	1.78	16.33	373.66	-16
18.696	2.692	-11	31	29.0	348	1.60	11.14	0.596	0	0.55	0.55	0.882	6.13	14.5	0.72	0.72	125.00	3875.00	1294.80	2580.20	1.86	16.63	390.29	-17
19.696	2.836	-12	32	30.0	360	1.63	11.33	0.575	0	0.55	0.55	0.898	6.23	15	0.73	0.73	125.00	4000.00	1357.20	2642.80	1.94	16.92	407.21	-18
20.696	2.980	-13	33	31.0	372	1.66	11.53	0.557	0	0.55	0.55	0.913	6.34	15.5	0.72	0.72	125.00	4125.00	1419.60	2705.40	1.96	17.21	424.42	-19
21.696	3.124	-14	34	32.0	384	1.69	11.72	0.540	0	0.55	0.55	0.929	6.45	16	0.71	0.71	125.00	4250.00	1482.00	2768.00	1.97	17.50	441.92	-20
22.696	3.268	-15	35	33.0	396	1.72	11.92	0.525	0	0.55	0.55	0.944	6.56	16.5	0.70	0.70	125.00	4375.00	1544.40	2830.60	1.98	17.80	459.72	-21
23.696	3.412	-16	36	34.0	408	1.74	12.12	0.511	0	0.55	0.55	0.960	6.66	17	0.69	0.69	125.00	4500.00	1606.80	2893.20	1.99	18.09	477.80	-22
24.696	3.556	-17	37	35.0	420	1.77	12.31	0.499	0	0.55	0.55	0.975	6.77	17.5	0.68	0.68	125.00	4625.00	1669.20	2955.80	2.00	18.38	496.18	-23
25.696	3.700	-18	38	36.0	432	1.80	12.51	0.487	0	0.55	0.55	0.991	6.88	18	0.67	0.67	125.00	4750.00	1731.60	3018.40	2.01	18.67	514.85	-24
26.696	3.844	-19	39	37.0	444	1.83	12.70	0.476	0	0.55	0.55	1.006	6.99	18.5	0.66	0.66	125.00	4875.00	1794.00	3081.00	2.02	18.96	533.82	-25
27.696	3.988	-20	40	38.0	456	1.86	12.90	0.466	0	0.55	0.55	1.022	7.09	19	0.64	0.64	125.00	5000.00	1856.40	3143.60	2.03	19.26	553.07	-26
28.696	4.132	-21	41	39.0	468	1.89	13.09	0.456	0	0.55	0.55	1.037	7.20	19.5	0.63	0.63	125.00	5125.00	1918.80	3206.20	2.03	19.55	572.62	-27
29.696	4.276	-22	42	40.0	480	1.91	13.29	0.448	0	0.55	0.55	1.053	7.31	20	0.62	0.62	125.00	5250.00	1981.20	3268.80	2.04	19.84	592.46	-28
30.696	4.420	-23	43	41.0	492	1.94	13.49	0.439	0	0.55	0.55	1.068	7.42	20.5	0.61	0.61	125.00	5375.00	2043.60	3331.40	2.04	20.13	612.59	-29
31.696	4.564	-24	44	42.0	504	1.97	13.68	0.432	0	0.55	0.55	1.084	7.52	21	0.60	0.60	125.00	5500.00	2106.00	3394.00	2.05	20.42	633.01	-30
32.696	4.708	-25	45	43.0	516	2.00	13.88	0.424	0	0.55	0.55	1.099	7.63	21.5	0.59	0.59	125.00	5625.00	2168.40	3456.60	2.05	20.72	653.73	-31
33.696	4.852	-26	46	44.0	528	2.03	14.07	0.418	0	0.55	0.55	1.114	7.74	22	0.58	0.58	125.00	5750.00	2230.80	3519.20	2.05	21.01	674.74	-32
34.696	4.996	-27	47	45.0	540	2.05	14.27	0.411	0	0.55	0.55	1.130	7.85	22.5	0.57	0.57	125.00	5875.00	2293.20	3581.80	2.05	21.30	696.04	-33
35.696	5.140	-28	48	46.0	552	2.08	14.46	0.405	0	0.55	0.55	1.145	7.95	23	0.56	0.56	125.00	6000.00	2355.60	3644.40	2.05	21.59	717.63	-34
36.696	5.284	-29	49	47.0	564	2.11	14.66	0.399	0	0.55	0.55	1.161	8.06	23.5	0.55	0.55	125.00	6125.00	2418.00	3707.00	2.05	21.88	739.51	-35
37.696	5.428	-30	50	48.0	576	2.14	14.85	0.394	0	0.55	0.55	1.176	8.17	24	0.54	0.54	125.00	6250.00	2480.40	3769.60	2.05	22.18	761.69	-36
38.696	5.572	-31	51	49.0	588	2.17	15.05	0.389	0	0.55	0.55	1.192	8.28	24.5	0.53	0.53	125.00	6375.00	2542.80	3832.20	2.05	22.47	784.16	-37
39.696	5.716	-32	52	50.0	600	2.20	15.25	0.384	0	0.55	0.55	1.207	8.39	25	0.52	0.52	125.00	6500.00	2605.20	3894.80	2.04	22.76	806.92	-38
40.696	5.860	-33	53	51.0	612	2.22	15.44	0.379	0	0.55	0.55	1.223	8.49	25.5	0.52	0.52	125.00	6625.00	2667.60	3957.40	2.04	23.05	829.97	-39
41.696	6.004	-34	54	52.0	624	2.25	15.64	0.375	0	0.55	0.55	1.238	8.60	26	0.51	0.51	125.00	6750.00	2730.00	4020.00	2.03	23.34	853.31	-40
42.696	6.148	-35	55	53.0	636	2.28	15.83	0.371	0	0.55	0.55	1.254	8.71	26.5	0.50	0.50	125.00	6875.00	2792.40	4082.60	2.03	23.64	876.95	-41
43.696	6.292	-36	56	54.0	648	2.31	16.03	0.367	0	0.55	0.55	1.269	8.82	27	0.49	0.49	125.00	7000.00	2854.80	4145.20	2.02	23.93	900.88	-42
44.696	6.436	-37	57	55.0	660	2.34	16.22	0.363	0	0.55	0.55	1.285	8.92	27.5	0.48	0.48	125.00	7125.00	2917.20	4207.80	2.01	24.22	925.10	-43
45.696	6.580	-38	58	56.0	672	2.36	16.42	0.359	0	0.55	0.55	1.300	9.03	28	0.47	0.47	125.00	7250.00	2979.60	4270.40	2.01	24.51	949.61	-44
46.696	6.724	-39	59	57.0	684	2.39	16.62	0.356	0	0.55	0.55	1.316	9.14	28.5	0.46	0.46	125.00	7375.00	3042.00	4333.00	2.00	24.80	974.41	-45
47.696	6.868	-40	60	58.0	696	2.42	16.81	0.352	0	0.55	0.55	1.331	9.25	29	0.45	0.45	125.00	7500.00	3104.40	4395.60	1.99	25.10	999.51	-46
48.696	7.012	-41	61	59.0	708	2.45	17.01	0.349	0	0.55	0.55	1.347	9.35	29.5	0.44	0.44	125.00	7625.00	3166.80	4458.20	1.98	25.39	1024.90	-47
49.696	7.156	-42	62	60.0	720	2.48	17.20	0.346	0	0.55	0.55	1.362	9.46	30	0.43	0.43	125.00	7750.00	3229.20	4520.80	1.97	25.68	1050.58	-48
50.696	7.300	-43	63	61.0	732	2.51	17.40	0.343	0	0.55	0.55	1.378	9.57	30.5	0.43	0.43	125.00	7875.00	3291.60	4583.40	1.95	25.97	1076.55	-49
51.696	7.444	-44	64	62.0	744	2.53	17.59	0.340	0	0.55	0.55	1.393	9.68	31	0.42	0.42	125.00	8000.00	3354.00	4646.00	1.94	26.26	1102.82	-50
52.696	7.588	-45	65	63.0	756	2.56	17.79	0.338	0	0.55	0.55	1.409	9.78	31.5	0.41	0.41	125.00	8125.00	3416.40	4708.60	1.93	26.56	1129.37	-51
53.696	7.732	-46	66	64.0	768	2.59	17.98	0.335	0	0.55	0.55	1.424	9.89	32	0.40	0.40	125.00	8250.00	3478.80	4771.20	1.91	26.85	1156.22	-52
54.696	7.876	-47	67	65.0	780	2.62	18.18	0.332	0	0.55	0.55	1.440	10.00	32.5	0.39	0.39	125.00	8375.00	3541.20	4833.80	1.90	27.14	1183.36	-53
55.696	8.020	-48	68	66.0	792	2.65	18.38	0.330	0	0.55	0.55	1.455	10.11	33	0.38	0.38	125.00	8500.00	3603.60	4896.40	1.88	27.43	1210.79	-54
56.696	8.164	-49	69	67.0	804	2.67	18.57	0.328	0	0.55	0.55	1.471	10.21	33.5	0.38	0.38	125.00	8625.00	3666.00	4959.00	1.87	27.72	1238.52	-55
57.696	8.308	-50	70	68.0	816	2.70	18.77	0.325	0	0.55	0.55	1.486	10.32	34	0.37	0.37	125.00	8750.00	3728.40	5021.60	1.85	28.02	1266.54	-56
58.696	8.452	-51	71	69.0	828	2.73	18.96	0.323	0	0.55	0.55	1.502	10.43	34.5	0.36	0.36	125.00	8875.00	3790.80	5084.20	1.83	28.31	1294.85	-57
59.696	8.596	-52	72	70.0	840	2.76	19.16	0.321	0	0.55	0.55	1.517	10.54	35	0.35	0.35	125.00	9000.00	3853.20	5146.80	1.81	28.60	1323.45	-58
60.696	8.740	-53	73	71.0	852	2.79	19.35	0.319	0	0.55	0.55	1.533	10.64	35.5	0.34	0.34	125.00	9125.00	3915.60	5209.40	1.79	28.89	1352.34	-59
61.696	8.884	-54	74	72.0	864	2.82	19.55	0.317	0	0.55	0.55	1.548	10.75	36	0.34	0.34	125.00	9250.00	3978.00	5272.00	1.77	29.18	1381.52	-60
62.696	9.028	-55	75	73.0	876	2.84	19.75	0.315	0	0.55	0.55	1.564	10.86	36.5	0.33	0.33	125.00	9375.00	4040.40	5334.60	1.75	29.48	1411.00	-61
63.696	9.172	-56	76	74.0	888	2.87	19.94	0.313	0	0.55	0.55	1.579	10.97	37	0.32	0.32	125.00	9500.00	4102.80	5397.20	1.73	29.77	1440.77	-62
64.696	9.316	-57	77	75.0	900	2.90	20.14	0.311	0	0.55	0.55	1.595	11.07	37.5	0.31	0.31	125.00	9625.00	4165.20	5459.80	1.71	30.06	1470.83	-63
65.696	9.460	-58	78	76.0	912	2.93	20.33	0.309	0	0.55	0.55	1.610	11.18	38	0.31	0.31	125.00	9750.00	4227.60	5522.40	1.69	30.35	1501.18	-64
66.696	9.604	-59	79	77.0	924	2.96	20.53	0.308	0	0.55	0.55	1.626	11.29	38.5	0.30	0.30	125.00	9875.00	4290.00	5585.00	1.66	30.65	1531.83	-65
67.696	9.748	-60	80	78.0	936	2.98	20.72	0.306	0	0.55	0.55	1.641	11.40	39	0.29	0.29	125.00	10000.00	4352.40	5647.60	1.64	30.94	1562.77	-66
68.696	9.892	-61	81	79.0	948	3.01	20.92	0.305	0	0.55	0.55	1.657	11.51	39.5	0.28	0.28	125.00	10125.00	4414.80	5710.20	1.61	31.23	1594.00	-67
69.696	10.036	-62	82	80.0	960	3.04	21.11	0.303	0	0.55	0.55	1.672	11.61	40	0.28	0.28	125.00	10250.00	4477.20	5772.80	1.59	31.52	1625.52	-68
70.696	10.180	-63	83	81.0	972	3.07	21.31	0.301	0	0.55	0.55	1.688	11.72	40.5	0.27	0.27	125.00	10375.00	4539.60	5835.40	1.56	31.81	1657.33	-69
71.696	10.324	-64	84	82.0	984	3.10	21.51	0.300	0	0.55	0.55	1.703	11.83	41	0.26	0.26	125.00	10500.00	4602.00	5898.00	1.54	32.11	1689.44	-70
72.696	10.468	-65	85	83.0	996	3.12	21.70	0.299	0	0.55	0.55	1.719	11.94	41.5	0.25	0.25	125.00	10625.00	4664.40	5960.60	1.51	32.40	1721.83	-71
73.696	10.612	-66	86	84.0	1008	3.15	21.90	0.297	0	0.55	0.55	1.734	12.04	42	0.25	0.25	125.00	10750.00	4726.80	6023.20	1.51	32.69	1754.52	-72
74.696	10.756	-67	87	85.0	1020	3.18	22.09	0.296	0	0.55	0.55	1.750	12.15	42.5	0.24	0.25	125.00	10875.00	4789.20	6085.80	1.52	32.98	1787.50	-73
75.696	10.900	-68	88	86.0	1032	3.21	22.29	0.294	0	0.55	0.55	1.765	12.26	43	0.23	0.25	125.00	11000.00	4851.60	6148.40	1.54	33.27	1820.78	-74
76.696	11.044	-69	89	87.0	1044	3.24	22.48	0.293	0	0.55	0.55	1.781	12.37	43.5	0.22	0.25	125.00	11125.00	4914.00	6211.00	1.55	33.57	1854.34	-75
77.696	11.188	-70	90	88.0	1056	3.27	22.68	0.292	0	0.55	0.55	1.796	12.47	44	0.22	0.25	125.00	11250.00	4976.40	6273.60	1.57	33.86	1888.20	-76
78.696	11.332	-71	91	89.0	1068	3.29	22.88	0.291	0	0.55	0.55	1.812	12.58	44.5	0.21	0.25	125.00	11375.00	5038.80	6336.20	1.58	34.15	1922.35	-77
79.696	11.476	-72	92	90.0	1080	3.32	23.07	0.289	0	0.55	0.55	1.827	12.69	45	0.20	0.25	125.00	11500.00	5101.20	6398.80	1.60	34.44	1956.79	-78
80.696	11.620	-73	93	91.0	1092	3.35	23.27	0.288	0	0.55	0.55	1.843	12.80	45.5	0.20	0.25	125.00	11625.00	5163.60	6461.40	1.62	34.73	1991.53	-79
81.696	11.764	-74	94	92.0	1104	3.38	23.46	0.287	0	0.55	0.55	1.858	12.90	46	0.19	0.25	125.00	11750.00	5226.00	6524.00	1.63	35.03	2026.55	-80
82.696	11.908	-75	95	93.0	1116	3.41	23.66	0.286	0	0.55	0.55	1.874	13.01	46.5	0.18	0.25	125.00	11875.00	5288.40	6586.60	1.65	35.32	2061.87	-81
83.696	12.052	-76	96	94.0	1128	3.43	23.85	0.285	0	0.55	0.55	1.889	13.12	47	0.17	0.25	125.00	12000.00	5350.80	6649.20	1.66	35.61	2097.48	-82
84.696	12.196	-77	97	95.0	1140	3.46	24.05	0.284	0	0.55	0.55	1.905	13.23	47.5	0.17	0.25	125.00	12125.00	5413.20	6711.80	1.68	35.90	2133.38	-83
85.696	12.340	-78	98	96.0	1152	3.49	24.24	0.283	0	0.55	0.55	1.920	13.33	48	0.16	0.25	125.00	12250.00	5475.60	6774.40	1.69	36.19	2169.58	-84
86.696	12.484	-79	99	97.0	1164	3.52	24.44	0.282	0	0.55	0.55	1.936	13.44	48.5	0.15	0.25	125.00	12375.00	5538.00	6837.00	1.71	36.49	2206.06	-85
87.696	12.628	-80	100	98.0	1176	3.55	24.64	0.281	0	0.55	0.55	1.951	13.55	49	0.15	0.25	125.00	12500.00	5600.40	6899.60	1.72	36.78	2242.84	-86
88.696	12.772	-81	101	99.0	1188	3.58	24.83	0.280	0	0.55	0.55	1.967	13.66	49.5	0.14	0.25	125.00	12625.00	5662.80	6962.20	1.74	37.07	2279.91	-87
89.696	12.916	-82	102	100.0	1200	3.60	25.03	0.279	0	0.55	0.55	1.982	13.76	50	0.13	0.25	125.00	12750.00	5725.20	7024.80	1.76	37.36	2317.27	-88
90.696	13.060	-83	103	101.0	1212	3.63	25.22	0.278	0	0.55	0.55	1.998	13.87	50.5	0.13	0.25	125.00	12875.00	5787.60	7087.40	1.77	37.65	2354.93	-89
91.696	13.204	-84	104	102.0	1224	3.66	25.42	0.277	0	0.55	0.55	2.013	13.98	51	0.12	0.25	125.00	13000.00	5850.00	7150.00	1.79	37.95	2392.87	-90
92.696	13.348	-85	105	103.0	1236	3.69	25.61	0.276	0	0.55	0.55	2.029	14.09	51.5	0.11	0.25	125.00	13125.00	5912.40	7212.60	1.80	38.24	2431.11	-91
93.696	13.492	-86	106	104.0	1248	3.72	25.81	0.275	0	0.55	0.55	2.044	14.20	52	0.11	0.25	125.00	13250.00	5974.80	7275.20	1.82	38.53	2469.64	-92
94.696	13.636	-87	107	105.0	1260	3.74	26.01	0.275	0	0.55	0.55	2.060	14.30	52.5	0.10	0.25	125.00	13375.00	6037.20	7337.80	1.83	38.82	2508.47	-93
95.696	13.780	-88	108	106.0	1272	3.77	26.20	0.274	0	0.55	0.55	2.075	14.41	53	0.09	0.25	125.00	13500.00	6099.60	7400.40	1.85	39.11	2547.58	-94
96.696	13.924	-89	109	107.0	1284	3.80	26.40	0.273	0	0.55	0.55	2.091	14.52	53.5	0.09	0.25	125.00	13625.00	6162.00	7463.00	1.87	39.41	2586.99	-95
97.696	14.068	-90	110	108.0	1296	3.83	26.59	0.272	0	0.55	0.55	2.106	14.63	54	0.08	0.25	125.00	13750.00	6224.40	7525.60	1.88	39.70	2626.69	-96
98.696	14.212	-91	111	109.0	1308	3.86	26.79	0.271	0	0.55	0.55	2.122	14.73	54.5	0.07	0.25	125.00	13875.00	6286.80	7588.20	1.90	39.99	2666.68	-97
99.696	14.356	-92	112	110.0	1320	3.89	26.98	0.271	0	0.55	0.55	2.137	14.84	55	0.07	0.25	125.00	14000.00	6349.20	7650.80	1.91	40.28	2706.96	-98
100.696	14.500	-93	113	111.0	1332	3.91	27.18	0.270	0	0.55	0.55	2.153	14.95	55.5	0.06	0.25	125.00	14125.00	6411.60	7713.40	1.93	40.57	2747.53	-99
101.696	14.644	-94	114	112.0	1344	3.94	27.37	0.269	0	0.55	0.55	2.168	15.06	56	0.06	0.25	125.00	14250.00	6474.00	7776.00	1.94	40.87	2788.40	-100
102.696	14.788	-95	115	113.0	1356	3.97	27.57	0.268	0	0.55	0.55	2.184	15.16	56.5	0.05	0.25	125.00	14375.00	6536.40	7838.60	1.96	41.16	2829.56	-101
103.696	14.932	-96	116	114.0	1368	4.00	27.77	0.268	0	0.55	0.55	2.199	15.27	57	0.04	0.25	125.00	14500.00	6598.80	7901.20	1.98	41.45	2871.01	-102
104.696	15.076	-97	117	115.0	1380	4.03	27.96	0.267	0	0.55	0.55	2.215	15.38	57.5	0.04	0.25	125.00	14625.00	6661.20	7963.80	1.99	41.74	2912.75	-103
105.696	15.220	-98	118	116.0	1392	4.05	28.16	0.266	0	0.55	0.55	2.230	15.49	58	0.03	0.25	125.00	14750.00	6723.60	8026.40	2.01	42.03	2954.79	-104
106.696	15.364	-99	119	117.0	1404	4.08	28.35	0.266	0	0.55	0.55	2.246	15.59	58.5	0.02	0.25	125.00	14875.00	6786.00	8089.00	2.02	42.33	2997.11	-105
107.696	15.508	-100	120	118.0	1416	4.11	28.55	0.265	0	0.55	0.55	2.261	15.70	59	0.02	0.25	125.00	15000.00	6848.40	8151.60	2.04	42.62	3039.73	-106
108.696	15.652	-101	121	119.0	1428	4.14	28.74	0.264	0	0.55	0.55	2.277	15.81	59.5	0.01	0.25	125.00	15125.00	6910.80	8214.20	2.05	42.91	3082.64	-107
109.696	15.796	-102	122	120.0	1440	4.17	28.94	0.264	0	0.55	0.55	2.292	15.92	60	0.01	0.25	125.00	15250.00	6973.20	8276.80	2.07	43.20	3125.85	-108
110.696	15.940	-103	123	121.0	1452	4.20	29.14	0.263	0	0.55	0.55	2.307	16.02	60.5	0.00	0.25	125.00	15375.00	7035.60	8339.40	2.08	43.50	3169.34	-109
111.696	16.084	-104	124	122.0	1464	4.22	29.33	0.263	0	0.55	0.55	2.323	16.13	61	-0.01	0.25	125.00	15500.00	7098.00	8402.00	2.10	43.79	3213.13	-110
112.696	16.228	-105	125	123.0	1476	4.25	29.53	0.262	0	0.55	0.55	2.338	16.24	61.5	-0.01	0.25	125.00	15625.00	7160.40	8464.60	2.12	44.08	3257.21	-111
113.696	16.372	-106	126	124.0	1488	4.28	29.72	0.261	0	0.55	0.55	2.354	16.35	62	-0.02	0.25	125.00	15750.00	7222.80	8527.20	2.13	44.37	3301.58	-112
114.696	16.516	-107	127	125.0	1500	4.31	29.92	0.261	0	0.55	0.55	2.369	16.45	62.5	-0.02	0.25	125.00	15875.00	7285.20	8589.80	2.15	44.66	3346.24	-113
115.696	16.660	-108	128	126.0	1512	4.34	30.11	0.260	0	0.55	0.55	2.385	16.56	63	-0.03	0.25	125.00	16000.00	7347.60	8652.40	2.16	44.96	3391.20	-114
116.696	16.804	-109	129	127.0	1524	4.36	30.31	0.260	0	0.55	0.55	2.400	16.67	63.5	-0.04	0.25	125.00	16125.00	7410.00	8715.00	2.18	45.25	3436.45	-115
117.696	16.948	-110	130	128.0	1536	4.39	30.50	0.259	0	0.55	0.55	2.416	16.78	64	-0.04	0.25	125.00	16250.00	7472.40	8777.60	2.19	45.54	3481.99	-116
118.696	17.092	-111	131	129.0	1548	4.42	30.70	0.259	0	0.55	0.55	2.431	16.89	64.5	-0.05	0.25	125.00	16375.00	7534.80	8840.20	2.21	45.83	3527.82	-117
119.696	17.236	-112	132	130.0	1560	4.45	30.90	0.258	0	0.55	0.55	2.447	16.99	65	-0.05	0.25	125.00	16500.00	7597.20	8902.80	2.23	46.12	3573.94	-118
120.696	17.380	-113	133	131.0	1572	4.48	31.09	0.258	0	0.55	0.55	2.462	17.10	65.5	-0.06	0.25	125.00	16625.00	7659.60	8965.40	2.24	46.42	3620.36	-119
121.696	17.524	-114	134	132.0	1584	4.51	31.29	0.257	0	0.55	0.55	2.478	17.21	66	-0.07	0.25	125.00	16750.00	7722.00	9028.00	2.26	46.71	3667.07	-120
122.696	17.668	-115	135	133.0	1596	4.53	31.48	0.257	0	0.55	0.55	2.493	17.32	66.5	-0.07	0.25	125.00	16875.00	7784.40	9090.60	2.27	47.00	3714.07	-121
123.696	17.812	-116	136	134.0	1608	4.56	31.68	0.256	0	0.55	0.55	2.509	17.42	67	-0.08	0.25	125.00	17000.00	7846.80	9153.20	2.29	47.29	3761.36	-122
124.696	17.956	-117	137	135.0	1620	4.59	31.87	0.256	0	0.55	0.55	2.524	17.53	67.5	-0.08	0.25	125.00	17125.00	7909.20	9215.80	2.30	47.58	3808.94	-123
125.696	18.100	-118	138	136.0	1632	4.62	32.07	0.255	0	0.55	0.55	2.540	17.64	68	-0.09	0.25	125.00	17250.00	7971.60	9278.40	2.32	47.88	3856.82	-124
126.696	18.244	-119	139	137.0	1644	4.65	32.27	0.255	0	0.55	0.55	2.555	17.75	68.5	-0.09	0.25	125.00	17375.00	8034.00	9341.00	2.34	48.17	3904.98	-125
127.696	18.388	-120	140	138.0	1656	4.67	32.46	0.254	0	0.55	0.55	2.571	17.85	69	-0.10	0.25	125.00	17500.00	8096.40	9403.60	2.35	48.46	3953.44	-126
128.696	18.532	-121	141	139.0	1668	4.70	32.66	0.254	0	0.55	0.55	2.586	17.96	69.5	-0.11	0.25	125.00	17625.00	8158.80	9466.20	2.37	48.75	4002.20	-127
129.696	18.676	-122	142	140.0	1680	4.73	32.85	0.253	0	0.55	0.55	2.602	18.07	70	-0.11	0.25	125.00	17750.00	8221.20	9528.80	2.38	49.04	4051.24	-128
130.696	18.820	-123	143	141.0	1692	4.76	33.05	0.253	0	0.55	0.55	2.617	18.18	70.5	-0.12	0.25	125.00	17875.00	8283.60	9591.40	2.40	49.34	4100.58	-129
131.696	18.964	-124	144	142.0	1704	4.79	33.24	0.252	0	0.55	0.55	2.633	18.28	71	-0.12	0.25	125.00	18000.00	8346.00	9654.00	2.41	49.63	4150.20	-130
132.696	19.108	-125	145	143.0	1716	4.82	33.44	0.252	0	0.55	0.55	2.648	18.39	71.5	-0.13	0.25	125.00	18125.00	8408.40	9716.60	2.43	49.92	4200.12	-131
133.696	19.252	-126	146	144.0	1728	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	72	-0.13	0.25	125.00	18250.00	8470.80	9779.20	2.44	#N/A	#N/A	-132

29th AVE. Off Ramp Bent 3c

Note: Required pile length: Add 1D to length (Column E)

Ground surface elevation/Top of soil elevation (feet)	20.25
Bottom of footing elevation / Pile top elevation (feet)	18.25
GWT elevation (feet)	10.00
Maximum tip elev for L/d < 30	-161.75

steps:

1-insert ground surface elevation, bottom of footing and water table
2-insert diameter in feet
3- insert Su in column G (ksf). If sands, input 0 depending on the depths of the materials from the drawing and borings.
4- Fill column J with "1" if sand, and "0" if clay
5-Fill column O with N60 (an average from each layer)
6-Fill column T with unit weights (Total) use average from each layer
That's it!!
Copy and repeat for different diameters (delete this text when done) and add to the graphic

Used alpha method for undrained and beta method for drained loading

Diameter 6.0 feet
72 inches

Patm (psi)	Patm (ksf)	Elevation (ft)	Depth (ft)	Depth/pile length(ft)	Depth (in)	Su (ksf)	Su (psi)	Su/pa	Coh (0)	Cohesive Soil: α	α (2)	f_{maxi} (ksf)	f_{maxi} (psi)	N60	β	β (2)	Cohesionless Soil: Unit Wt. (pcf)	σvo	u (psf)	σ' (psf)	q_{maxi} (ksf)	ΔR_{SN} (kips)	R_{SN} (kips)	Pile Tip Elevation (ft)
14.696	2.116	18	2	0.0	0	2.15	14.93	1.016	0	0.55	0.00	0.000	0.00	10	0.87	0.87	125.00	250.00	0.00	250.00	0.00	0.00	0.00	12
14.696	2.116	17	3	1.0	12	2.10	14.58	0.992	0	0.55	0.00	0.000	0.00	10	0.84	0.84	125.00	375.00	0.00	375.00	0.00	0.00	0.00	11
14.696	2.116	16	4	2.0	24	2.05	14.24	0.969	0	0.55	0.00	0.000	0.00	10	0.82	0.82	125.00	500.00	0.00	500.00	0.00	0.00	0.00	10
14.696	2.116	15	5	3.0	36	2.00	13.89	0.945	0	0.55	0.00	0.000	0.00	10	0.80	0.80	125.00	625.00	0.00	625.00	0.00	0.00	0.00	9
14.696	2.116	14	6	4.0	48	1.95	13.54	0.921	0	0.55	0.00	0.000	0.00	10	0.78	0.78	125.00	750.00	0.00	750.00	0.00	0.00	0.00	8
14.696	2.116	13	7	5.0	60	1.90	13.19	0.898	0	0.55	0.00	0.000	0.00	10	0.76	0.76	125.00	875.00	0.00	875.00	0.00	0.00	0.00	7
14.696	2.116	12	8	6.0	72	1.85	12.85	0.874	0	0.55	0.55	1.018	7.07	10	0.74	0.74	125.00	1000.00	0.00	1000.00	0.74	19.18	19.18	6
14.696	2.116	11	9	7.0	84	1.80	12.50	0.851	0	0.55	0.55	0.990	6.88	10	0.73	0.73	125.00	1125.00	0.00	1125.00	0.82	18.66	37.84	5
14.696	2.116	10	10	8.0	96	1.75	12.15	0.827	0	0.55	0.55	0.963	6.68	10	0.71	0.71	125.00	1250.00	0.00	1250.00	0.89	18.14	55.98	4
14.696	2.116	9	11	9.0	108	1.70	11.81	0.803	0	0.55	0.55	0.935	6.49	10	0.70	0.70	125.00	1375.00	46.80	1328.20	0.93	17.62	73.61	3
14.696	2.116	8	12	10.0	120	1.65	11.46	0.780	0	0.55	0.55	0.908	6.30	10	0.69	0.69	125.00	1500.00	109.20	1390.80	0.96	17.11	90.71	2
14.696	2.116	7	13	11.0	132	1.60	11.11	0.756	0	0.55	0.55	0.880	6.11	10	0.67	0.67	125.00	1625.00	171.60	1453.40	0.98	16.59	107.30	1
14.696	2.116	6	14	12.0	144	1.55	10.76	0.732	0	0.55	0.55	0.853	5.92	10	0.66	0.66	125.00	1750.00	234.00	1516.00	1.00	16.07	123.37	0
14.696	2.116	5	15	13.0	156	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.65	0.65	125.00	1875.00	296.40	1578.60	1.03	15.55	138.92	-1
14.696	2.116	4	16	14.0	168	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.64	0.64	125.00	2000.00	358.80	1641.20	1.05	15.55	154.47	-2
14.696	2.116	3	17	15.0	180	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.63	0.63	125.00	2125.00	421.20	1703.80	1.07	15.55	170.02	-3
14.696	2.116	2	18	16.0	192	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.62	0.62	125.00	2250.00	483.60	1766.40	1.09	15.55	185.57	-4
14.696	2.116	1	19	17.0	204	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.61	0.61	125.00	2375.00	546.00	1829.00	1.11	15.55	201.12	-5
14.696	2.116	0	20	18.0	216	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.60	0.60	125.00	2500.00	608.40	1891.60	1.13	15.55	216.68	-6
14.696	2.116	-1	21	19.0	228	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.59	0.59	125.00	2625.00	670.80	1954.20	1.15	15.55	232.23	-7
14.696	2.116	-2	22	20.0	240	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10	0.58	0.58	125.00	2750.00	733.20	2016.80	1.16	15.55	247.78	-8
14.696	2.116	-3	23	21.0	252	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	10.5	0.60	0.60	125.00	2875.00	795.60	2079.40	1.24	15.55	263.33	-9
14.696	2.116	-4	24	22.0	264	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11	0.61	0.61	125.00	3000.00	858.00	2142.00	1.32	15.55	278.88	-10
14.696	2.116	-5	25	23.0	276	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	11.5	0.63	0.63	125.00	3125.00	920.40	2204.60	1.39	15.55	294.43	-11
14.696	2.116	-6	26	24.0	288	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12	0.65	0.65	125.00	3250.00	982.80	2267.20	1.47	15.55	309.98	-12
14.696	2.116	-7	27	25.0	300	1.50	10.42	0.709	0	0.55	0.55	0.825	5.73	12.5	0.66	0.66	125.00	3375.00	1045.20	2329.80	1.55	15.55	325.53	-13
15.696	2.260	-8	28	26.0	312	1.52	10.55	0.672	0	0.55	0.55	0.836	5.80	13	0.68	0.68	125.00	3500.00	1107.60	2392.40	1.63	15.75	341.28	-14
16.696	2.404	-9	29	27.0	324	1.55	10.75	0.644	0	0.55	0.55	0.851	5.91	13.5	0.69	0.69	125.00	3625.00	1170.00	2455.00	1.70	16.04	357.33	-15
17.696	2.548	-10	30	28.0	336	1.58	10.94	0.618	0	0.55	0.55	0.867	6.02	14	0.71	0.71	125.00	3750.00	1232.40	2517.60	1.78	16.33	373.66	-16
18.696	2.692	-11	31	29.0	348	1.60	11.14	0.596	0	0.55	0.55	0.882	6.13	14.5	0.72	0.72	125.00	3875.00	1294.80	2580.20	1.86	16.63	390.29	-17
19.696	2.836	-12	32	30.0	360	1.63	11.33	0.575	0	0.55	0.55	0.898	6.23	15	0.73	0.73	125.00	4000.00	1357.20	2642.80	1.94	16.92	407.21	-18
20.696	2.980	-13	33	31.0	372	1.66	11.53	0.557	0	0.55	0.55	0.913	6.34	15.5	0.72	0.72	125.00	4125.00	1419.60	2705.40	1.96	17.21	424.42	-19
21.696	3.124	-14	34	32.0	384	1.69	11.72	0.540	0	0.55	0.55	0.929	6.45	16	0.71	0.71	125.00	4250.00	1482.00	2768.00	1.97	17.50	441.92	-20
22.696	3.268	-15	35	33.0	396	1.72	11.92	0.525	0	0.55	0.55	0.944	6.56	16.5	0.70	0.70	125.00	4375.00	1544.40	2830.60	1.98	17.80	459.72	-21
23.696	3.412	-16	36	34.0	408	1.74	12.12	0.511	0	0.55	0.55	0.960	6.66	17	0.69	0.69	125.00	4500.00	1606.80	2893.20	1.99	18.09	477.80	-22
24.696	3.556	-17	37	35.0	420	1.77	12.31	0.499	0	0.55	0.55	0.975	6.77	17.5	0.68	0.68	125.00	4625.00	1669.20	2955.80	2.00	18.38	496.18	-23
25.696	3.700	-18	38	36.0	432	1.80	12.51	0.487	0	0.55	0.55	0.991	6.88	18	0.67	0.67	125.00	4750.00	1731.60	3018.40	2.01	18.67	514.85	-24
26.696	3.844	-19	39	37.0	444	1.83	12.70	0.476	0	0.55	0.55	1.006	6.99	18.5	0.66	0.66	125.00	4875.00	1794.00	3081.00	2.02	18.96	533.82	-25
27.696	3.988	-20	40	38.0	456	1.86	12.90	0.466	0	0.55	0.55	1.022	7.09	19	0.64	0.64	125.00	5000.00	1856.40	3143.60	2.03	19.26	553.07	-26
28.696	4.132	-21	41	39.0	468	1.89	13.09	0.456	0	0.55	0.55	1.037	7.20	19.5	0.63	0.63	125.00	5125.00	1918.80	3206.20	2.03	19.55	572.62	-27
29.696	4.276	-22	42	40.0	480	1.91	13.29	0.448	0	0.55	0.55	1.053	7.31	20	0.62	0.62	125.00	5250.00	1981.20	3268.80	2.04	19.84	592.46	-28
30.696	4.420	-23	43	41.0	492	1.94	13.49	0.439	0	0.55	0.55	1.068	7.42	20.5	0.61	0.61	125.00	5375.00	2043.60	3331.40	2.04	20.13	612.59	-29
31.696	4.564	-24	44	42.0	504	1.97	13.68	0.432	0	0.55	0.55	1.084	7.52	21	0.60	0.60	125.00	5500.00	2106.00	3394.00	2.05	20.42	633.01	-30
32.696	4.708	-25	45	43.0	516	2.00	13.88	0.424	0	0.55	0.55	1.099	7.63	21.5	0.59	0.59	125.00	5625.00	2168.40	3456.60	2.05	20.72	653.73	-31
33.696	4.852	-26	46	44.0	528	2.03	14.07	0.418	0	0.55	0.55	1.114	7.74	22	0.58	0.58	125.00	5750.00	2230.80	3519.20	2.05	21.01	674.74	-32
34.696	4.996	-27	47	45.0	540	2.05	14.27	0.411	0	0.55	0.55	1.130	7.85	22.5	0.57	0.57	125.00	5875.00	2293.20	3581.80	2.05	21.30	696.04	-33
35.696	5.140	-28	48	46.0	552	2.08	14.46	0.405	0	0.55	0.55	1.145	7.95	23	0.56	0.56	125.00	6000.00	2355.60	3644.40	2.05	21.59	717.63	-34
36.696	5.284	-29	49	47.0	564	2.11	14.66	0.399	0	0.55	0.55	1.161	8.06	23.5	0.55	0.55	125.00	6125.00	2418.00	3707.00	2.05	21.88	739.51	-35
37.696	5.428	-30	50	48.0	576	2.14	14.85	0.394	0	0.55	0.55	1.176	8.17	24	0.54	0.54	125.00	6250.00	2480.40	3769.60	2.05	22.18	761.69	-36
38.696	5.572	-31	51	49.0	588	2.17	15.05	0.389	0	0.55	0.55	1.192	8.28	24.5	0.53	0.53	125.00	6375.00	2542.80	3832.20	2.05	22.47	784.16	-37
39.696	5.716	-32	52	50.0	600	2.20	15.25	0.384	0	0.55	0.55	1.207	8.39	25	0.52	0.52	125.00	6500.00	2605.20	3894.80	2.04	22.76	806.92	-38
40.696	5.860	-33	53	51.0	612	2.22	15.44	0.379	0	0.55	0.55	1.223	8.49	25.5	0.52	0.52	125.00	6625.00	2667.60	3957.40	2.04	23.05	829.97	-39
41.696	6.004	-34	54	52.0	624	2.25	15.64	0.375	0	0.55	0.55	1.238	8.60	26	0.51	0.51	125.00	6750.00	2730.00	4020.00	2.03	23.34	853.31	-40
42.696	6.148	-35	55	53.0	636	2.28	15.83	0.371	0	0.55	0.55	1.254	8.71	26.5	0.50	0.50	125.00	6875.00	2792.40	4082.60	2.03	23.64	876.95	-41
43.696	6.292	-36	56	54.0	648	2.31	16.03	0.367	0	0.55	0.55	1.269	8.82	27	0.49	0.49	125.00	7000.00	2854.80	4145.20	2.02	23.93	900.88	-42
44.696	6.436	-37	57	55.0	660	2.34	16.22	0.363	0	0.55	0.55	1.285	8.92	27.5	0.48	0.48	125.00	7125.00	2917.20	4207.80	2.01	24.22	925.10	-43
45.696	6.580	-38	58	56.0	672	2.36	16.42	0.359	0	0.55	0.55	1.300	9.03	28	0.47	0.47	125.00	7250.00	2979.60	4270.40	2.01	24.51	949.61	-44
46.696	6.724	-39	59	57.0	684	2.39	16.62	0.356	0	0.55	0.55	1.316	9.14	28.5	0.46	0.46	125.00	7375.00	3042.00	4333.00	2.00	24.80	974.41	-45
47.696	6.868	-40	60	58.0	696	2.42	16.81	0.352	0	0.55	0.55	1.331	9.25	29	0.45	0.45	125.00	7500.00	3104.40	4395.60	1.99	25.10	999.51	-46
48.696	7.012	-41	61	59.0	708	2.45	17.01	0.349	0	0.55	0.55	1.347	9.35	29.5	0.44	0.44	125.00	7625.00	3166.80	4458.20	1.98	25.39	1024.90	-47
49.696	7.156	-42	62	60.0	720	2.48	17.20	0.346	0	0.55	0.55	1.362	9.46	30	0.43	0.43	125.00	7750.00	3229.20	4520.80	1.97	25.68	1050.58	-48
50.696	7.300	-43	63	61.0	732	2.51	17.40	0.343	0	0.55	0.55	1.378	9.57	30.5	0.43	0.43	125.00	7875.00	3291.60	4583.40	1.95	25.97	1076.55	-49
51.696	7.444	-44	64	62.0	744	2.53	17.59	0.340	0	0.55	0.55	1.393	9.68	31	0.42	0.42	125.00	8000.00	3354.00	4646.00	1.94	26.26	1102.82	-50
52.696	7.588	-45	65	63.0	756	2.56	17.79	0.338	0	0.55	0.55	1.409	9.78	31.5	0.41	0.41	125.00	8125.00	3416.40	4708.60	1.93	26.56	1129.37	-51
53.696	7.732	-46	66	64.0	768	2.59	17.98	0.335	0	0.55	0.55	1.424	9.89	32	0.40	0.40	125.00	8250.00	3478.80	4771.20	1.91	26.85	1156.22	-52
54.696	7.876	-47	67	65.0	780	2.62	18.18	0.332	0	0.55	0.55	1.440	10.00	32.5	0.39	0.39	125.00	8375.00	3541.20	4833.80	1.90	27.14	1183.36	-53
55.696	8.020	-48	68	66.0	792	2.65	18.38	0.330	0	0.55	0.55	1.455	10.11	33	0.38	0.38	125.00	8500.00	3603.60	4896.40	1.88	27.43	1210.79	-54
56.696	8.164	-49	69	67.0	804	2.67	18.57	0.328	0	0.55	0.55	1.471	10.21	33.5	0.38	0.38	125.00	8625.00	3666.00	4959.00	1.87	27.72	1238.52	-55
57.696	8.308	-50	70	68.0	816	2.70	18.77	0.325	0	0.55	0.55	1.486	10.32	34	0.37	0.37	125.00	8750.00	3728.40	5021.60	1.85	28.02	1266.54	-56
58.696	8.452	-51	71	69.0	828	2.73	18.96	0.323	0	0.55	0.55	1.502	10.43	34.5	0.36	0.36	125.00	8875.00	3790.80	5084.20	1.83	28.31	1294.85	-57
59.696	8.596	-52	72	70.0	840	2.76	19.16	0.321	0	0.55	0.55	1.517	10.54	35	0.35	0.35	125.00	9000.00	3853.20	5146.80	1.81	28.60	1323.45	-58
60.696	8.740	-53	73	71.0	852	2.79	19.35	0.319	0	0.55	0.55	1.533	10.64	35.5	0.34	0.34	125.00	9125.00	3915.60	5209.40	1.79	28.89	1352.34	-59
61.696	8.884	-54	74	72.0	864	2.82	19.55	0.317	0	0.55	0.55	1.548	10.75	36	0.34	0.34	125.00	9250.00	3978.00	5272.00	1.77	29.18	1381.52	-60
62.696	9.028	-55	75	73.0	876	2.84	19.75	0.315	0	0.55	0.55	1.564	10.86	36.5	0.33	0.33	125.00	9375.00	4040.40	5334.60	1.75	29.48	1411.00	-61
63.696	9.172	-56	76	74.0	888	2.87	19.94	0.313	0	0.55	0.55	1.579	10.97	37	0.32	0.32	125.00	9500.00	4102.80	5397.20	1.73	29.77	1440.77	-62
64.696	9.316	-57	77	75.0	900	2.90	20.14	0.311	0	0.55	0.55	1.595	11.07	37.5	0.31	0.31	125.00	9625.00	4165.20	5459.80	1.71	30.06	1470.83	-63
65.696	9.460	-58	78	76.0	912	2.93	20.33	0.309	0	0.55	0.55	1.610	11.18	38	0.31	0.31	125.00	9750.00	4227.60	5522.40	1.69	30.35	1501.18	-64
66.696	9.604	-59	79	77.0	924	2.96	20.53	0.308	0	0.55	0.55	1.626	11.29	38.5	0.30	0.30	125.00	9875.00	4290.00	5585.00	1.66	30.65	1531.83	-65
67.696	9.748	-60	80	78.0	936	2.98	20.72	0.306	0	0.55	0.55	1.641	11.40	39	0.29	0.29	125.00	10000.00	4352.40	5647.60	1.64	30.94	1562.77	-66
68.696	9.892	-61	81	79.0	948	3.01	20.92	0.305	0	0.55	0.55	1.657	11.51	39.5	0.28	0.28	125.00	10125.00	4414.80	5710.20	1.61	31.23	1594.00	-67
69.696	10.036	-62	82	80.0	960	3.04	21.11	0.303	0	0.55	0.55	1.672	11.61	40	0.28	0.28	125.00	10250.00	4477.20	5772.80	1.59	31.52	1625.52	-68
70.696	10.180	-63	83	81.0	972	3.07	21.31	0.301	0	0.55	0.55	1.688	11.72	40.5	0.27	0.27	125.00	10375.00	4539.60	5835.40	1.56	31.81	1657.33	-69
71.696	10.324	-64	84	82.0	984	3.10	21.51	0.300	0	0.55	0.55	1.703	11.83	41	0.26	0.26	125.00	10500.00	4602.00	5898.00	1.54	32.11	1689.44	-70
72.696	10.468	-65	85	83.0	996	3.12	21.70	0.299	0	0.55	0.55	1.719	11.94	41.5	0.25	0.25	125.00	10625.00	4664.40	5960.60	1.51	32.40	1721.83	-71
73.696	10.612	-66	86	84.0	1008	3.15	21.90	0.297	0	0.55	0.55	1.734	12.04	42	0.25	0.25	125.00	10750.00	4726.80	6023.20	1.51	32.69	1754.52	-72
74.696	10.756	-67	87	85.0	1020	3.18	22.09	0.296	0	0.55	0.55	1.750	12.15	42.5	0.24	0.25	125.00	10875.00	4789.20	6085.80	1.52	32.98	1787.50	-73
75.696	10.900	-68	88	86.0	1032	3.21	22.29	0.294	0	0.55	0.55	1.765	12.26	43	0.23	0.25	125.00	11000.00	4851.60	6148.40	1.54	33.27	1820.78	-74
76.696	11.044	-69	89	87.0	1044	3.24	22.48	0.293	0	0.55	0.55	1.781	12.37	43.5	0.22	0.25	125.00	11125.00	4914.00	6211.00	1.55	33.57	1854.34	-75
77.696	11.188	-70	90	88.0	1056	3.27	22.68	0.292	0	0.55	0.55	1.796	12.47	44	0.22	0.25	125.00	11250.00	4976.40	6273.60	1.57	33.86	1888.20	-76
78.696	11.332	-71	91	89.0	1068	3.29	22.88	0.291	0	0.55	0.55	1.812	12.58	44.5	0.21	0.25	125.00	11375.00	5038.80	6336.20	1.58	34.15	1922.35	-77
79.696	11.476	-72	92	90.0	1080	3.32	23.07	0.289	0	0.55	0.55	1.827	12.69	45	0.20	0.25	125.00	11500.00	5101.20	6398.80	1.60	34.44	1956.79	-78
80.696	11.620	-73	93	91.0	1092	3.35	23.27	0.288	0	0.55	0.55	1.843	12.80	45.5	0.20	0.25	125.00	11625.00	5163.60	6461.40	1.62	34.73	1991.53	-79
81.696	11.764	-74	94	92.0	1104	3.38	23.46	0.287	0	0.55	0.55	1.858	12.90	46	0.19	0.25	125.00	11750.00	5226.00	6524.00	1.63	35.03	2026.55	-80
82.696	11.908	-75	95	93.0	1116	3.41	23.66	0.286	0	0.55	0.55	1.874	13.01	46.5	0.18	0.25	125.00	11875.00	5288.40	6586.60	1.65	35.32	2061.87	-81
83.696	12.052	-76	96	94.0	1128	3.43	23.85	0.285	0	0.55	0.55	1.889	13.12	47	0.17	0.25	125.00	12000.00	5350.80	6649.20	1.66	35.61	2097.48	-82
84.696	12.196	-77	97	95.0	1140	3.46	24.05	0.284	0	0.55	0.55	1.905	13.23	47.5	0.17	0.25	125.00	12125.00	5413.20	6711.80	1.68	35.90	2133.38	-83
85.696	12.340	-78	98	96.0	1152	3.49	24.24	0.283	0	0.55	0.55	1.920	13.33	48	0.16	0.25	125.00	12250.00	5475.60	6774.40	1.69	36.19	2169.58	-84
86.696	12.484	-79	99	97.0	1164	3.52	24.44	0.282	0	0.55	0.55	1.936	13.44	48.5	0.15	0.25	125.00	12375.00	5538.00	6837.00	1.71	36.49	2206.06	-85
87.696	12.628	-80	100	98.0	1176	3.55	24.64	0.281	0	0.55	0.55	1.951	13.55	49	0.15	0.25	125.00	12500.00	5600.40	6899.60	1.72	36.78	2242.84	-86
88.696	12.772	-81	101	99.0	1188	3.58	24.83	0.280	0	0.55	0.55	1.967	13.66	49.5	0.14	0.25	125.00	12625.00	5662.80	6962.20	1.74	37.07	2279.91	-87
89.696	12.916	-82	102	100.0	1200	3.60	25.03	0.279	0	0.55	0.55	1.982	13.76	50	0.13	0.25	125.00	12750.00	5725.20	7024.80	1.76	37.36	2317.27	-88
90.696	13.060	-83	103	101.0	1212	3.63	25.22	0.278	0	0.55	0.55	1.998	13.87	50.5	0.13	0.25	125.00	12875.00	5787.60	7087.40	1.77	37.65	2354.93	-89
91.696	13.204	-84	104	102.0	1224	3.66	25.42	0.277	0	0.55	0.55	2.013	13.98	51	0.12	0.25	125.00	13000.00	5850.00	7150.00	1.79	37.95	2392.87	-90
92.696	13.348	-85	105	103.0	1236	3.69	25.61	0.276	0	0.55	0.55	2.029	14.09	51.5	0.11	0.25	125.00	13125.00	5912.40	7212.60	1.80	38.24	2431.11	-91
93.696	13.492	-86	106	104.0	1248	3.72	25.81	0.275	0	0.55	0.55	2.044	14.20	52	0.11	0.25	125.00	13250.00	5974.80	7275.20	1.82	38.53	2469.64	-92
94.696	13.636	-87	107	105.0	1260	3.74	26.01	0.275	0	0.55	0.55	2.060	14.30	52.5	0.10	0.25	125.00	13375.00	6037.20	7337.80	1.83	38.82	2508.47	-93
95.696	13.780	-88	108	106.0	1272	3.77	26.20	0.274	0	0.55	0.55	2.075	14.41	53	0.09	0.25	125.00	13500.00	6099.60	7400.40	1.85	39.11	2547.58	-94
96.696	13.924	-89	109	107.0	1284	3.80	26.40	0.273	0	0.55	0.55	2.091	14.52	53.5	0.09	0.25	125.00	13625.00	6162.00	7463.00	1.87	39.41	2586.99	-95
97.696	14.068	-90	110	108.0	1296	3.83	26.59	0.272	0	0.55	0.55	2.106	14.63	54	0.08	0.25	125.00	13750.00	6224.40	7525.60	1.88	39.70	2626.69	-96
98.696	14.212	-91	111	109.0	1308	3.86	26.79	0.271	0	0.55	0.55	2.122	14.73	54.5	0.07	0.25	125.00	13875.00	6286.80	7588.20	1.90	39.99	2666.68	-97
99.696	14.356	-92	112	110.0	1320	3.89	26.98	0.271	0	0.55	0.55	2.137	14.84	55	0.07	0.25	125.00	14000.00	6349.20	7650.80	1.91	40.28	2706.96	-98
100.696	14.500	-93	113	111.0	1332	3.91	27.18	0.270	0	0.55	0.55	2.153	14.95	55.5	0.06	0.25	125.00	14125.00	6411.60	7713.40	1.93	40.57	2747.53	-99
101.696	14.644	-94	114	112.0	1344	3.94	27.37	0.269	0	0.55	0.55	2.168	15.06	56	0.06	0.25	125.00	14250.00	6474.00	7776.00	1.94	40.87	2788.40	-100
102.696	14.788	-95	115	113.0	1356	3.97	27.57	0.268	0	0.55	0.55	2.184	15.16	56.5	0.05	0.25	125.00	14375.00	6536.40	7838.60	1.96	41.16	2829.56	-101
103.696	14.932	-96	116	114.0	1368	4.00	27.77	0.268	0	0.55	0.55	2.199	15.27	57	0.04	0.25	125.00	14500.00	6598.80	7901.20	1.98	41.45	2871.01	-102
104.696	15.076	-97	117	115.0	1380	4.03	27.96	0.267	0	0.55	0.55	2.215	15.38	57.5	0.04	0.25	125.00	14625.00	6661.20	7963.80	1.99	41.74	2912.75	-103
105.696	15.220	-98	118	116.0	1392	4.05	28.16	0.266	0	0.55	0.55	2.230	15.49	58	0.03	0.25	125.00	14750.00	6723.60	8026.40	2.01	42.03	2954.79	-104
106.696	15.364	-99	119	117.0	1404	4.08	28.35	0.266	0	0.55	0.55	2.246	15.59	58.5	0.02	0.25	125.00	14875.00	6786.00	8089.00	2.02	42.33	2997.11	-105
107.696	15.508	-100	120	118.0	1416	4.11	28.55	0.265	0	0.55	0.55	2.261	15.70	59	0.02	0.25	125.00	15000.00	6848.40	8151.60	2.04	42.62	3039.73	-106
108.696	15.652	-101	121	119.0	1428	4.14	28.74	0.264	0	0.55	0.55	2.277	15.81	59.5	0.01	0.25	125.00	15125.00	6910.80	8214.20	2.05	42.91	3082.64	-107
109.696	15.796	-102	122	120.0	1440	4.17	28.94	0.264	0	0.55	0.55	2.292	15.92	60	0.01	0.25	125.00	15250.00	6973.20	8276.80	2.07	43.20	3125.85	-108
110.696	15.940	-103	123	121.0	1452	4.20	29.14	0.263	0	0.55	0.55	2.307	16.02	60.5	0.00	0.25	125.00	15375.00	7035.60	8339.40	2.08	43.50	3169.34	-109
111.696	16.084	-104	124	122.0	1464	4.22	29.33	0.263	0	0.55	0.55	2.323	16.13	61	-0.01	0.25	125.00	15500.00	7098.00	8402.00	2.10	43.79	3213.13	-110
112.696	16.228	-105	125	123.0	1476	4.25	29.53	0.262	0	0.55	0.55	2.338	16.24	61.5	-0.01	0.25	125.00	15625.00	7160.40	8464.60	2.12	44.08	3257.21	-111
113.696	16.372	-106	126	124.0	1488	4.28	29.72	0.261	0	0.55	0.55	2.354	16.35	62	-0.02	0.25	125.00	15750.00	7222.80	8527.20	2.13	44.37	3301.58	-112
114.696	16.516	-107	127	125.0	1500	4.31	29.92	0.261	0	0.55	0.55	2.369	16.45	62.5	-0.02	0.25	125.00	15875.00	7285.20	8589.80	2.15	44.66	3346.24	-113
115.696	16.660	-108	128	126.0	1512	4.34	30.11	0.260	0	0.55	0.55	2.385	16.56	63	-0.03	0.25	125.00	16000.00	7347.60	8652.40	2.16	44.96	3391.20	-114
116.696	16.804	-109	129	127.0	1524	4.36	30.31	0.260	0	0.55	0.55	2.400	16.67	63.5	-0.04	0.25	125.00	16125.00	7410.00	8715.00	2.18	45.25	3436.45	-115
117.696	16.948	-110	130	128.0	1536	4.39	30.50	0.259	0	0.55	0.55	2.416	16.78	64	-0.04	0.25	125.00	16250.00	7472.40	8777.60	2.19	45.54	3481.99	-116
118.696	17.092	-111	131	129.0	1548	4.42	30.70	0.259	0	0.55	0.55	2.431	16.89	64.5	-0.05	0.25	125.00	16375.00	7534.80	8840.20	2.21	45.83	3527.82	-117
119.696	17.236	-112	132	130.0	1560	4.45	30.90	0.258	0	0.55	0.55	2.447	16.99	65	-0.05	0.25	125.00	16500.00	7597.20	8902.80	2.23	46.12	3573.94	-118
120.696	17.380	-113	133	131.0	1572	4.48	31.09	0.258	0	0.55	0.55	2.462	17.10	65.5	-0.06	0.25	125.00	16625.00	7659.60	8965.40	2.24	46.42	3620.36	-119
121.696	17.524	-114	134	132.0	1584	4.51	31.29	0.257	0	0.55	0.55	2.478	17.21	66	-0.07	0.25	125.00	16750.00	7722.00	9028.00	2.26	46.71	3667.07	-120
122.696	17.668	-115	135	133.0	1596	4.53	31.48	0.257	0	0.55	0.55	2.493	17.32	66.5	-0.07	0.25	125.00	16875.00	7784.40	9090.60	2.27	47.00	3714.07	-121
123.696	17.812	-116	136	134.0	1608	4.56	31.68	0.256	0	0.55	0.55	2.509	17.42	67	-0.08	0.25	125.00	17000.00	7846.80	9153.20	2.29	47.29	3761.36	-122
124.696	17.956	-117	137	135.0	1620	4.59	31.87	0.256	0	0.55	0.55	2.524	17.53	67.5	-0.08	0.25	125.00	17125.00	7909.20	9215.80	2.30	47.58	3808.94	-123
125.696	18.100	-118	138	136.0	1632	4.62	32.07	0.255	0	0.55	0.55	2.540	17.64	68	-0.09	0.25	125.00	17250.00	7971.60	9278.40	2.32	47.88	3856.82	-124
126.696	18.244	-119	139	137.0	1644	4.65	32.27	0.255	0	0.55	0.55	2.555	17.75	68.5	-0.09	0.25	125.00	17375.00	8034.00	9341.00	2.34	48.17	3904.98	-125
127.696	18.388	-120	140	138.0	1656	4.67	32.46	0.254	0	0.55	0.55	2.571	17.85	69	-0.10	0.25	125.00	17500.00	8096.40	9403.60	2.35	48.46	3953.44	-126
128.696	18.532	-121	141	139.0	1668	4.70	32.66	0.254	0	0.55	0.55	2.586	17.96	69.5	-0.11	0.25	125.00	17625.00	8158.80	9466.20	2.37	48.75	4002.20	-127
129.696	18.676	-122	142	140.0	1680	4.73	32.85	0.253	0	0.55	0.55	2.602	18.07	70	-0.11	0.25	125.00	17750.00	8221.20	9528.80	2.38	49.04	4051.24	-128
130.696	18.820	-123	143	141.0	1692	4.76	33.05	0.253	0	0.55	0.55	2.617	18.18	70.5	-0.12	0.25	125.00	17875.00	8283.60	9591.40	2.40	49.34	4100.58	-129
131.696	18.964	-124	144	142.0	1704	4.79	33.24	0.252	0	0.55	0.55	2.633	18.28	71	-0.12	0.25	125.00	18000.00	8346.00	9654.00	2.41	49.63	4150.20	-130
132.696	19.108	-125	145	143.0	1716	4.82	33.44	0.252	0	0.55	0.55	2.648	18.39	71.5	-0.13	0.25	125.00	18125.00	8408.40	9716.60	2.43	49.92	4200.12	-131
133.696	19.252	-126	146	144.0	1728	#N/A	#N/A	#N/A	0	#N/A	#N/A	#N/A	#N/A	72	-0.13	0.25	125.00	18250.00	8470.80	9779.20	2.44	#N/A	#N/A	-132

URS

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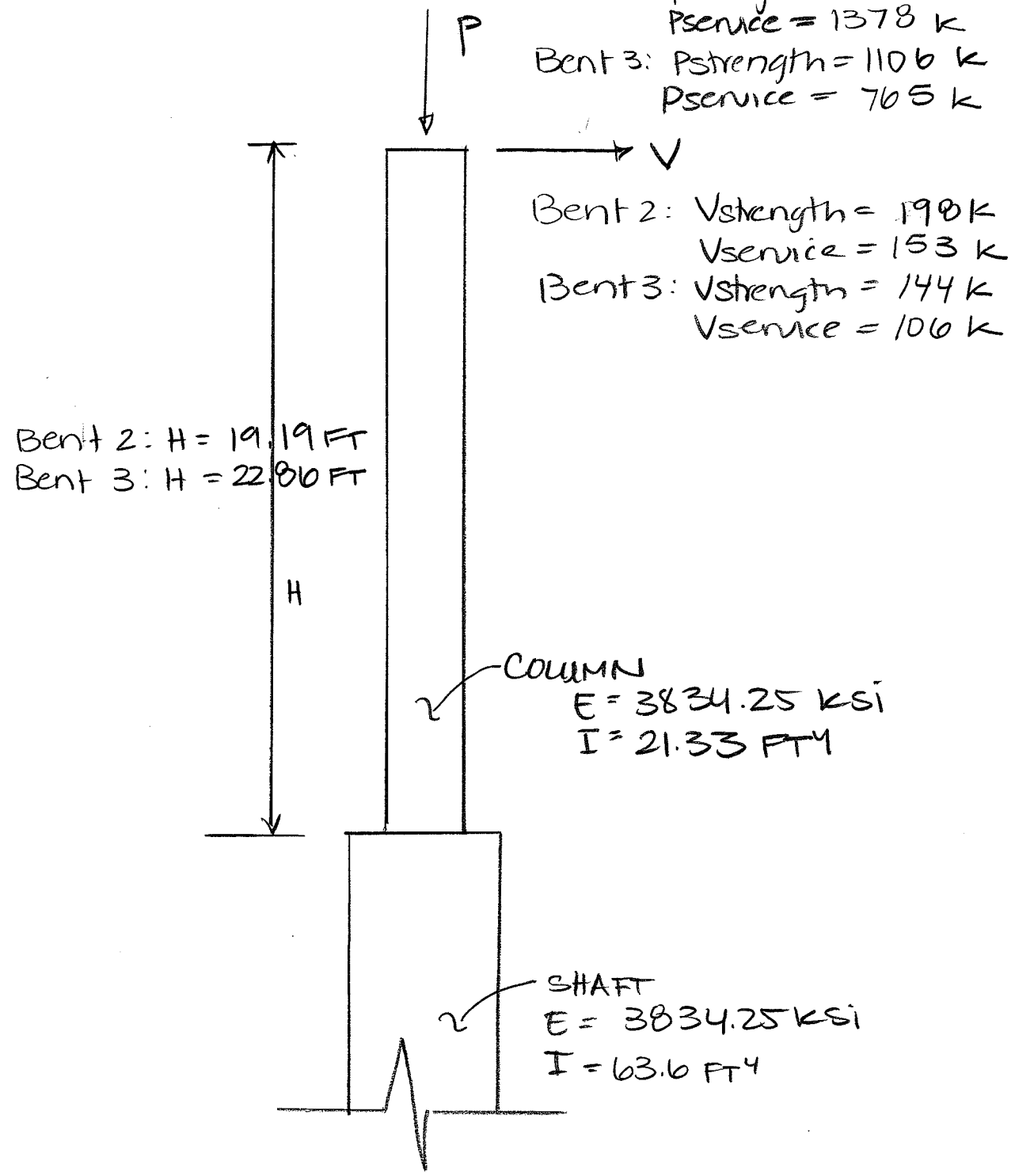
Checked by | Date

Reference

Bent 2: Pstrength = 1938 k
Pservice = 1378 k
Bent 3: Pstrength = 1106 k
Pservice = 765 k



Bent 2: Vstrength = 198k
Vservice = 153 k
Bent 3: Vstrength = 144 k
Vservice = 106 k

Bent 2: H = 19.19 FT
Bent 3: H = 22.80 FT

URS

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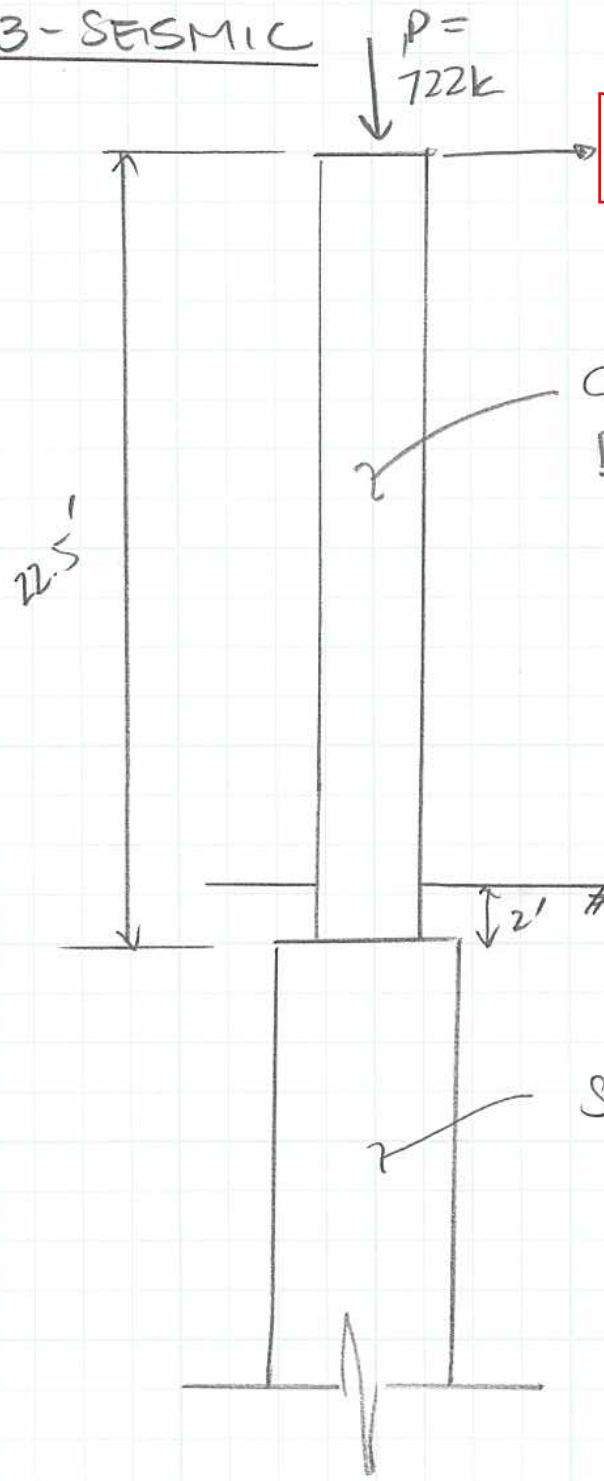
Checked by | Date 06/11

Reference

BENT 3 - SESMIC



Column

□ 4'x4' square

E = 4371.72 ksi

I = 5.71 ft⁴

Shaft

○ 6' dia

E = 4371.72 ksi

I = 63.6 Ft⁴

URS

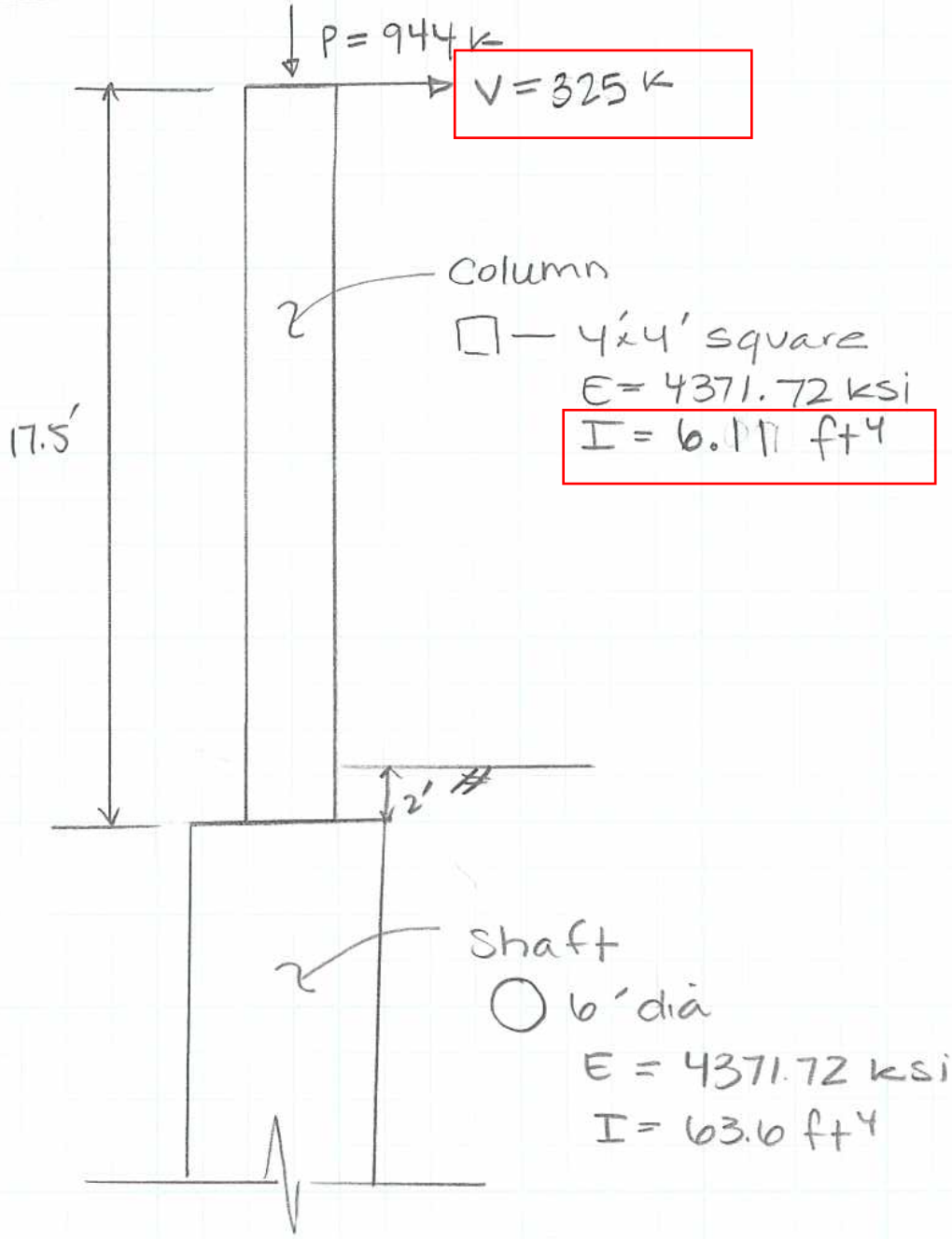
Job 29th Ave Off Ramp | Project No. | Page ____ of ____

Description | Computed by SL | Sheet ____ of ____

Checked by | Date 06/11

Reference

BENT 2 – SEISMIC



Location		Finished Grade	Cut Off Elevation	Su @ cut off EL.	hcol*
		ft	ft	psf	ft
Abut		23-24	17.5	2075	0
Bent 2	Left a	21.5	19.5	2225	19.19
	Right b	23	19.5	2225	19.19
Bent 3	Left a	20.25	18.25	2162.5	22.86
	Center b	21	18.25	2162.5	22.86
	Right c	22.5	18.25	2162.5	22.86

* height of column

bent 2a	EL ft	Su psf	L** ft
	19.5	2225	19.19
	15	2000	23.69
Water table	10	1750	28.69
	5	1500	33.69
	-7.5	1500	46.19
	-25	2000	63.69
	-95	5000	133.69
	-130	5000	168.69

bent 3a	EL ft	Su psf	L** ft
	18.25	2162.5	22.86
	15	2000	26.11
Water table	10	1750	31.11
	5	1500	36.11
	-7.5	1500	48.61
	-25	2000	66.11
	-95	5000	136.11
	-130	5000	171.11

bent 2b	EL ft	Su psf	L** ft
	19.5	2225	19.19
	15	2000	23.69
Water table	10	1750	28.69
	5	1500	33.69
	-7.5	1500	46.19
	-25	2000	63.69
	-95	4000	133.69
	-130	5000	168.69

bent 3b	EL ft	Su psf	L** ft
	18.25	2162.5	22.86
	15	2000	26.11
Water table	10	1750	31.11
	5	1500	36.11
	-7.5	1500	48.61
	-25	2000	66.11
	-95	4000	136.11
	-130	5000	171.11

Abut	EL ft	Su psf	L** ft
	17.5	2075	0
	15	2000	2.5
Water table	10	1750	7.5
	5	1500	12.5
	-7.5	1500	25
	-25	2000	42.5
	-95	4000	112.5
	-130	5000	147.5

bent 3c	EL ft	Su psf	L** ft
	18.25	2162.5	22.86
	15	2000	26.11
Water table	10	1750	31.11
	5	1500	36.11
	-7.5	1500	48.61
	-25	2000	66.11
	-95	4000	136.11
	-130	5000	171.11

**L is from top of column

```
LPILEP6
TITLE
29th Ave Offramp Abut 1
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      300
MaxDeflectionLimit    1.000000000000000E+0002
ConvergenceTolerance  1.000000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
1 = Section type =  drilled shaft
 6.000000000000000E+0001 = Section length (ft)
 2.400000000000000E+0001 = Shaft diameter (in)
 4.000000000000000E+0003 = Concrete Compressive Strength (psi)
 7.500000000000000E-0001 = maximum aggregate size (in)
Use default concrete tensile strength
Use internal stress-strain curve for concrete
Rebar Arrangement Not Same As Section Above
Rebar in circle
 6.000000000000000E+0004 = yield stress of bars (psi)
 2.900000000000000E+0007 = modulus of bars (psi)
8 = number of bars or bundles
1 = number of bars per bundle
 1.000000000000000E+0000 = bar diameter (in)
 7.900000000000000E-0001 = bar area (sq. in.)
 1.498537329320 2E+0000 = rebar cover (in)
 0.000000000000000E+0000 = rebar offset (in)
SOIL LAYERS
6 = number of soil layers
3        0.000000000000000E+0000  2.500000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.250000000000000E+0002  2.125000000000000E+0003  5.000000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.250000000000000E+0002  2.000000000000000E+0003  5.000000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.500000000000000E+0000  7.500000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.250000000000000E+0002  2.000000000000000E+0003  7.000000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.250000000000000E+0002  1.750000000000000E+0003  7.000000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        7.500000000000000E+0000  1.250000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.250000000000000E+0001  1.750000000000000E+0003  7.000000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.250000000000000E+0001  1.500000000000000E+0003  7.000000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.250000000000000E+0001  2.500000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.250000000000000E+0001  1.500000000000000E+0003  7.000000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.250000000000000E+0001  1.500000000000000E+0003  7.000000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.500000000000000E+0001  4.250000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.250000000000000E+0001  1.500000000000000E+0003  7.000000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.250000000000000E+0001  2.000000000000000E+0003  7.000000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.250000000000000E+0001  1.125000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.250000000000000E+0001  2.000000000000000E+0003  5.000000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.250000000000000E+0001  4.000000000000000E+0003  5.000000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.000000000000000E+0000 = Ground Slope (deg)
 0.000000000000000E+0000 = Pile Batter  (deg)
LOADING
7 = Number of load cases
1        4        1.000000000000000E-0001  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2        4        3.000000000000000E-0001  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3        4        5.000000000000000E-0001  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4        4        1.000000000000000E+0000  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
5        4        1.500000000000000E+0000  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
6        4        2.000000000000000E+0000  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC4:Displ (in), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
7        1        7.690000000000000E+0004  0.000000000000000E+0000
0.000000000000000E+0000  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
New LPILE Plus 5.0 Data File
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
2 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 1.91900000000000E+0001 = Section length (ft)
1 = Elastic rectangular section
 3.83425000000000E+0006 = Elastic modulus (psi)
 4.80000000000000E+0001 = Section width at top (in)
 4.80000000000000E+0001 = Section width at bottom (in)
 4.80000000000000E+0001 = Section depth at top (in)
 4.80000000000000E+0001 = Section depth at bottom (in)
 2.30400000000000E+0003 = Section area at top (sqin)
 2.30400000000000E+0003 = Section area at bottom (sq in)
 4.42298880000000E+0005 = Section MOI at top (in^4)
 4.42298880000000E+0005 = Section MOI at bottom (in^4)
2 = Section Number
11 = Section type =  elastic section
 1.25000000000000E+0002 = Section length (ft)
2 = Elastic circular section
 3.83425000000000E+0006 = Elastic modulus (psi)
 7.20000000000000E+0001 = Section circular pile width at top (in)
 7.20000000000000E+0001 = Section circular pile width at bottom (in)
 4.07150407905237E+0003 = Section area at top (sq in)
 4.07150407905237E+0003 = Section area at bottom (sq in)
 1.31916732161297E+0006 = Section MOI at top (in^4)
 1.31916732161297E+0006 = Section MOI at bottom (in^4)
SOIL LAYERS
6 = number of soil layers
3        1.91900000000000E+0001  2.36900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.22500000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.36900000000000E+0001  2.86900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.86900000000000E+0001  3.36900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.36900000000000E+0001  4.61900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.61900000000000E+0001  6.36900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  2.00016000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        6.36900000000000E+0001  1.68690000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  2.00016000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  5.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
2 = Number of load cases
1       1        1.98000000000000E+0005  0.00000000000000E+0000
1.93800000000000E+0006  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        1.53000000000000E+0005  0.00000000000000E+0000
1.37800000000000E+0006  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
29th Ave Off Ramp Bent 2 (Seismic)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
2 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 1.91900000000000E+0001 = Section length (ft)
1 = Elastic rectangular section
 4.37172000000000E+0006 = Elastic modulus (psi)
 4.80000000000000E+0001 = Section width at top (in)
 4.80000000000000E+0001 = Section width at bottom (in)
 4.80000000000000E+0001 = Section depth at top (in)
 4.80000000000000E+0001 = Section depth at bottom (in)
 2.30400000000000E+0003 = Section area at top (sqin)
 2.30400000000000E+0003 = Section area at bottom (sq in)
 1.26696960000000E+0005 = Section MOI at top (in^4)
 1.26696960000000E+0005 = Section MOI at bottom (in^4)
2 = Section Number
11 = Section type =  elastic section
 1.25000000000000E+0002 = Section length (ft)
2 = Elastic circular section
 4.37172000000000E+0006 = Elastic modulus (psi)
 7.20000000000000E+0001 = Section circular pile width at top (in)
 7.20000000000000E+0001 = Section circular pile width at bottom (in)
 4.07150407905237E+0003 = Section area at top (sq in)
 4.07150407905237E+0003 = Section area at bottom (sq in)
 1.31916732161297E+0006 = Section MOI at top (in^4)
 1.31916732161297E+0006 = Section MOI at bottom (in^4)
SOIL LAYERS
6 = number of soil layers
3        1.91900000000000E+0001  2.36900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.22500000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.36900000000000E+0001  2.86900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
```



```
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.86900000000000E+0001  3.36900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.36900000000000E+0001  4.61900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.61900000000000E+0001  6.36900000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  2.00016000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        6.36900000000000E+0001  1.68690000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  2.00016000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  5.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
1 = Number of load cases
1        1        3.25000000000000E+0005  0.00000000000000E+0000
9.44000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

```
LPILEP6
TITLE
29th Ave Off Ramp Bent 3 (Service and Strength)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
2 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 2.28600000000000E+0001 = Section length (ft)
1 = Elastic rectangular section
 3.83425000000000E+0006 = Elastic modulus (psi)
 4.80000000000000E+0001 = Section width at top (in)
 4.80000000000000E+0001 = Section width at bottom (in)
 4.80000000000000E+0001 = Section depth at top (in)
 4.80000000000000E+0001 = Section depth at bottom (in)
 2.30400000000000E+0003 = Section area at top (sqin)
 2.30400000000000E+0003 = Section area at bottom (sq in)
 4.42299000000000E+0005 = Section MOI at top (in^4)
 4.42299000000000E+0005 = Section MOI at bottom (in^4)
2 = Section Number
11 = Section type =  elastic section
 9.50000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.83425000000000E+0006 = Elastic modulus (psi)
 7.20000000000000E+0001 = Section circular pile width at top (in)
 7.20000000000000E+0001 = Section circular pile width at bottom (in)
 4.07150407905237E+0003 = Section area at top (sq in)
 4.07150407905237E+0003 = Section area at bottom (sq in)
 1.31880960000000E+0006 = Section MOI at top (in^4)
 1.31880960000000E+0006 = Section MOI at bottom (in^4)
SOIL LAYERS
6 = number of soil layers
3        2.28600000000000E+0001  2.61100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.16250000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.61100000000000E+0001  3.11100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
```

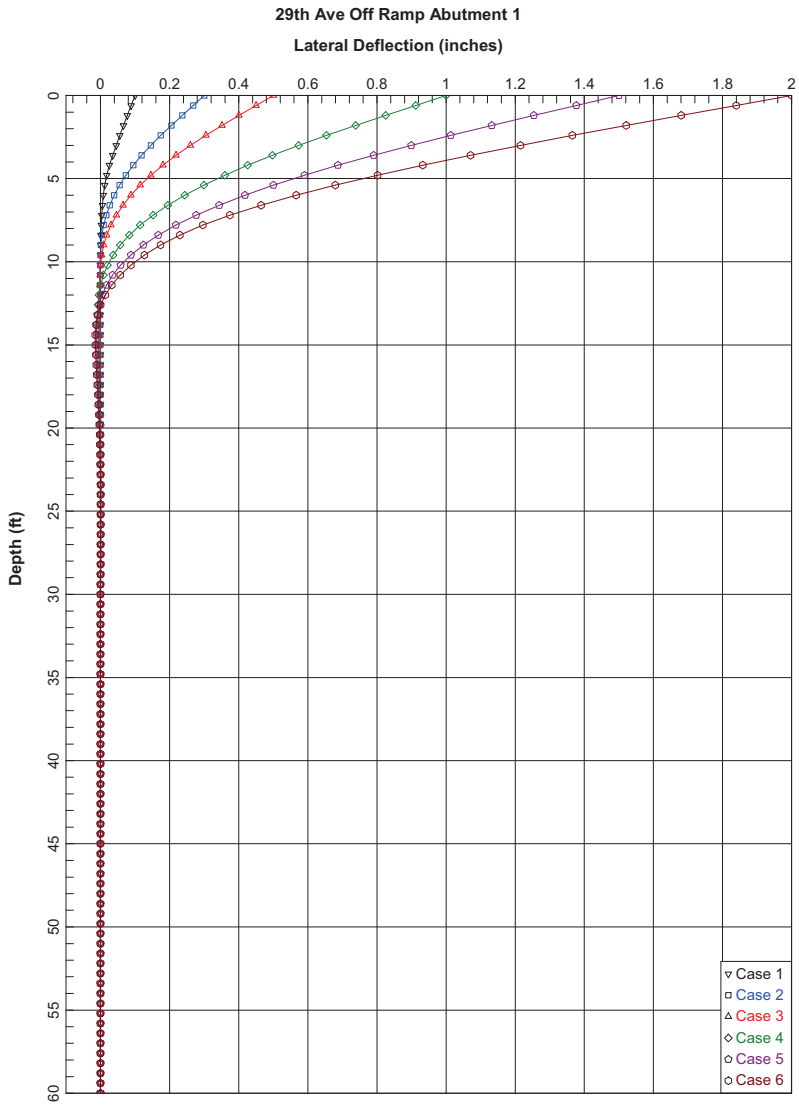


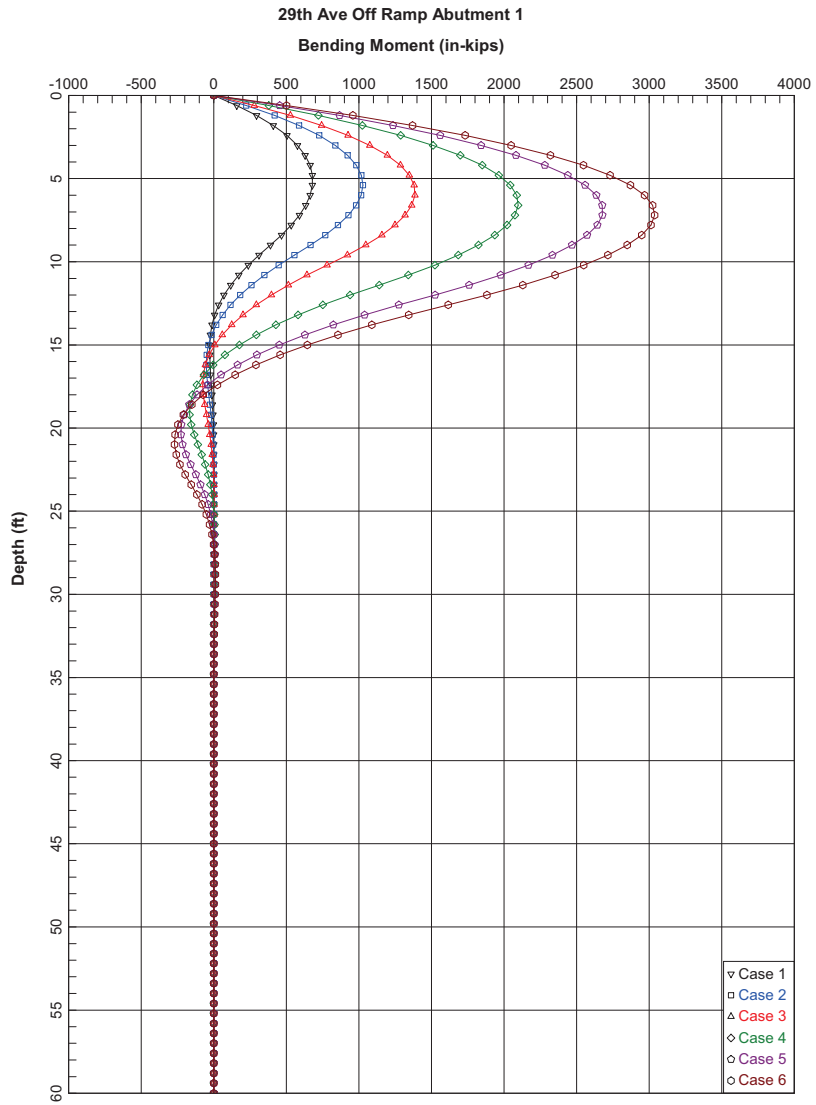
```
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.11100000000000E+0001  3.61100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.61100000000000E+0001  4.86100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.86100000000000E+0001  6.61100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  2.00016000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        6.61100000000000E+0001  1.71110000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  2.00016000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  5.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
2 = Number of load cases
1        1        1.44000000000000E+0005  0.00000000000000E+0000
1.10600000000000E+0006  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2        1        1.06000000000000E+0005  0.00000000000000E+0000
7.65000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

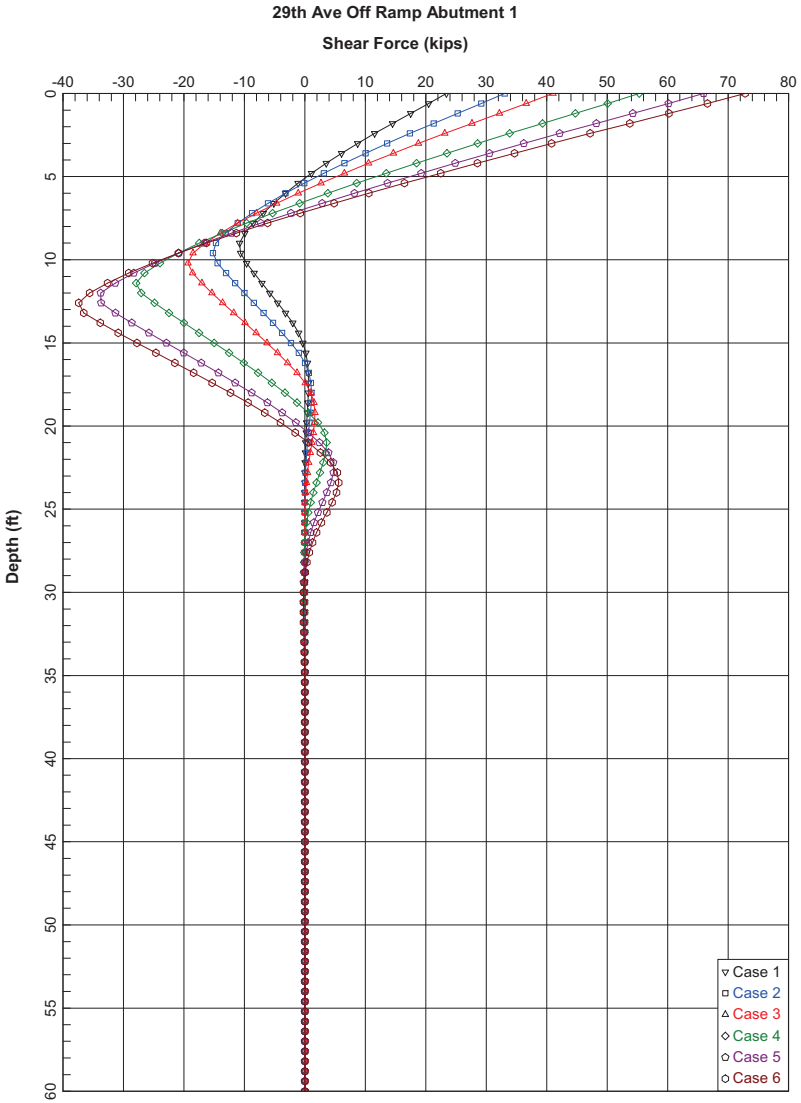
```
LPILEP6
TITLE
29th Ave Off Ramp Bent 3 (Seismic)
Job Number:
Client:
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
2 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 2.28600000000000E+0001 = Section length (ft)
1 = Elastic rectangular section
 4.37172000000000E+0006 = Elastic modulus (psi)
 4.80000000000000E+0001 = Section width at top (in)
 4.80000000000000E+0001 = Section width at bottom (in)
 4.80000000000000E+0001 = Section depth at top (in)
 4.80000000000000E+0001 = Section depth at bottom (in)
 2.30400000000000E+0003 = Section area at top (sqin)
 2.30400000000000E+0003 = Section area at bottom (sq in)
 1.18402560000000E+0005 = Section MOI at top (in^4)
 1.18402560000000E+0005 = Section MOI at bottom (in^4)
2 = Section Number
11 = Section type =  elastic section
 9.50000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 4.37172000000000E+0006 = Elastic modulus (psi)
 7.20000000000000E+0001 = Section circular pile width at top (in)
 7.20000000000000E+0001 = Section circular pile width at bottom (in)
 4.07150407905237E+0003 = Section area at top (sq in)
 4.07150407905237E+0003 = Section area at bottom (sq in)
 1.31880960000000E+0006 = Section MOI at top (in^4)
 1.31880960000000E+0006 = Section MOI at bottom (in^4)
SOIL LAYERS
6 = number of soil layers
3        2.28600000000000E+0001  2.61100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.16250000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  2.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.61100000000000E+0001  3.11100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  2.00000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.75000000000000E+0003  7.00000000000000E-0003 = bot gamma
```

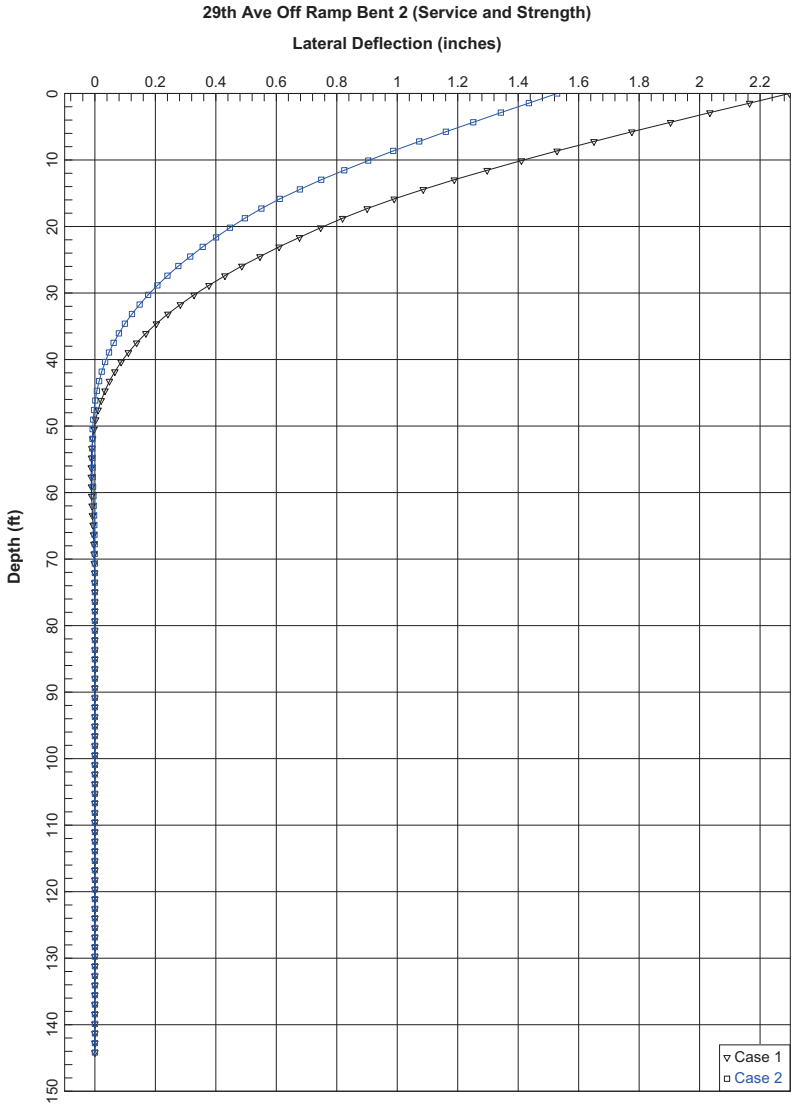


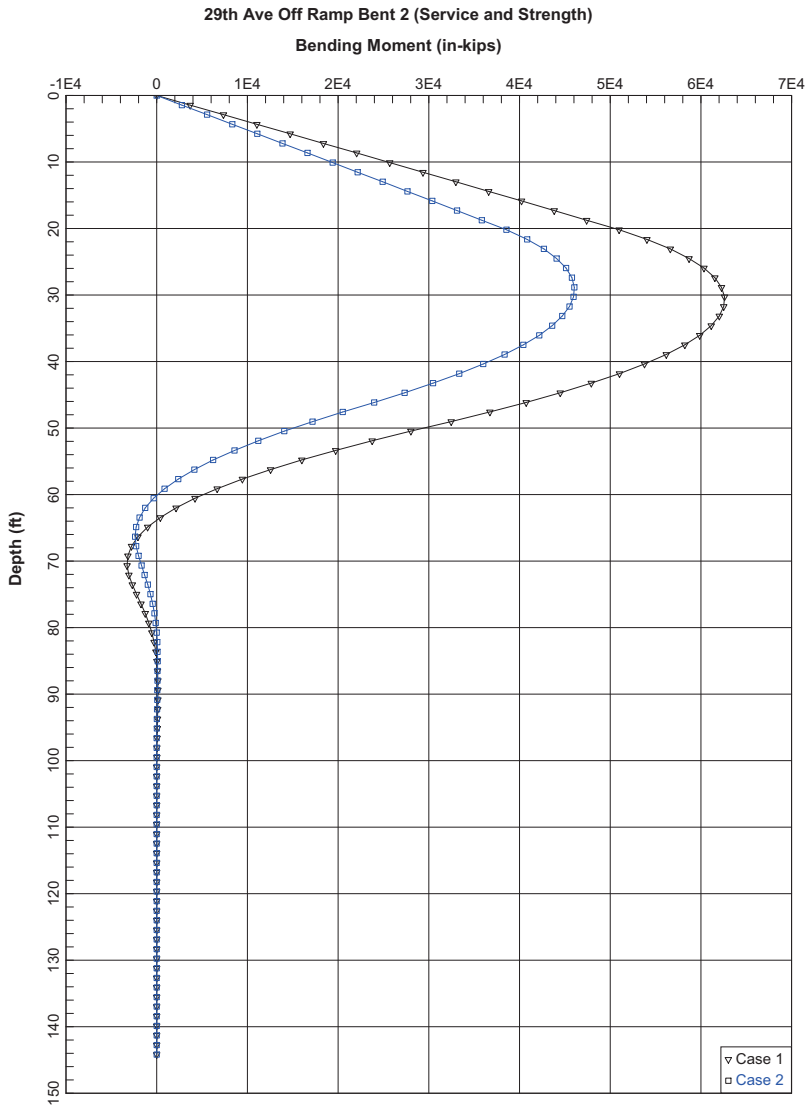
```
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.11100000000000E+0001  3.61100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.75000000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.61100000000000E+0001  4.86100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.86100000000000E+0001  6.61100000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  1.50048000000000E+0003  7.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  2.00016000000000E+0003  7.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        6.61100000000000E+0001  1.71110000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.22080000000000E+0001  2.00016000000000E+0003  5.00000000000000E-0003 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.22080000000000E+0001  5.00000000000000E+0003  5.00000000000000E-0003 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
1 = Number of load cases
1        1       2.55000000000000E+0005  0.00000000000000E+0000
7.22000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

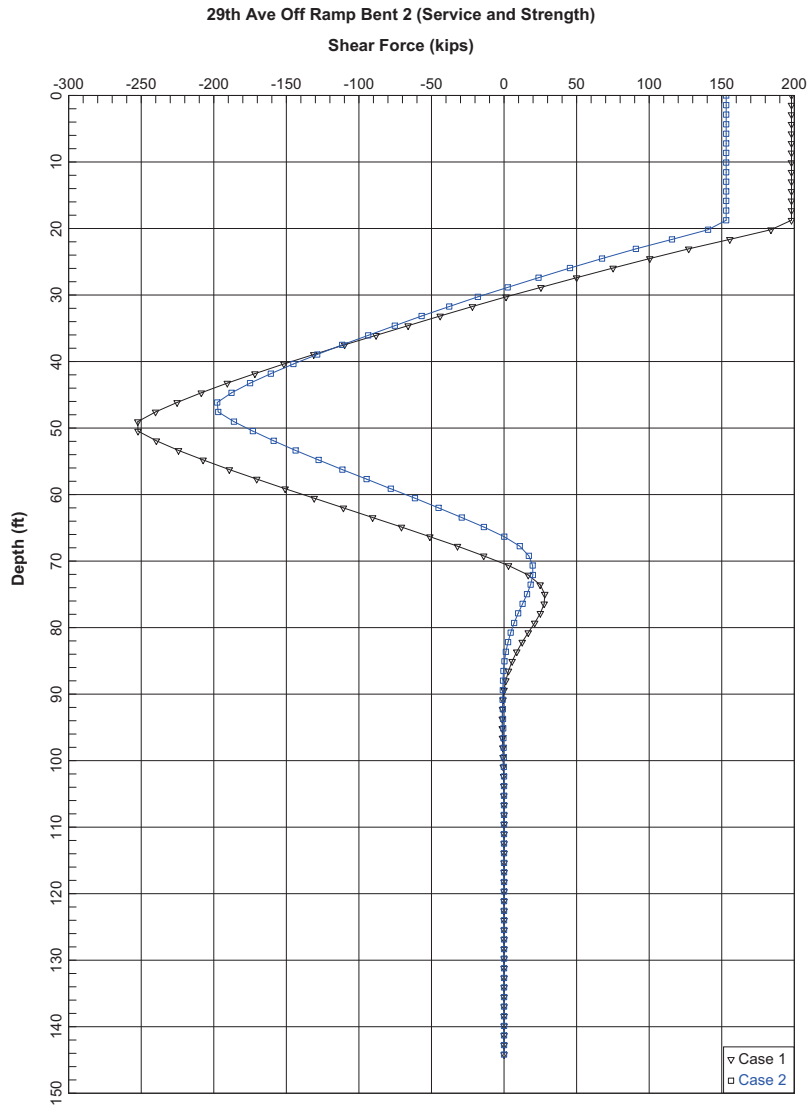

29th Ave Off Ramp Abutment 1
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

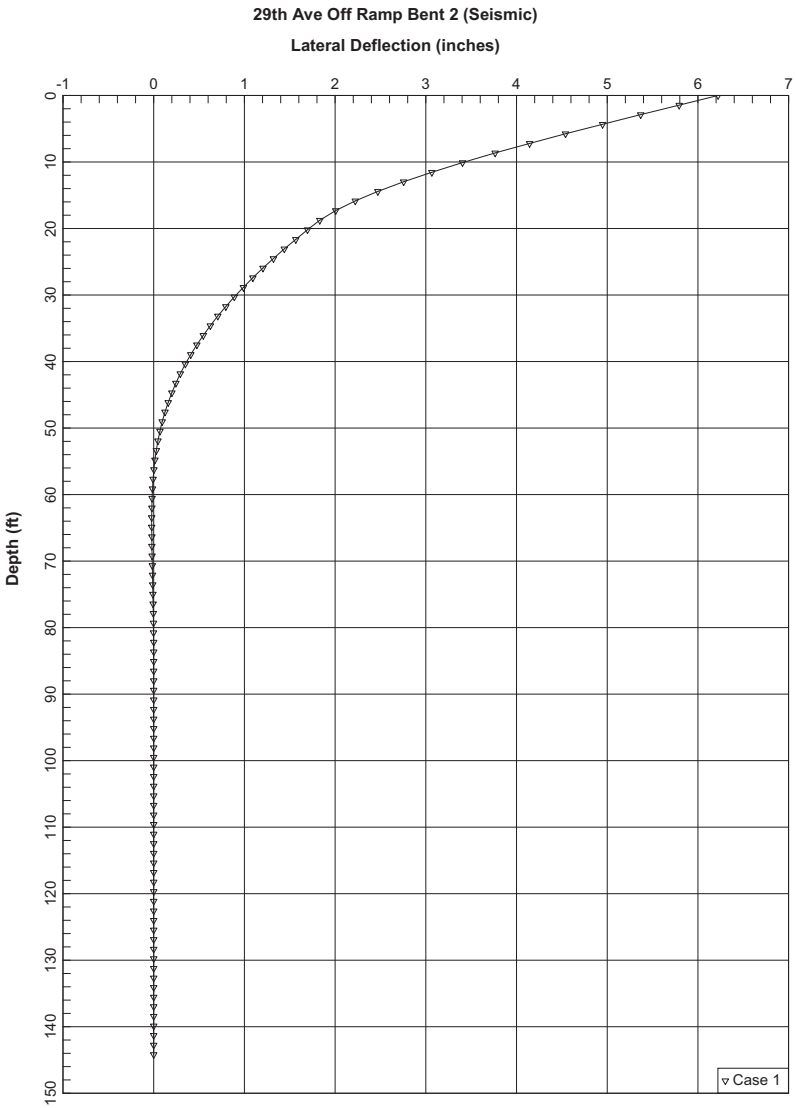

29th Ave Off Ramp Abutment 1
Bending Moment (in-kips)
Depth (ft)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20
25
30
35
40
45
50
55
60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

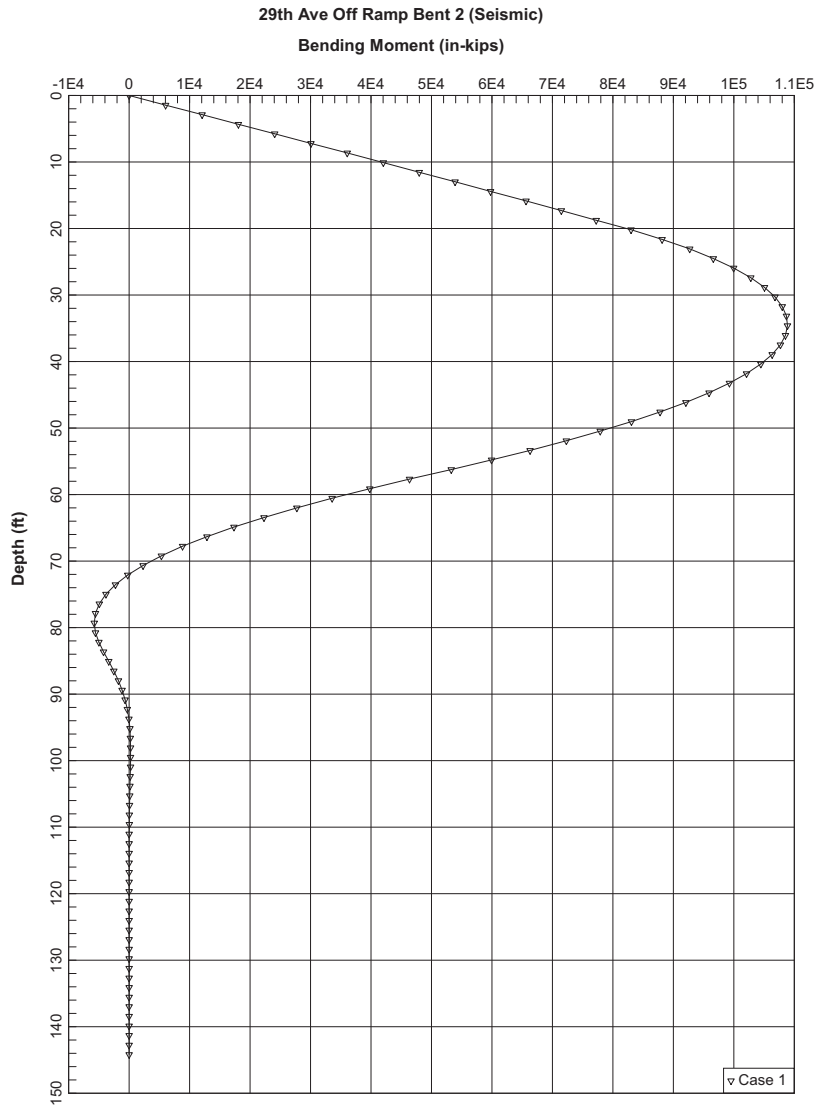

29th Ave Off Ramp Abutment 1
Shear Force (kips)
Depth (ft)
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80
0 5 10 15 20 25 30 35 40 45 50 55 60
Case 1
Case 2
Case 3
Case 4
Case 5
Case 6

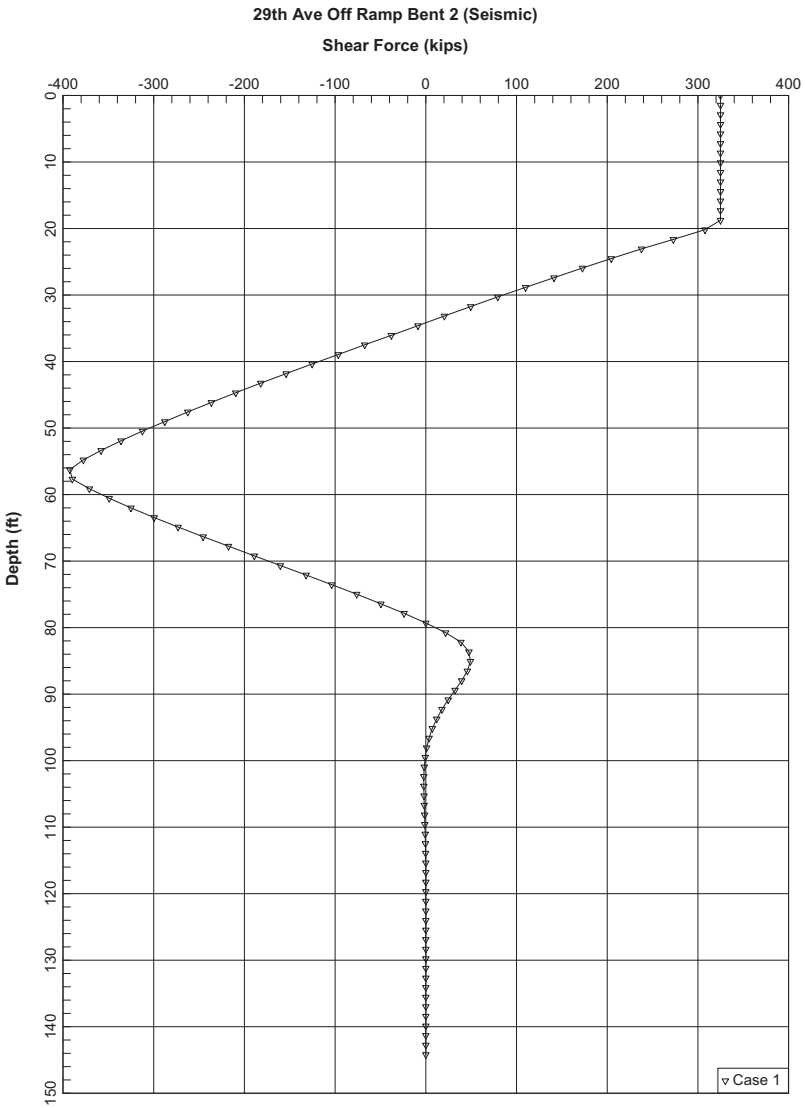

29th Ave Off Ramp Bent 2 (Service and Strength)
Lateral Deflection (inches)
Depth (ft)
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2 2.2
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Case 1
Case 2

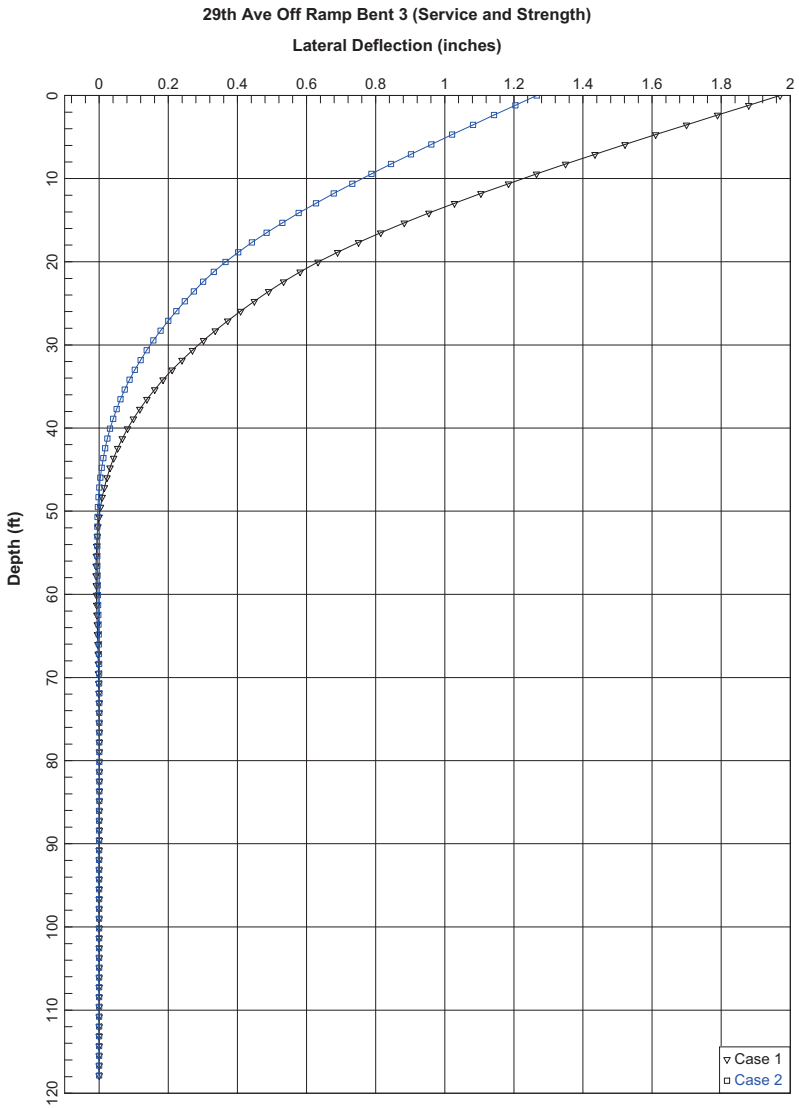

29th Ave Off Ramp Bent 2 (Service and Strength)
Bending Moment (in-kips)
-1E4
0
1E4
2E4
3E4
4E4
5E4
6E4
7E4
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Case 1
Case 2

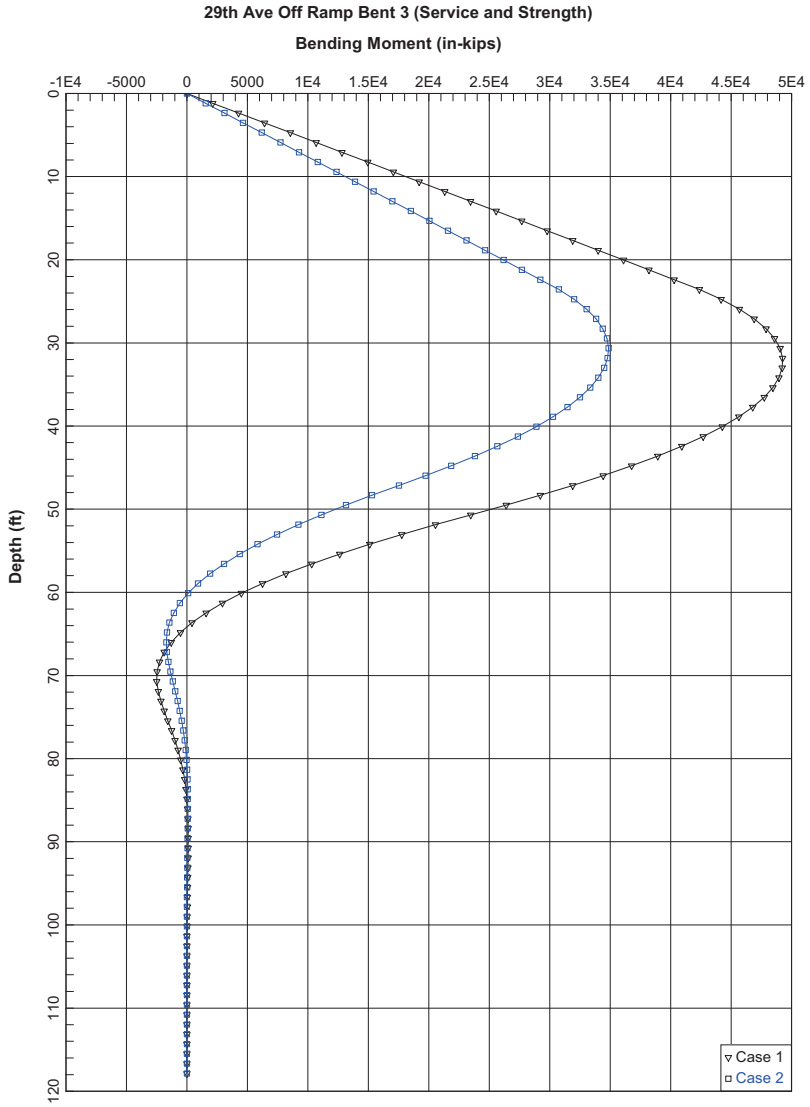

29th Ave Off Ramp Bent 2 (Service and Strength)
Shear Force (kips)
-300
-250
-200
-150
-100
-50
0
50
100
150
200
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Case 1
Case 2

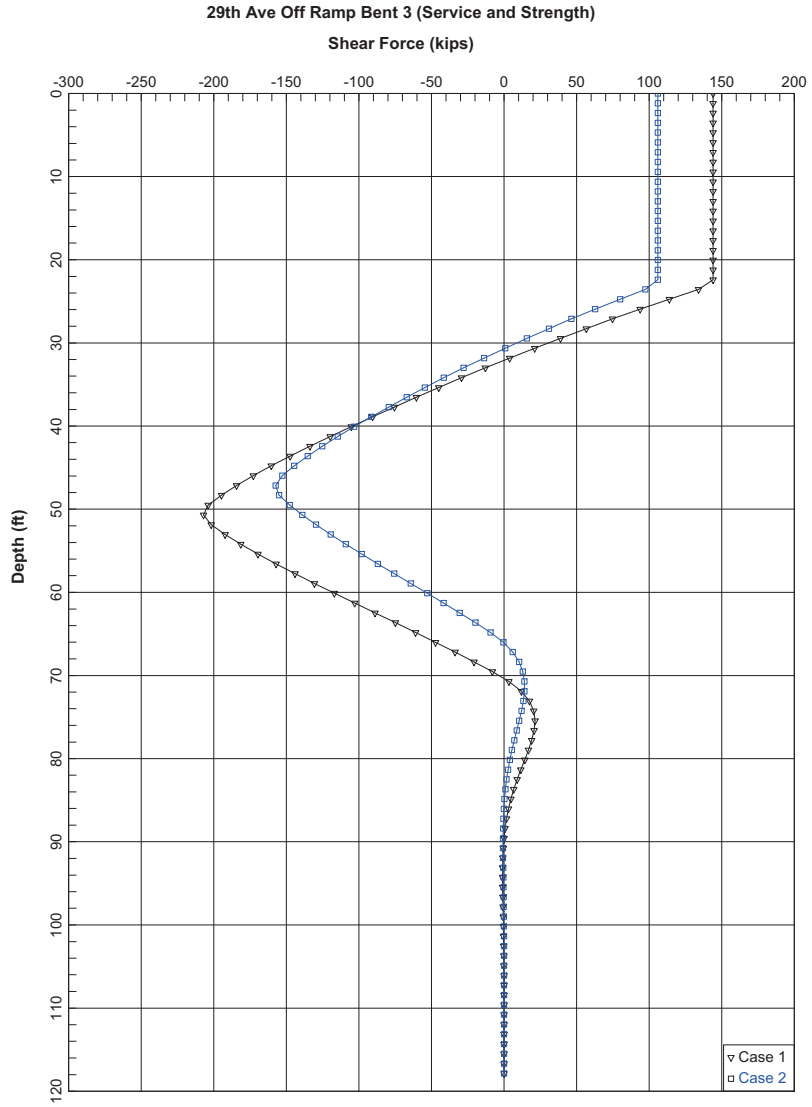

29th Ave Off Ramp Bent 2 (Seismic)
Lateral Deflection (inches)
-1
0
1
2
3
4
5
6
7
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Case 1

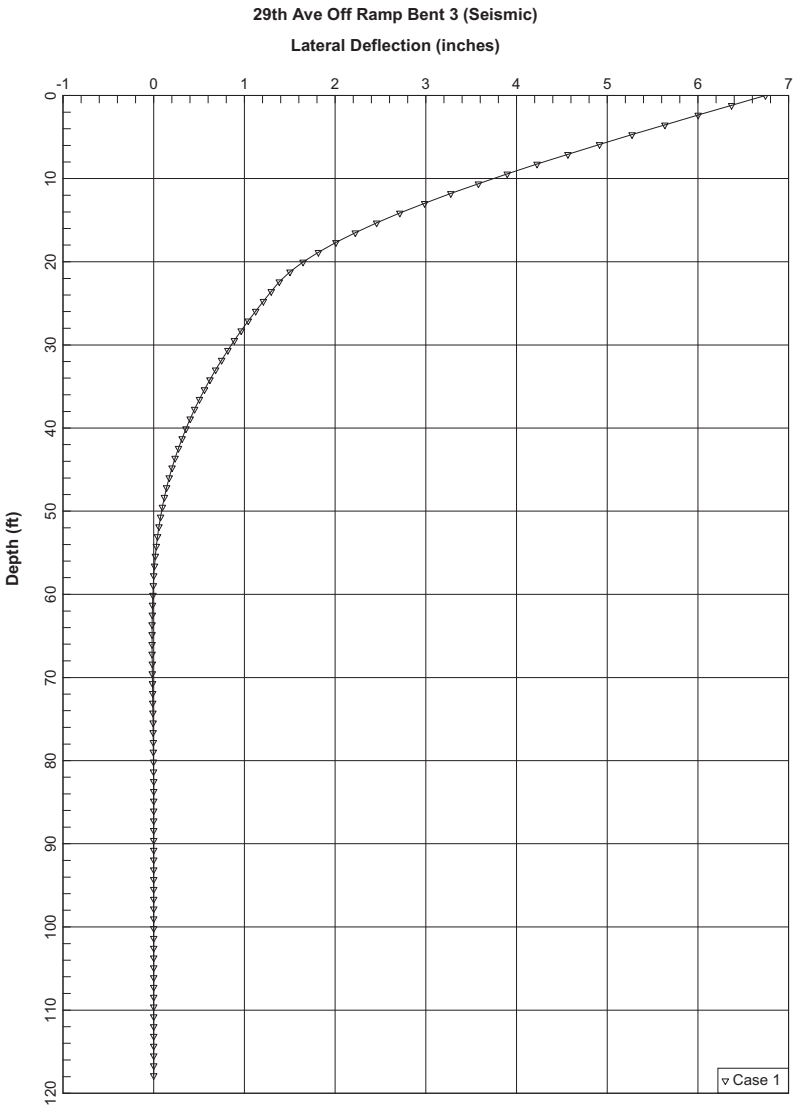

29th Ave Off Ramp Bent 2 (Seismic)
Bending Moment (in-kips)
-1E4
0
1E4
2E4
3E4
4E4
5E4
6E4
7E4
8E4
9E4
1E5
1.1E5
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Case 1

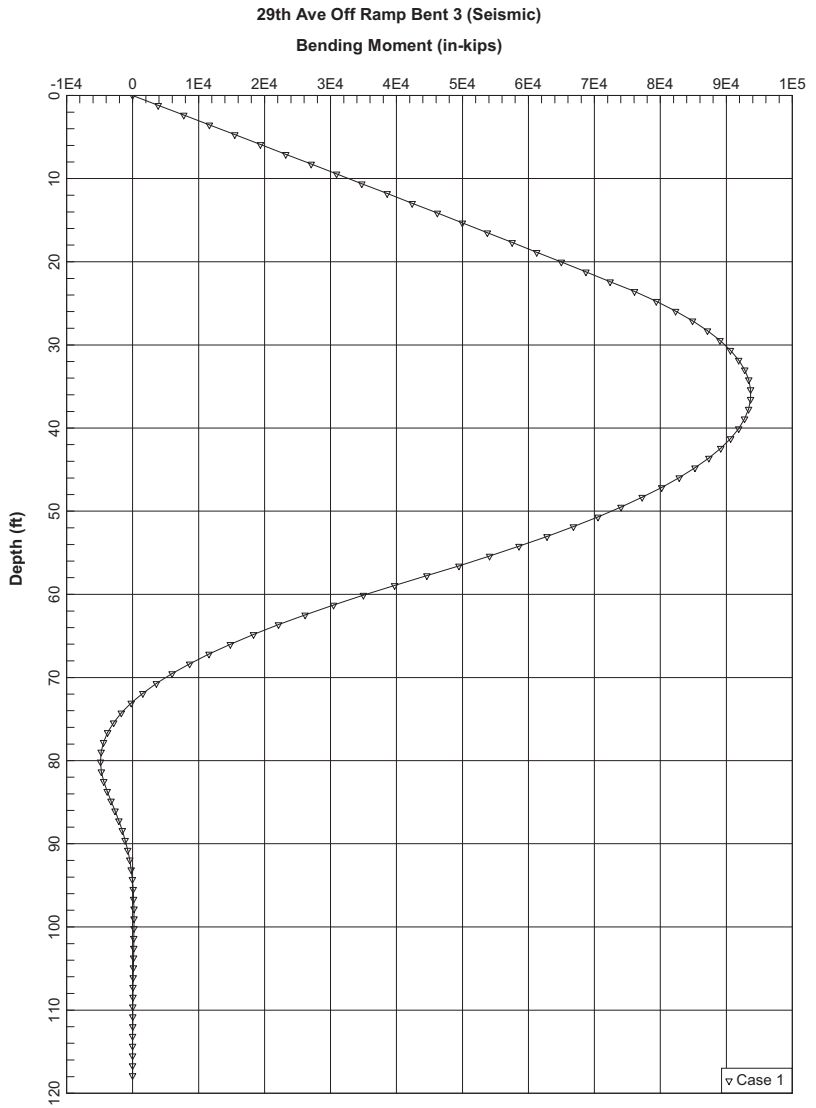

29th Ave Off Ramp Bent 2 (Seismic)
Shear Force (kips)
Depth (ft)
-400
-300
-200
-100
0
100
200
300
400
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Case 1

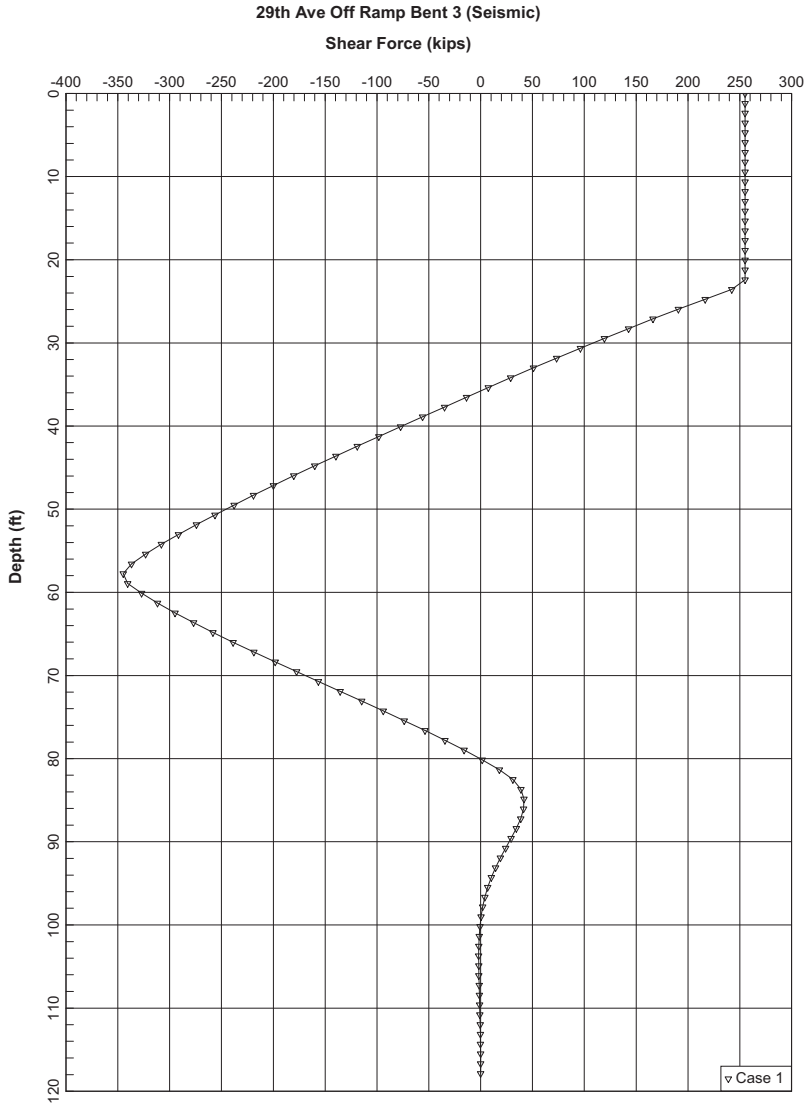

29th Ave Off Ramp Bent 3 (Service and Strength)
Lateral Deflection (inches)
Depth (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
10
20
30
40
50
60
70
80
90
100
110
120
Case 1
Case 2


29th Ave Off Ramp Bent 3 (Service and Strength)
Bending Moment (in-kips)
-1E4
-5000
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
4.5E4
5E4
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
Case 1
Case 2


29th Ave Off Ramp Bent 3 (Service and Strength)
Shear Force (kips)
-300
-250
-200
-150
-100
-50
0
50
100
150
200
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
Case 1
Case 2


29th Ave Off Ramp Bent 3 (Seismic)
Lateral Deflection (inches)
-1
0
1
2
3
4
5
6
7
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
Case 1


29th Ave Off Ramp Bent 3 (Seismic)
Bending Moment (in-kips)
-1E4
0
1E4
2E4
3E4
4E4
5E4
6E4
7E4
8E4
9E4
1E5
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
Case 1


29th Ave Off Ramp Bent 3 (Seismic)
Shear Force (kips)
-400 -350 -300 -250 -200 -150 -100 -50 0 50 100 150 200 250 300
Depth (ft)
0 10 20 30 40 50 60 70 80 90 100 110 120
Case 1

EMI data 1

Boring	Soil type	Depth	Δd (in)	H_{50} (in.)	t_{50} (min.)	c_v (ft^2/day)	t_{90} (min.)	c_v (ft^2/day)	sp' ksf	depth ft	sv psf	OCR
R-11-002	CL	15	0.0702	0.9298	1.50	0.28	9.00	0.20	3.5	15	1563	2.2
R-11-002	CL	25	0.084	0.9160	1.5	0.28	4	0.44	4	25	2189	1.8
R-11-010	CL	15	0.0742	0.9258	3	0.14	9	0.20	5.5	15	1563	3.5
R-11-014	CL	40	0.081	0.9190	2	0.21	6.25	0.29	5	40	3128	1.6
R-11-034	CL	20	0.0793	0.9207	4.5	0.09	9	0.20	3.5	20	1876	1.9
				Average	0.27							

Boring	Soil type	Depth	s1 ksf	e1 %	s2 ksf	e2 %	Cc
R-11-002	CL	15	4	4	10	9	0.125647
R-11-002	CL	25	5	5	15	9	0.083836
R-11-010	CL	15	10	5	15	6.5	0.085183
R-11-014	CL	40	6.5	5	15	9	0.110139
R-11-034	CL	20	5	5	15	12.2	0.150905
						average	0.11

Boring	Soil type	Depth	s1 ksf	e1 %	s2 ksf	e2 %	Cr
R-11-002	CL	15	10	11	0.4	8	0.02146
R-11-002	CL	25	2	7.5	0.4	6	0.02146
R-11-010	CL	15	9	6	0.6	3	0.025508
R-11-014	CL	40	5	8	0.7	6	0.023423
R-11-034	CL	20	5	11	2	10	0.025129
						average	0.02

URS Lab Consolidation Tests

Boring	Soil type	LL	PI	sp' ksf	depth ft	sv psf	OCR	Cv of recompression range ft/day			
B-2	CL	44	27	7	32	2627.2	2.7	0.68	1.25		
B-4	CL	40	20	5	21	1938.6	2.6	0.496302	0.255747	3.16317	
B-5	CL	48	24	7	50	3754	1.9	0.209155	0.050357	1.348924	
B-8	CL	49	24	7	10	1250	5.6	0.109361	2.323357	0.468885	1.349241
B-11	CH	65	35	7	27	2314.2	3.0	0.212382	4.87707		
										Average	1.20

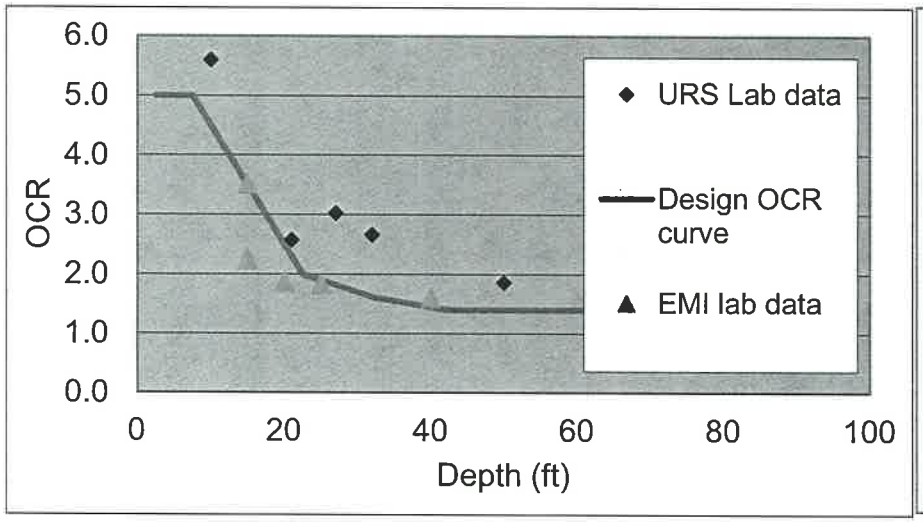
Boring	Soil type	LL	PI	s1 ksf	e1 %	s2 ksf	e2 %	Cc	
B-2	CL	44	27	80	17	10	6.5	0.116267	} Average.
B-4	CL	40	20	90	20	10	7	0.136234	
B-5	CL	48	24	100	21.5	20	11	0.150221	
B-8	CL	49	24	100	20	20	10	0.143068	
B-11	CH	65	35	40	24	10	7	0.282364	
							average	0.14	

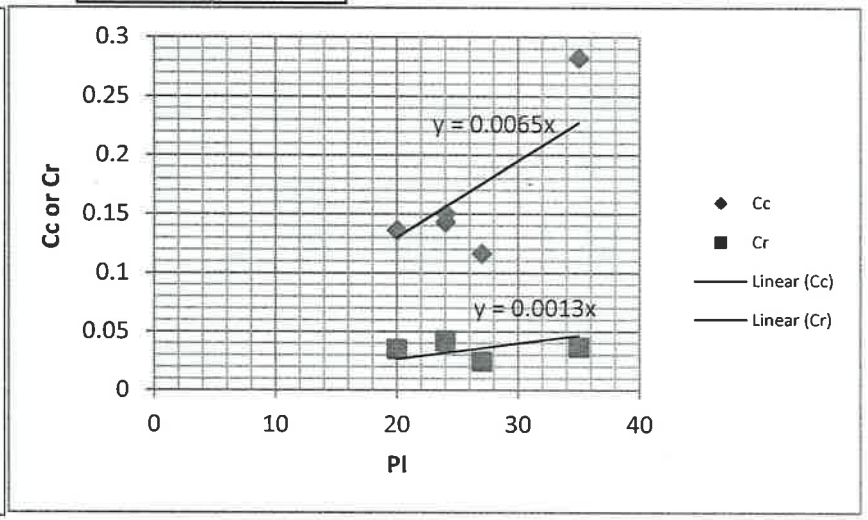
Boring	Soil type	LL	PI	s1 ksf	e1 %	s2 ksf	e2 %	Cr
B-2	CL	44	27	5	15	0.3	12	0.024553
B-4	CL	40	20	10	19.5	1	16	0.035
B-5	CL	48	24	30	22.3	0.9	16	0.041369
B-8	CL	49	24	20	20	1	14.5	0.042274
B-11	CH	65	35	30	26	0.7	20	0.036764
							average	0.04

Boring	Sample No.	Sample depth	USGS	LL	PI
URS-1	4	15	CL	34	15
URS-3	4	15	CL	33	17
URS-3	12	60	CL	45	20
URS-4	5	20	CL	44	20
URS-9	14	80	CL	41	20
URS-5	11	85	CL	48	24
URS-8	3	10	CL	49	24
URS-2	5	30	CL	44	27
URS-11	7	27	CL	65	35
URS-4	8	35	CH	77	44
URS-9	11	50	CH	75	44
URS-8	8	35	CH	80	52
			Average	52.9	28.5

Design parameter				
	Cc=	0.19	to	0.12
	Cr=	0.04	to	0.03
	Cv=	1.20 ft2/day		
	OCR=	See left		

Depth (ft)	OCR	
2.5	5	
7.5	5	
12.5	4	
17.5	3	
22.5	2	
27.5	1.8	
32.5	1.6	
37.5	1.5	
42.5	1.4	*given Su/σv'=0.3, OCR~1.4
47.5	1.4	
52.5	1.4	
57.5	1.4	
62.5	1.4	
67.5	1.4	
72.5	1.4	
77.5	1.4	
82.5	1.4	
87.5	1.4	
92.5	1.4	
97.5	1.4	





29 off ramp (upperbound)

Fill Height	12.75	ft	**Settlement**	**2.94**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	50	ft			
Length of fill	118.75	ft			
Design Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	1657.5	psf			

Based on URSB-4

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	1546	1858.52	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1356	2293.18	5	-	-	-
CL	12.5	5	125	0.04	0.19	1562.5	156	1406.5	1200	2606.21	4	5626	N	0.64
CL	17.5	5	125	0.04	0.19	2187.5	468	1719.5	1070	2789.58	3	5158.5	N	0.50
CL	22.5	5	125	0.04	0.19	2812.5	780	2032.5	961	2993.52	2	4065	N	0.40
CL	27.5	5	125	0.04	0.19	3437.5	1092	2345.5	868	3213.78	1.8	4221.9	N	0.33
CH	32.5	5	125	0.04	0.19	4062.5	1404	2658.5	789	3447.19	1.6	4253.6	N	0.27
SM	37.5	5	125	0.04	0.19	4687.5	1716	2971.5	720	3691.33	1.5	4457.25	N	0.00
CL	42.5	5	125	0.04	0.19	5312.5	2028	3284.5	660	3944.31	1.4	4598.3	N	0.19
ML	47.5	5	125	0.04	0.19	5937.5	2340	3597.5	607	4204.64	1.4	5036.5	N	0.16
CL	52.5	5	125	0.04	0.19	6562.5	2652	3910.5	561	4471.16	1.4	5474.7	N	0.14
SM	57.5	5	125	0.04	0.19	7187.5	2964	4223.5	519	4742.92	1.4	5912.9	N	0.00
SP-SM	62.5	5	125	0.04	0.19	7812.5	3276	4536.5	483	5019.14	1.4	6351.1	N	0.00
SP-SM	67.5	5	125	0.04	0.19	8437.5	3588	4849.5	450	5299.20	1.4	6789.3	N	0.00
SP-SM	72.5	5	125	0.04	0.19	9062.5	3900	5162.5	420	5582.57	1.4	7227.5	N	0.00
CL	77.5	5	125	0.04	0.19	9687.5	4212	5475.5	393	5868.81	1.4	7665.7	N	0.07
CL	82.5	5	125	0.04	0.19	10312.5	4524	5788.5	369	6157.57	1.4	8103.9	N	0.06
CL	87.5	5	125	0.04	0.19	10937.5	4836	6101.5	347	6448.52	1.4	8542.1	N	0.06
CL	92.5	5	125	0.04	0.19	11562.5	5148	6414.5	327	6741.42	1.4	8980.3	N	0.05
CL	97.5	5	125	0.04	0.19	12187.5	5460	6727.5	309	7036.04	1.4	9418.5	N	0.05
														2.94

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	12.5	ft	(25ft compression 2 direction drain)		
t50	2.57E+01	day			
t90	1.10E+02	day			

29 off ramp (lower bound)

Fill Height	12.75	ft	**Settlement**	**2.20**	**inches**
Fill Unit Weight	130	pcf			
Width of fill	50	ft			
Length of fill	118.75	ft			
Design Groundwater at	10	ft bgs			
Depth to Start Sett. Calc.	10	ft bgs			
Surcharge Load	1657.5	psf			

Based on URSB-4

Layer	Depth (ft)	Thickness (ft)	Unit Wt. (pcf)	Cr/(1+eo) -	Cc/(1+eo)* -	σvo (psf)	Water Pressure (psf)	σ'vo (psf)	Δσ (psf)	σ'vf (psf)	OCR -	σ'p (psf)	Comp. Range ?	$S_{@EOP}$ (in)
CL	2.5	5	125	-	-	312.5	0	312.5	1546	1858.52	5	-	-	-
CL	7.5	5	125	-	-	937.5	0	937.5	1356	2293.18	5	-	-	-
CL	12.5	5	125	0.03	0.12	1562.5	156	1406.5	1200	2606.21	4	5626	N	0.48
CL	17.5	5	125	0.03	0.12	2187.5	468	1719.5	1070	2789.58	3	5158.5	N	0.38
CL	22.5	5	125	0.03	0.12	2812.5	780	2032.5	961	2993.52	2	4065	N	0.30
CL	27.5	5	125	0.03	0.12	3437.5	1092	2345.5	868	3213.78	1.8	4221.9	N	0.25
CH	32.5	5	125	0.03	0.12	4062.5	1404	2658.5	789	3447.19	1.6	4253.6	N	0.20
SM	37.5	5	125	0.03	0.12	4687.5	1716	2971.5	720	3691.33	1.5	4457.25	N	0.00
CL	42.5	5	125	0.03	0.12	5312.5	2028	3284.5	660	3944.31	1.4	4598.3	N	0.14
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CL	52.5	5	125	0.03	0.12	6562.5	2652	3910.5	561	4471.16	1.4	5474.7	N	0.10
SM	57.5	5	125	0.03	0.12	7187.5	2964	4223.5	519	4742.92	1.4	5912.9	N	0.00
SP-SM	62.5	5	125	0.03	0.12	7812.5	3276	4536.5	483	5019.14	1.4	6351.1	N	0.00
SP-SM	67.5	5	125	0.03	0.12	8437.5	3588	4849.5	450	5299.20	1.4	6789.3	N	0.00
SP-SM	72.5	5	125	0.03	0.12	9062.5	3900	5162.5	420	5582.57	1.4	7227.5	N	0.00
CL	77.5	5	125	0.03	0.12	9687.5	4212	5475.5	393	5868.81	1.4	7665.7	N	0.05
CL	82.5	5	125	0.03	0.12	10312.5	4524	5788.5	369	6157.57	1.4	8103.9	N	0.05
CL	87.5	5	125	0.03	0.12	10937.5	4836	6101.5	347	6448.52	1.4	8542.1	N	0.04
CL	92.5	5	125	0.03	0.12	11562.5	5148	6414.5	327	6741.42	1.4	8980.3	N	0.04
CL	97.5	5	125	0.03	0.12	12187.5	5460	6727.5	309	7036.04	1.4	9418.5	N	0.04
														2.20

Given LL=50%

Cv=	2.50E-07	m^2/sec	(NAVAFAC, compresion)=	0.23	ft2/day
Cv=	1.50E-06		(NAVAFAC, recompresion)	1.40	ft2/day
Cv=	1.20	ft2/day	(lab test)		
T50	0.197				
T90	0.848				
H	12.5	ft	(25ft compression 2 direction drain)		
t50	2.57E+01	day			
t90	1.10E+02	day			

Appendix E
Responses to Comments

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Paul Cotter** **Phone: (916)227-5671** **e-mail: paul.cotter@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ **Other:** FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 05/09/2012** **Structure Name*: 29th Ave Off-Ramp Br No*:33-0752s** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 3/30/2012, responses to Caltrans last review comments dated 2/17/2012, and Plans prepared by URS dated 3/30/2012.		
2	FR	Section 7.4	1) Report states the CIDH piles are expected to encounter groundwater at approximate El +10 ft, which is about 4 ft lower than the highest groundwater encountered during field investigation. 2) Cut-off elevations shown on Table 5 are not consistent with those presented on Tables 7 and 8. 3) Note 3 under Tables 7 and 8 do not apply. 4) Table 8: Please indentify each bent only once unless there is difference between piles at the same bent.	1) The text was revised as "CIDH piles are expected to encounter groundwater approximately between Elevation +8 to +14 ft MSL" 2) Cut-off elevations shown on Tables 7 and 8 are corrected. 3) Note 3 under Tables 7 and 8 were deleted. 4) Table 8 was revised to remove the redundant rows.	
3	FR	Page 7-5 Section 7.4	Table numbers (Table 5 and Table 6) referenced on this page is wrong.	Table numbers were corrected.	
4	FR	Section 7.5	Wick drains are recommended for the soil zone consisting	The feasibility and effectiveness of using wick	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer:_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

			predominately of stiff to very stiff clay. Please check the feasibility.	drains in the soil conditions present at this site at this site was confirmed with a specialty wick drain installation contractor. In addition, the use of wick drains was also recommended for consideration by Caltrans Design as it was successfully and economically used on the recent 5th Avenue Project construction.	
5			Please include the additional boring (130 ft deep) in the report and the LOTB sheet.	The additional boring (R-12-012) was added in the report and the LOTB sheet.	
6	FR,P	LOTBs	Please include LOTBs originally intended for other structures, including those done by different geotechnical consultant, into the plans for each structure if the borings are close enough and are being referenced/used for the analysis for that particular structure. It is noted that several structures significantly rely on the borings conducted for adjacent structures for the GW information, or the borings intended for adjacent structure show much higher GWT than those intended for this particular one.	We agree that it is useful to include LOTBs originally intended for other structures done by different geotechnical consultant into the plans for our design structure. However, since Caltrans have a standard way to name boring ID, it's possible to have identical IDs on a plan if using LOTB from different geotechnical consultants. To avoid confusion, we clearly stated which borings in addition to our explorations were used instead of including them in our LOTBs.	

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: yiwei.hu@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 2/17/2012** **Structure Name*: 29th Ave Off-Ramp Br No*:33-0752S** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 1/6/2012, responses to Caltrans last review comments dated 10/3/2011, and Plans prepared by URS dated 1/10/2012.		
2	FR	Page 3-1,2 Section 3.2.1	1) Borehole diameters indicated in this section and on LOTBs are inconsistent. 2) The drilling methods indicated in this section for the top 5 ft is not reflected in the LOTBs. 3) The SPT sampler size indicated in the report is 1.5 inch (I.D.), but LOTBs shows 1.4 inch.	1. Changed the borehole diameter on the LOTBs to match the text. 2. The boring was hand augered to check for the existence of underground utilities, but then re-drilled through using Rotary Wash method. A note "The borings were hand augered in the top 5 ft to check for the existence of underground utilities" was added on LOTB 3. The SPT sampler has a 1.4-in cutting shoe, with a 1.5-in barrel. Both are correct. Changed text to reflect this.	
3	FR	Page 4-1,2	Please add a note to reflect how the soil strength changes with	Text was revised to reflect how the soil strength	

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RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

		Section 4.2	depth.	changes with depth, in an overconsolidated strength profile.	
4	FR	Page 4-2 Section 4.3	How far away is it from the job site to the EMI borings? Is GW elevation encountered in those borings considered preventative for this site as well? If so, why is the design elevation assumed to be at about El +10.0 ft, which is much lower than what was actually encountered in EMI's boring?	The design ground water elevation was selected to be EL+10.0 feet at the 29th Avenue Off Ramp based on several data sources. We reviewed groundwater elevations in the 2011 EMI borings R-11-008, R-11-034, and R-11-035, which are at the site. Our design water table is much higher than the investigations conducted in 1993 (elevation -1.5 feet and elevation -1.7 feet), slightly higher than our CPT interpretation (elevation +8.6 feet), and is consistent with the range encountered by EMI (between elevation +9.3 feet and +14.0 feet). Therefore, the design ground water elevation was reasonably assumed to be EL+10.0 feet at the 29th Avenue Off Ramp.	
5	FR	Page 7-2 Section 7.4	1) Please include foundation data provided by structure designer and present foundation design data and resistance factor for each limit state in the main body of the report, not in the appendix. 2) The values of required factored nominal resistance are not correct. 3) Tip of piles at Bent 2 is much deeper than the maximum field exploration depth. Available borings have to be deeper than the specified pile tips.	1. We have included foundation data provided by structure designer and presented foundation design data and resistance factors for each limit state in the main body of the report 2. The values of required factored nominal resistance have been corrected 3. An additional boring (130 ft deep) has been drilled to confirm the subsurface conditions beyond the proposed pile tip elevations.	
6	FR		Please show bridge number on the cover page of the report since it is now available. Please indicate both the old and new bridge numbers in the beginning of the report.	1. New Bridge numbers have been added to the cover page of the report. 2. Old and new Bridge numbers have been added in the beginning of the report.	
7	LOTBs		Boreholes are not identified correctly. Please refer to the current Caltrans logging manual. Please revise accordingly, including the LOTBs, report, and all pertinent information such as lab test results included in the appendices. Please examine the entire LOTB set to make sure it follows Caltrans current logging manual.	Changed names of the borings in LOTB, text and lab test appendices	

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer to complete)
Dist: 04 EA: 0A7101 **Project Name: I-880 Operational and Safety Improvement Project** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: yiwei.hu@dot.ca.gov**	__ PSR/PDS (Review No.__ _ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction _X_ Other: FOUNDATION REPORT	**Reviewer Name: Caroline Chen** **Functional Unit: GDW** **Cost Center: 3660** **Phone Number: (916)227-5386** **e-mail: caroline_chen@dot.ca.gov** **Date of Review: 10/03/2011** **Structure Name*: 29th Ave Off-Ramp Br No*:33-xxxx** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	**Structure Consultant Firm**	**Phone Number**	**e-mail**	**Response Date**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by URS dated 9/6/2011 and Plans prepared by URS dated 9/6/2011.		
2	FR	Page 3-1,2 Section 3.2.1	1) LOTB for Borings B-1 through B-6 should be included since soil profile and soil parameters used for analyses are based on them. 2) Borehole diameters indicated in this section and on LOTBs are inconsistent. 3) The drilling methods indicated in this section are not reflected in the LOTBs. 4) The SPT sampler size indicated in the report is 1.5 inch (I.D.), but LOTBs shows 1.4 inch.	1) Borings B-1 through B-6 was added in LOTBs 2) Borehole diameters of 8" indicated in LOTBs are revised. The text in Section 3.2.1 was revised. 3) The drilling methods indicated in LOTBs were revised to reflect rotary wash method. 4) The SPT sampler size of 1.4 inch indicated LOTBs is correct. The text in Section 3.2.1 was revised.	
3	FR	Page 4-1,2 Section 4.2	1) Figure 7 shows soil layer elevation up to 20 ft. No information is shown for zone between Elevations 20 and 25. 2) Cohesion of the first soil layer is shown to range from 2500 psf to 1500psf. Please use a single value or indicate how such a wide range of value is used in analyses.	1) Figure 7 was revised to include the information between Elevations +20 feet and +25feet. 2) As shown in figure 7, the field testing, lab testing, and CPT interpretation exhibits a classic overconsolidated stress history at the	

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RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

				site, in which the shear strength is higher near ground surface and decreases with depth until reaching normally consolidated conditions. Based on a review of all geotechnical data, generalized soil engineering parameters were developed as shown in the solid gray line in Figure 7, indicating soil strength ranges from 2500 psf to 1500 psf with the depth.	
4	FR	Page 4-2 Section 4.3	1) Groundwater (GW) encountered in one of the borings conducted in 1993 is at El -1.5 ft, not 1.5 ft. 2) Show the GW table indicated by the CPTs on the LOTBs. 3) How far away is it from the job site to the EMI borings? Is GW elevation encountered in those borings considered preventative for this site as well? If so, why is the design elevation assumed to be at about El +10.0 ft, which is much lower than what was actually encountered in EMI's boring?	1) Corrected. 2) GW table indicated by the CPTs was added to the LOTBs. 3) The CPT data obtained by this study indicate that the water table was at elevation of +8.6 feet in boring B6. Groundwater encountered in the boring by Earth Mechanics Inc. (EMI, 2011) also presented in the similar range, between elevation +7.7 feet and elevation +14.3 feet. Therefore, the design ground water elevation was rational selected to be about EL+10.0 feet at the 29th Avenue Overcrossing.	
5	FR	Page 5-2 Section 5.4	Be specific that the ARS curve mentioned and generated based on the parameters mentioned in the first paragraph is the ARS curve obtained by deterministic method, not the design curve. The design curve is the envelope as mentioned in the second paragraph.	Text revised to clarify the difference.	
6	FR	Page 7-1 Section 7.3	Report states spread footing foundations are expected to be suitable for support of the bridge bents. Why are they not recommended/proposed?	Adequate soil bearing capacity exists for spread footing foundations, however, excessive settlements are computed under the design loading. Therefore deep foundations are recommended. Additional explanation was provided in text.	
7	FR	Page 7-2 Section 7.4	1) Please make recommendations following LRFD method. Include foundation data provided by structure designer. Present foundation design data and resistance factor for each limit state. Refer to AASHTO Bridge Design Specifications, Caltrans amendments, and Caltrans Memo To Designer for information.	1) Foundation data provided by structure designer was included in Appendix D. Foundation design data and resistance factor for each limit state was also presented in Appendix D per AASHTO Bridge Design Specifications, Caltrans amendments, and Caltrans Memo To	

			2) Nominal resistance should be rounded up to the nearest 10 kips. 3) Put "0" instead of "NA" if there is no tension demand.	Designers. 2) Pile data table has been updated. 3) "0"is entered instead of "NA" if there is no tension demand.	
8	FR	Page 7-3 Section 7.4	What type of connection between pile and pile cap is assumed in the lateral analyses? Please provide summary of lateral displacement at pile head.	Pinned head connections between pile and cap were assumed. A summary table of lateral displacement at pile head has been added.	
9	LOTBs		Please prepare LOTBs in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition). There are many items need to be corrected or added. Following are some items noted: 1) Borehole is not identified correctly. 1) Legend sheets are missing. 2) All the laboratory and field testing performed are not presented, such as UU test, UC test, etc.. 3) All laboratory and field testing data are not presented, such Pocket Penetration test. 4) GW encountered is not shown. A note should be added accordingly if GW is not encountered or not measured. 5) Indicate Hammer energy ration. 6) Consistency or density of soil layers is not described. 7) Description of consistency of several clay layers is not supported by the field test or lab test results. 8) Graphics are not following legends in the Logging Manual 9) Why does the conversion table on the as-built LOTBs refer to Rte 101? The above list shows only some of the many issues needed to be corrected. Consultant should examine the entire LOTB set to make sure it follows Caltrans current logging manual referenced above.	LOTBs are revised according to the comment and in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition). 1) Borehole is identified as rotary drilling. 2) Legend sheets have been added. 3) All the laboratory and field testing performed are now presented. 4) All laboratory and field testing data are now presented. 5) GW encountered in CPT is now shown. A note "Ground water table was not measured in the borings due to rotary wash drilling "was added. 6) A note "Hammer energy ratio calibration not performed" was added. 7) Consistency or density of soil layers was added. 8) Description of consistency was checked against the field test or lab test results. 9) Graphics were revised following legends in the Logging Manual 10) "Rte 101" was removed.	
10	FR	Lab test report	What are the values shown on the Particle Size report and Liquid and Plastic Limit Test report, elevation or depth?	It was clarified as depth.	

FINAL FOUNDATION REPORT

Retaining Walls and Soundwall
I-880 Operational and Safety Improvements
Alameda County, California
04-Ala-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)
EMI Project No. 10-133
Date: June 25, 2012

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

June 25, 2012

EMI Project No. 10-133

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Attention: Ms. Jennifer Harmon, P.E.

Subject: Final Foundation Report for Non-Standard Retaining Walls and Soundwall
I-880 Operational and Safety Improvements
Alameda County, California
04-Ala-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)

Dear Ms. Harmon:

Attached please find the Final Foundation Report for the Non-Standard Retaining Walls and Soundwall for the I-880 Operational and Safety Improvements project. This report contains the findings and conclusions of our field investigation and laboratory testing program. This report also contains our recommendations for the design and construction of the wall foundations. It should be noted that new pile-head demands were recently provided for SW 232 (Utility Corridor) by the structural designers. These new pile-head demands and corresponding pile data table are included in this Final Foundation Report.

Earlier versions of this foundation report, dated September 6, 2011, January 10, 2012, and March 30, 2012, were submitted to Caltrans for review. Copies of the Caltrans review comments and our responses are included in Appendix D. All Caltrans review comments and our responses have been incorporated into this Final Foundation Report.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,

EARTH MECHANICS, INC.

REGISTERED PROFESSIONAL ENGINEER (RANJAN) G. J. GUNARANJAN No. C71758 Exp. 12-31-2013 CIVIL STATE OF CALIFORNIA

6-25-12

(Ranjan) G. J. Gunaranjan, PE 71758
Senior Staff Engineer

REGISTERED PROFESSIONAL ENGINEER LINO C. CHEANG NO. GE 2345 EXP. 9/30/13 GEOTECHNICAL STATE OF CALIFORNIA

6-25-12

Lino Cheang, GE 2345
Project Manager

GJG/gjg,lcc

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

FINAL FOUNDATION REPORT

NON-STANDARD RETAINING WALLS AND SOUNDWALL
I-880 OPERATIONAL AND SAFETY IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880, PM 28.4/29.2
CALTRANS PROJECT NO. 04000001601 (EA 04-0A7100)

Prepared for:

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 10-133

June 25, 2012

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APPENDICES

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1.0 INTRODUCTION

1.1 Purpose and Scope of Study

This Foundation Report presents the findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for the proposed non-standard Retaining Walls and Soundwall as a part of the Interstate I-880 (I-880) Operational and Safety Improvements at 29th Avenue Overcrossing (OC) at Post Mile (PM) 28.4 and 23rd Avenue OC at PM 29.2 located in Alameda County, California. It presents results of our foundation evaluation and provides design and construction recommendations to assist RBF Consulting (RBF) designers in preparing the project Plans, Specifications, and Estimates (PS&E) for the project. A site location map is presented in Figure 1-1.

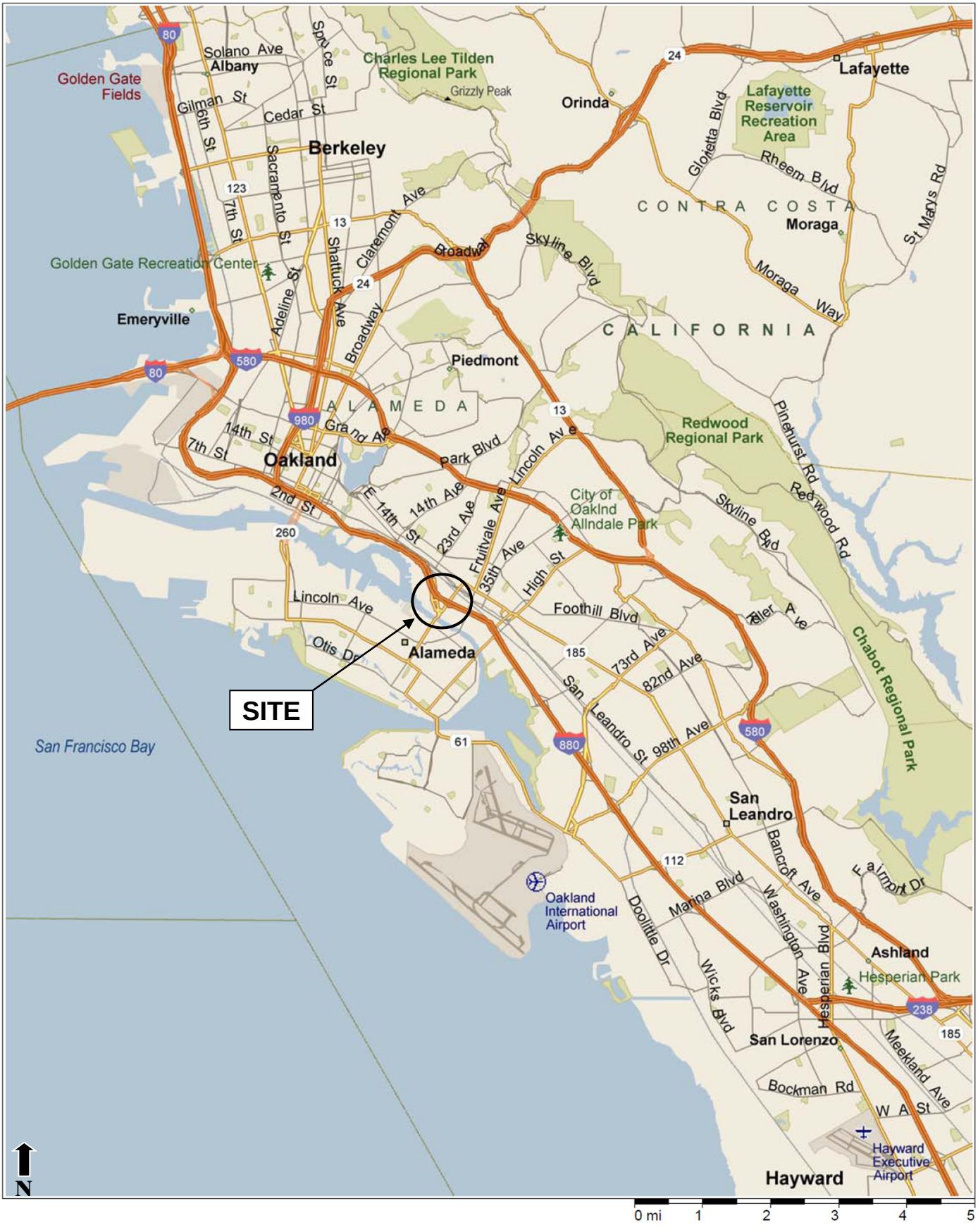
EMI is a subconsultant to RBF. The geotechnical services provided for this project included the following tasks:

- Collection and review of existing geotechnical information;
- Field exploration consisting of drilling and logging exploratory borings and Cone Penetration Test (CPT) sounding;
- Laboratory testing of selected bulk and relatively undisturbed soil samples;
- Engineering calculations and analysis to develop foundation design and construction recommendations; and
- Preparation of this report presenting our findings, conclusions, and recommendations.

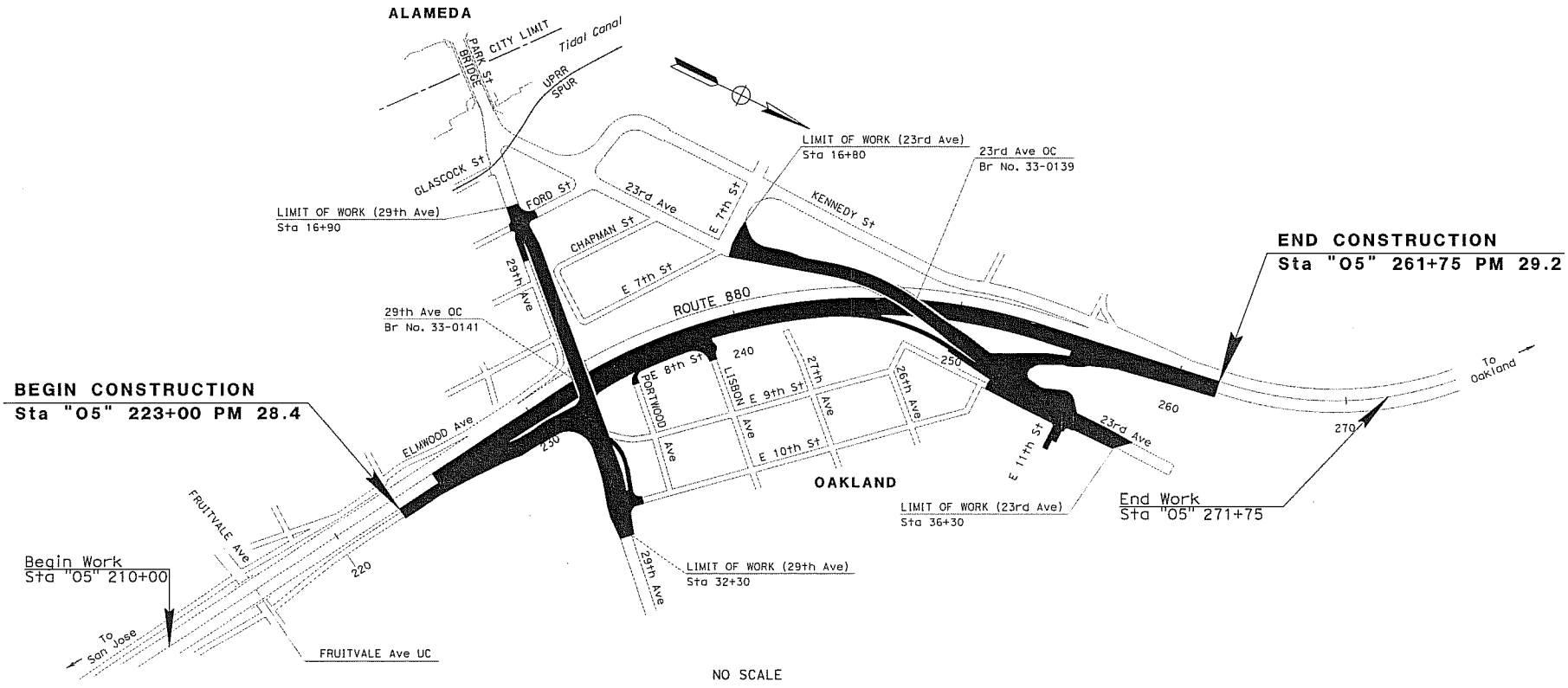
1.2 Project Description

The subject project is sponsored by the Alameda County Transportation Commission (ACTA). As part of this project, the California Department of Transportation (Caltrans), in cooperation and coordination with the City of Oakland, proposes to improve operations and safety at 29th Avenue and 23rd Avenue overcrossings (OC) of I-880. I-880, which is on the National Highway System and classified as being part of the Federal Aid Interstate System, is a major route for Bay Area commuters and goods movement providers. The proposed project improvement limits are shown in Figure 1-2.

To improve operations and safety, the proposed project will replace the 29th Avenue OC and the two 23rd Avenue OCs of I-880 and reconstruct the existing northbound 29th and 23rd Avenues off- and on-ramps. The intersection of E. 9th Street / 29th Avenue / northbound 29th Avenue on-ramp will be configured as a roundabout. Replacement of these OCs will also provide room to widen the existing I-880 mainline lanes outside shoulders to the Caltrans standard width and lengthen existing northbound auxiliary lane between the 29th Avenue on-ramp and 23rd Avenue off-ramp. To accommodate the bridge and road widening improvements, a series of retaining walls including Mechanically Stabilized Embankment (MSE) walls and a Caltrans Standard Type-1 wall are proposed. In addition, a soundwall on barrier or on a L-shape retaining wall is also proposed along East 8th Street between 29th and 23rd Avenues to reduce the noise impacts associated with the I-880 freeway within the Jingletown residential community.



I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	**Site Location Map**
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Figure 1-1
Project No. 10-133	Date: 08-25-2011



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 OPERATIONAL AND SAFETY IMPROVEMENTS Project No. 10-133 Date: 08-25-11	Project Limit Map Figure 1-2

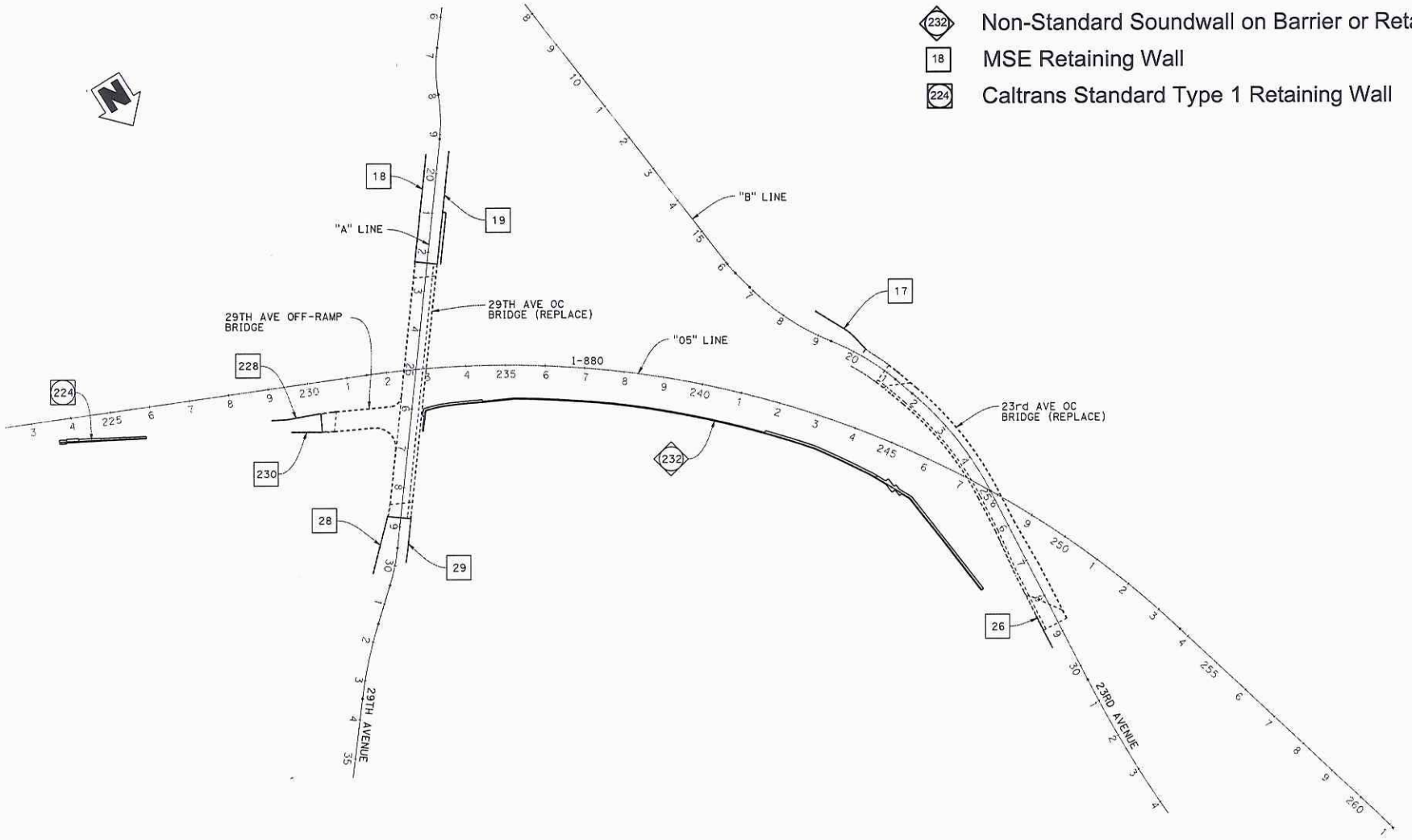
This foundation report pertains to the non-standard retaining walls and soundwall only. In addition to this foundation report, a Geotechnical Design Report (GDR) is prepared to address design and construction of roadway embankments and the Caltrans Standard Type-1 wall (EMI, 2012a), and a Materials Report is prepared to provide recommendations on pavement structural sections and mitigations of buried utility lines and drainage devices against soil corrosion (EMI, 2012b). Foundation reports for the two replacement overcrossings and the new 29th Avenue Off-Ramp bridge are being prepared by another geotechnical consultant, URS Corporation.

1.3 Proposed Walls

A total of nine retaining walls and one soundwall are included in the report. The wall locations are presented in Figure 1-3. Walls pertinent information is presented in Table 1-1.

LEGEND

- 232 — Non-Standard Soundwall on Barrier or Retaining Wall
- 18 — MSE Retaining Wall
- 224 — Caltrans Standard Type 1 Retaining Wall



Note:
(1) Foundation recommendations for Wall 224 are included in the GDR (EMI, 2012a).

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 OPERATIONAL AND SAFETY IMPROVEMENTS Project No. 10-133 Date: 01-05-12	Retaining Walls and Soundwall Key Map Figure 1-3

Table 1-1. Non-Standard Retaining Walls and Soundwall Pertinent Data

Wall No.	Wall Type	Wall Location	Approximate Length (feet)	Retaining Wall or Barrier Height (feet)	Approx. Bottom of Footing / Top of Leveling Pad Elevation (feet)	Backfill Slope Condition
17	MSE	West side of southern approach embankment of 23rd Ave. OC	159.5	10 to 20	+12.91 to +15.41	Level
18	MSE	East side of southern approach embankment of 29th Ave. OC	275	7.5 to 20	+15.00 to +17.50	Level
19	MSE	West side of southern approach embankment of 29th Ave. OC	287.9	7.5 to 22.5	+15.41 to +17.91	Level
26	MSE	East side of northern approach embankment of 23rd Ave. OC	95	12.5 to 15	+19.54	Level
28	MSE	East side of northern approach embankment of 29th Ave. OC	150	7.5 to 15	+25.00	Level
29	MSE	West side of northern approach embankment of 29th Ave. OC	113	7.5 to 17.5	+25.44	Level
230	MSE	North side of approach embankment of 29th Ave. off-ramp	77.5	7.5 to 12.5	+23.50	Level
228	MSE	South side of approach embankment of 29th Ave. off-ramp	125	7.5 to 17.5	+20.70	Level
232	Type 736SV 7SWBP	North side of I-880 between 29th and 23rd Avenues	1,058.5 560.0	2 to 4 5 and 6	+13.25 to +17.00 +8.50 to +12.50	Level

A pair of Return Walls is proposed between the new 23rd Avenue OC southern abutment and the approach embankment retained on one side by MSE Wall 17. Light weight fill (LWF) consisting of Expanded Polystyrene (EPS) blocks will be placed between the two return walls. LWF is required in order to minimize the impact of embankment loading on the nearby abutment and bent footings of the existing 23rd Avenue OC during stage construction. RBF will design the EPS blocks with soil types and soil strength parameters provided in Table 4-1 of this report. Design of the return walls is performed by URS Corporation.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Existing Information

The as-built Logs-of-Test-Borings (LOTB) sheets prepared for the 1993 seismic retrofitting of the existing 23rd and 29th Avenue Overcrossings were reviewed as part of the preparation of this report. The soil data from the 1993 seismic retrofit was not used by EMI for preparation of this foundation report because these borings do not contain the required soil data, especially soil compressibility; therefore, these LOTB sheets are not provided in this foundation report.

In addition, URS Corporation recently conducted nine rotary-wash soil borings and three Cone Penetrometer Test (CPT) soundings in April and May 2011 and March 2012 for the replacement of the 23rd and 29th Avenue Overcrossings. The soil data, especially soil compressibility data from the recent URS investigation, was used by EMI for preparation of this foundation report. Copies of these URS LOTB sheets are included in Appendix A.

2.2 Field Investigation

To supplement the existing subsurface information, a geotechnical field investigation was conducted between March 28 and April 19, 2011. Ten exploratory borings and seven CPTs were accomplished under the supervision of EMI. Exploration information, including boring/CPT number, stations, offsets, ground surface elevations, boring/CPT depths, and groundwater elevations are summarized in Table 2-1. Locations of the exploratory borings and CPTs are shown on the LOTB sheets provided in Appendix A.

2.2.1 Soil Borings

Exploratory borings were drilled by Pitcher Drilling Co., under a subcontract with EMI, using a truck-mounted drill rig equipped with 5-inch diameter drill bit and a mud-rotary circulation drill system. The top 10 feet to 15 feet of depth was drilled using an 8-inch diameter drill bit. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval is generally 5 feet. Relatively undisturbed soil samples were obtained using a 3-inch outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1-inch long with a 2.5-inch outside diameter. The SPT sampler (1.4-inch inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18 inches into the ground or until refusal was encountered using a 140-lb automatic hammer free falling from a height of 30 inches. The numbers of blows to advance the sampler each 6 inches of penetration was recorded. The numbers of blows for the final 12 inches or shorter of driving was recorded on the LOTB sheets.

Charts published by Winterkorn and Fang (1975) can be used to determine a reduction factor used to convert blowcounts recorded using the MCD sampler into SPT blowcounts. Using those charts, we obtained a reduction factor of 0.5 which was used for this project.

2.2.2 CPT Soundings

The CPT soundings were performed by Middle Earth Geo Testing, Inc., under subcontract with EMI, using an electronic cone penetrometer in general accordance with current ASTM Standards

(ASTM D5778 and ASTM D3441). The CPT equipment consisted of a cone penetrometer assembly mounted at the end of a series of hollow sounding rods. The cone penetrometer assembly consisted of a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in² (10 cm²) and a cylindrical friction sleeve with a surface area of 23.25 in² (150 cm²). The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurements of cone tip and friction sleeve resistance during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79 inch per second (20 mm per second) while the cone tip resistance and sleeve friction resistance are recorded every 1.967 inches (50 mm) and stored in digital form. A specially designed all-wheel drive 25-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

Table 2-1. Geotechnical Exploration Information

Exploration No.	Station Line	Approx. Station	Approx. Offset (feet)	GSE (ft)	GWE (ft)	Exploration Depth (ft)	Method
R-11-002	"05" Line	225+11	72RT	+26.6	+13.6	71.5	RW
R-11-006	"A" Line	30+15	50RT	+27.8	NM	71.5	
R-11-008	"A" Line	28+70	27LT	+27.5	+14.0	71.3	
R-11-010	"05" Line	234+20	95RT	+21.8	+14.3	51.5	
R-11-014	"05" Line	242+02	85RT	+19.5	+10.0	71.5	
R-11-021	"B" Line	28+56	50RT	+24.2	+10.7	51.5	
R-11-030	"B" Line	20+44	28LT	+15.4	+7.9	71.5	
R-11-031	"B" Line	21+80	45RT	+19.0	+7.2	71.5	
R-11-034	"A" Line	20+33	45LT	+16.9	+9.4	71.0	
R-11-035	"A" Line	19+21	33RT	+17.3	+9.3	71.5	
CPT-11-001	"05" Line	224+00	51RT	+27.0	NM	50.0	CPT
CPT-11-003	"05" Line	227+44	128RT	+25.3	NM	70.0	
CPT-11-011	"05" Line	236+95	85RT	+21.7	NM	50.0	
CPT-11-013	"05" Line	239+55	84RT	+19.8	NM	50.0	
CPT-11-017	"05" Line	245+95	113RT	+17.0	NM	70.0	
CPT-11-033	"A" Line	21+39	28RT	+18.2	NM	70.0	
CPT-11-040	"05" Line	247+00	220RT	+19.0	NM	70.0	

Notes:
GSE = Approximate Ground Surface Elevation; GWE = Approximate Groundwater Elevation; RW = Rotary Wash Boring; CPT = Cone Penetrometer Test; NM = Not Measured.

2.3 Laboratory Testing

Soil samples considered representative of the subsurface conditions were tested to obtain or derive relevant physical and engineering soil properties. The following laboratory tests were conducted to supplement the observations recorded during the field investigation:

- In-situ Moisture Content and Unit Weight
- Percent Passing No. 200 Sieve
- Atterberg Limit
- Direct Shear
- Unconsolidated Undrained Triaxial
- Pocket Penetrometer
- Consolidation
- Maximum Density and Optimum Moisture Content
- R-Value
- Minimum Resistivity, pH, Sulfate Content and Chloride Content

The laboratory tests were conducted in general accordance with California Test Methods or American Society for Testing and Materials (ASTM) Standards. Laboratory test results are included in Appendix B.

R-value test is noted on the LOTBs in Appendix A. These test results were not used in preparation of the recommendations included in this report and therefore, they were omitted from Appendix B.

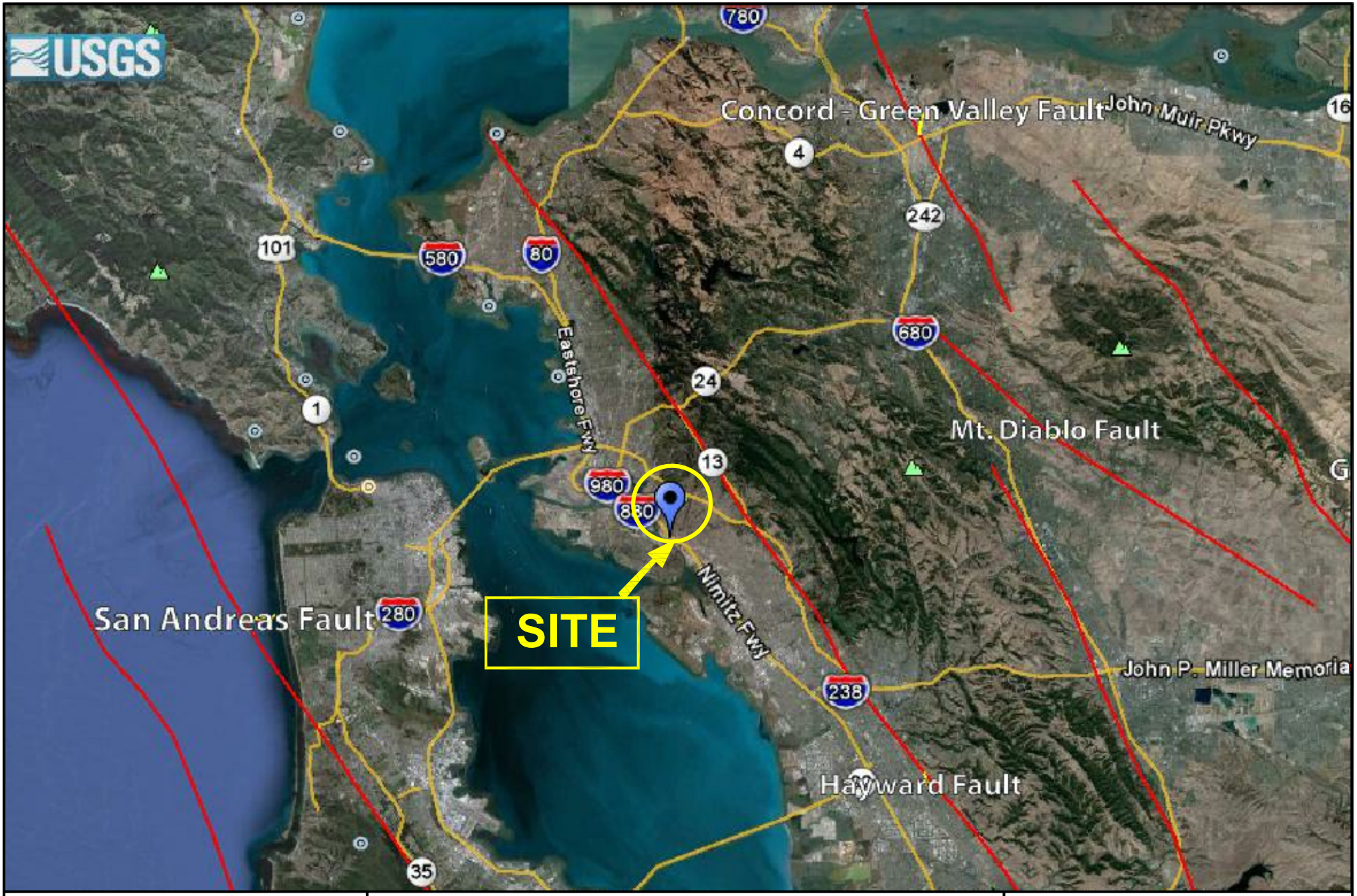
3.0 GEOLOGY AND SEISMICITY

3.1 Physiography

The project area is located in the Coast Ranges geomorphic province of California. The Coast Ranges are bounded by the Pacific Ocean on the west and the Great Valley on the east. The ranges extend from the Oregon border south to the Santa Ynez River near Santa Barbara; San Francisco Bay further subdivides the province into the northern and southern sections. The Coast Ranges are characterized by discontinuous, northwest-trending mountain ranges, ridges, and valleys. East of the San Andreas Fault, most of the province bedrock is composed of a heterogeneous mix of marine and volcanic rocks of the Franciscan Assemblage, including chert, greywacke sandstone, altered mafic volcanic rock, shale, serpentinite, and metamorphic rock. Granitic rocks of the Salinian block comprise much of the basement rock of the ranges located west of the San Andreas Fault.

3.2 Geologic Structure

San Francisco Bay is a structural depression formed by downwarping and subsidence of the structural block in response to activity along the San Andreas Fault system. The San Andreas Fault system is a right-lateral, strike-slip fault zone that extends from the Gulf of California north to Cape Mendocino and defines the boundary between the North American Plate to the east and the Pacific Plate to the west. The Pacific plate moves about 1.5 inches per year relative to central California across a broad, approximately 60 mile wide zone in northern California. Additional deformation in eastern California and the Basin and Range province contribute to the total relative Pacific-North America motion of about 2 inches per year. Within the San Francisco Bay Area, movement across this plate boundary is distributed across a complex system of primarily northwest-trending, right-lateral, strike-slip faults, including the San Andreas, Hayward, and Calaveras faults. Other major regional faults include the Concord-Green Valley, Mount Diablo Thrust, and Greenville faults (Figure 3-1). There is also a significant degree of compression across the greater Bay Area, most prominently evident in the faults and associated folds of the Mt. Diablo thrust and fold belt. These thrust faults generally trend west-northwest, are oblique to the strike-slip faults of the San Andreas system, and exhibit a well-defined right-stepping, en echelon geometry.



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 OPERATIONAL AND SAFETY IMPROVEMENTS Project No. 10-133 Date: 08-25-11	Regional Map of Active Faults Figure 3-1

A summary of active regional faults, distances to project site, maximum earthquakes, slip rates, and fault types is presented in Table 3-1.

Table 3-1. Active Regional Fault Information

Fault Name	Fault ID	Maximum Magnitude (M_{max})	Approx. Closest Distance to Project Site (miles)	Approx. Direction from Project Site	Slip Rate (mm/year)	Fault Type
Hayward Fault Zone (Northern Section)	353	7.3	2.8	Northeast	9	RLSS
Calaveras Fault Zone (Northern Calaveras Section)	321	6.8	11.5	Northeast	6	RLSS
Mount Diablo Thrust	150	6.6	13.5	Northeast	2	R
San Andreas Fault Zone (Peninsula Section)	309	7.9	15.8	Southwest	20	RLSS
Concord Fault (Ygnacio Valley Section)	341	6.6	15.8	Northeast	4.7	RLSS
Greenville Fault Zone (Clayton Section)	351	6.8	20.8	Northeast	2	RLSS

1 mm/year = 0.04 inch/year; R = Reverse; RLSS = Right Lateral Strike Slip

3.3 Geological Hazards

The only significant geologic hazard at the project site is earthquake shaking and perhaps local liquefaction. The site is not located within an Alquist-Priolo Fault Rupture Hazard Zone and no known active faults cross the project site. Therefore, ground rupture is not considered to be a factor. The site is not subject to landslide, tsunami or volcanic hazards. The flat-lying topography of the area is not susceptible to landsliding. While current understanding of tsunami hazards in the San Francisco Bay region is still emerging, the project site lies outside of the California Emergency Management Agency's currently defined Tsunami Inundation Area, as developed for evacuation planning. There are no volcanoes in the region.

As presented in Figure 3-2, the project site is located in a potential liquefaction zone as defined by the California Geological Survey (CGS, 2003). However, findings from the site-specific geotechnical explorations indicate that the subsurface consists primarily of fine-grained, cohesive soils. Liquefaction analyses were conducted for the site-specific geotechnical explorations and are detailed in Section 5.2. Based on these findings, liquefaction potential is considered to be low at the project site.

I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	**Map of Liquefaction Potential** Figure 3-2
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 10-133 | Date: 08-25-2011

3.4 Seismicity

The project site is located within a seismically active region. Historical, ground-rupturing earthquakes have occurred on the nearby Hayward, San Andreas, Calaveras, and Greenville faults. The USGS currently estimates that the probability of a magnitude 6.7 or greater earthquake occurring in the San Francisco Bay area during the next 30 years is 63% and the probability of a larger, magnitude 7.5 earthquake during the next 30 years is 15%. The Hayward-Rodgers Creek fault is considered by the USGS to be the fault most likely to generate a magnitude 6.7 or greater quake in the San Francisco Bay area (Field et al, 2008).

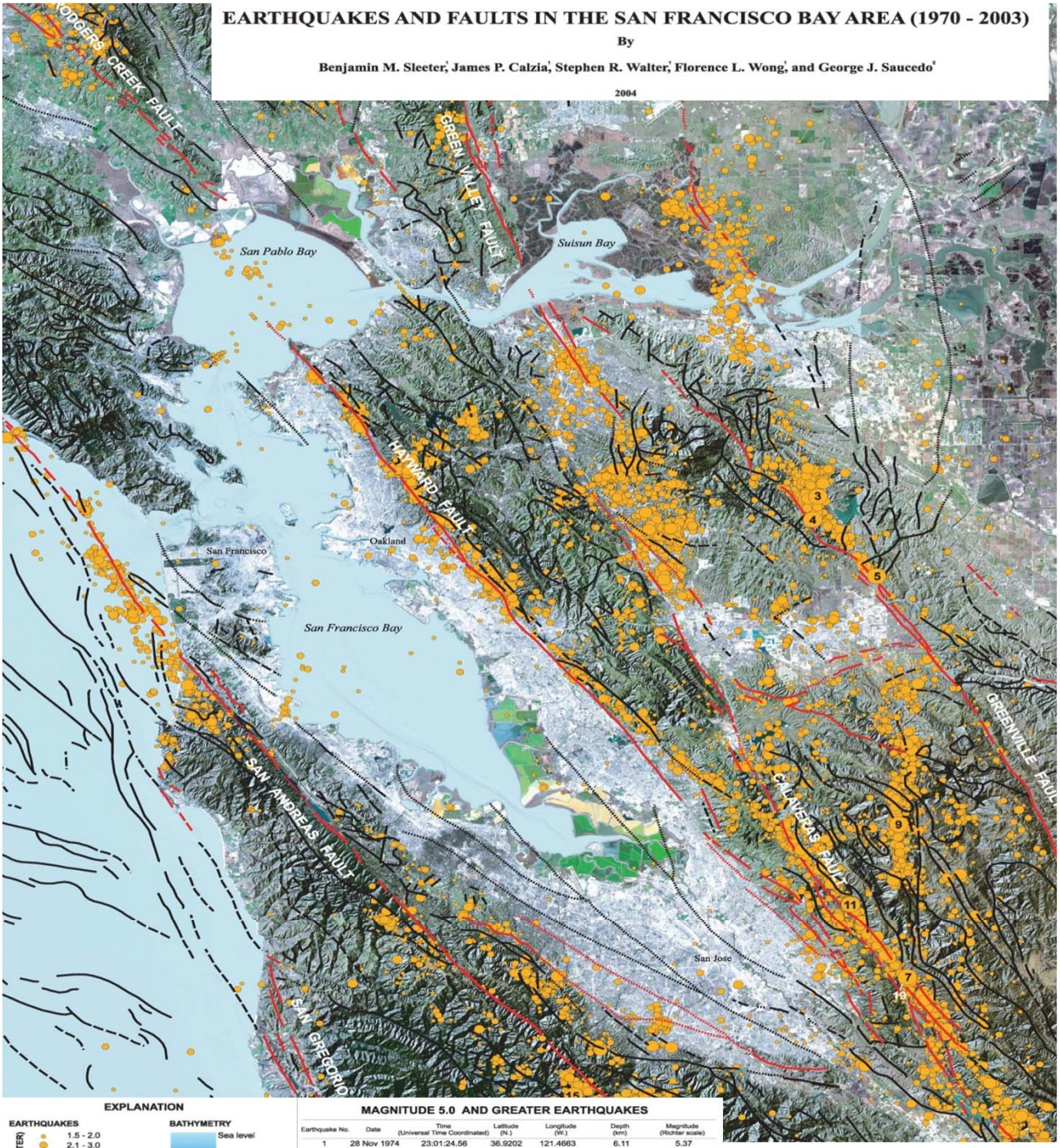
Historical earthquake epicenter maps show seismicity generally clustered along the traces of the major fault zones (Figure 3-3). The majority of earthquakes are predominantly right-lateral, strike-slip quakes with varying degrees of minor reverse-oblique motion. A summary of significant historical regional earthquakes in the San Francisco Bay area (Toppozada, 2000) is presented in Table 3-2.

Table 3-2. Summary of Significant Historical Regional Earthquakes

Fault	Year	Approximate Magnitude	Approximate Epicenter Location
Unknown	1836	6.4	Between Monterey and Santa Clara
San Andreas	1838	7.4	Santa Clara
Unknown	1865	6.5	Santa Cruz Mountains
Hayward	1868	6.8	Hayward
Unknown	1892	6.4	Vacaville
Rodgers Creek	1898	6.3	Mare Island
San Andreas	1906	7.8	Daly City
Calaveras	1911	6.5	Morgan Hill
Calaveras	1984	6.2	Morgan Hill
San Andreas Fault System	1989	6.9	Santa Cruz Mountains

The largest historical earthquake in the San Francisco Bay area was the 7.8 M_w 1906 earthquake on the San Andreas fault. Accepted magnitudes for this event generally range from 7.7 M_s (Wald et al, 1993) to 7.9 M_w (Thatcher et al, 1997). The earthquake ruptured the northernmost 296 miles of the San Andreas Fault, extending from northwest of San Juan Bautista to the triple junction at Cape Mendocino. Measured slip maxima varied from 28.2 feet and 24.6 feet at Shelter Cove and Tomales Bay to 14.8 feet near Mount Tamalpais and 8.9 feet at Loma Prieta.

In terms of damage, the 1868 earthquake on the Hayward fault was the second most significant regional earthquake. The 1868 rupture damaged buildings from Hayward to San Francisco and was referred to as "the great San Francisco earthquake" until the 1906 earthquake occurred. Ground rupture along the Hayward fault was traced for about 20 miles from San Leandro to Warm Springs in Fremont. However, recent modeling of survey data (Yu and Segall, 1996) suggest that the fault moved as far north as Berkeley, with about 32 miles of rupture, and from this data, the average amount of horizontal movement along the fault is inferred to be about 6 feet.



MAGNITUDE 5.0 AND GREATER EARTHQUAKES

Earthquake No.	Date	Time (Universal Time Coordinated)	Latitude (N.)	Longitude (W.)	Depth (km)	Magnitude (Richter scale)
1	28 Nov 1974	23:01:24.56	36.9202	121.4663	6.11	5.37
2	6 Aug 1979	17:05:22.91	37.1042	121.5127	8.93	5.80
3	24 Jan 1980	19:00:08.63	37.8367	121.7708	14.72	5.23
4	24 Jan 1980	19:01:01.53	37.8115	121.7772	7.07	5.10
5	27 Jan 1980	02:33:35.32	37.7493	121.7062	14.69	5.18
6	23 Jan 1984	05:40:19.93	36.3650	121.8878	8.19	5.12
7	24 Apr 1984	21:15:18.75	37.3095	121.6787	8.74	5.82
8	26 Jan 1986	19:20:50.93	36.8040	121.2847	8.72	5.50
9	31 Mar 1986	11:55:39.80	37.4788	121.6858	9.17	5.70
10	20 Feb 1988	08:39:57.24	36.7957	121.3117	9.62	5.03
11	13 June 1988	01:45:36.52	37.3923	121.7415	9.71	5.30
12	27 June 1988	18:43:22.32	37.1268	121.8962	13.15	5.30
13	8 Aug 1989	08:13:27.36	37.1458	121.9282	14.23	5.40
14	18 Oct 1989	00:04:15.20	37.0362	121.8802	17.29	7.00
15	18 Oct 1989	00:41:23.70	37.1873	122.0548	16.78	5.10
16	18 Apr 1990	13:53:51.30	36.9320	121.6577	5.68	5.75
17	18 Apr 1990	15:46:03.44	36.9583	121.6848	6.67	5.36
18	16 Jan 1993	06:29:35.00	37.0182	121.4630	7.90	5.10
19	11 Aug 1993	22:33:04.00	37.3120	121.6793	9.35	5.00
20	23 Apr 1995	08:41:36.63	36.6025	121.2015	7.84	5.14
21	12 Aug 1998	14:10:25.12	36.7533	121.4622	9.13	5.35
22	3 Sept 2000	08:36:30.09	38.3788	122.4127	10.12	5.17

I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	**Map of Historic Earthquakes and Fault Zones**	Figure 3-3
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 10-133	Date: 08-25-2011

The 1989 Loma Prieta earthquake occurred not on the main trace of the San Andreas Fault, but on a nearby fault associated with the larger San Andreas Fault system. The rupture occurred about 10.5 miles beneath the Santa Cruz Mountains along a left-stepping, restraining bend in the San Andreas fault system on a steep, southwest-dipping, right-lateral reverse fault that did not rupture to the surface. Six feet of right-lateral strike-slip and 4 feet of reverse-slip were inferred from geodetic data. The most significant effect of the Loma Prieta earthquake was damage and disruption to transportation systems; in Oakland and San Francisco reinforced-concrete viaducts collapsed: the Nimitz Freeway (Interstate 880) in Oakland, and the Embarcadero Freeway, Highway 101, and Interstate 280 in San Francisco.

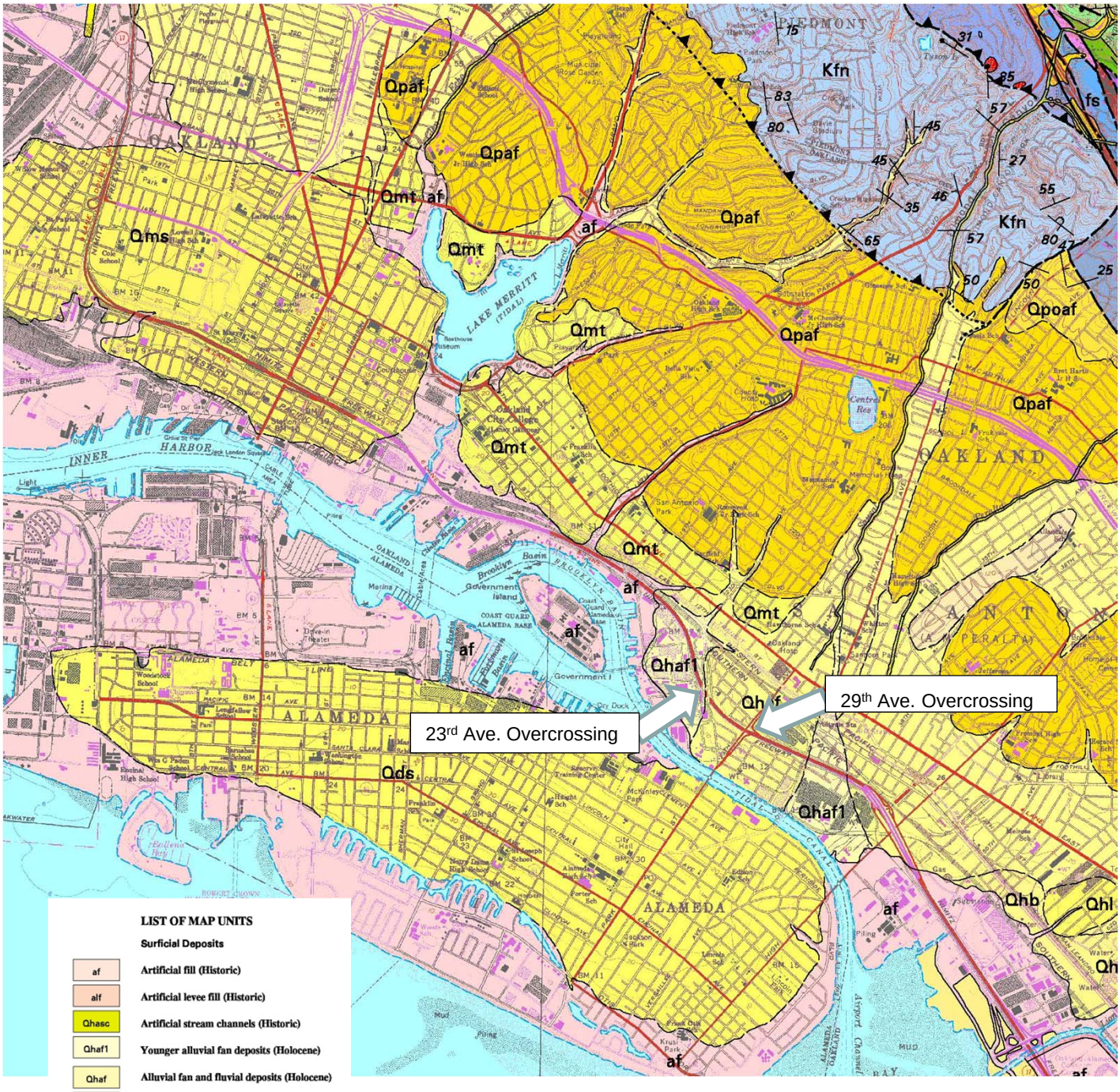
Ground rupture during the 1838 earthquake was previously believed to have been limited to the 37.5-mile peninsula segment of the San Andreas Fault. However, a reevaluation of the quake by Toppozada and Borchardt (1998) indicate that faulting probably extended almost 100 miles, from San Francisco to San Juan Bautista, indicating a significantly larger earthquake, approximately 7.4 M_w, than previously thought. The northern end of the 1838 faulting was previously assumed to be 15.5 miles south of San Francisco. However, Mission San Francisco Dolores was damaged in 1838 but not in 1906, suggesting that the 1838 faulting extended to San Francisco. Also, the 1838 aftershocks were felt in Oakland as frequently and violently as those following the major 1868 Hayward earthquake, suggesting that the 1838 faulting on the San Andreas extended to the latitude of Oakland. The 1838 fault segment ruptured again 68 years later as part of the overlapping 1906 San Andreas Fault rupture.

The 1971 San Fernando earthquake involves surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 9 miles under the San Gabriel Mountains, and considered part of the Sierra Madre Fault System.

3.5 Site Geology and Stratigraphy

The project area is underlain predominantly by stiff to hard layers of clay with silt and sandy clay and few interbedded layers of medium dense to very dense sand and gravel. The geologic formations of importance to this project are flat-lying sediments with no notable geologic structures such as faults, folds, or unconformities. The site area is flat, with no natural hills or slopes.

The subsurface soil conditions at the project location consist primarily of unconsolidated Holocene alluvial fan deposits. These materials are typical of late Quaternary-age sediments deposited in a distal alluvial fan environment. As presented in Figure 3-4, the project site is mapped as undifferentiated Holocene alluvial gravel, sand, and clay by Dibblee (2005) and as Holocene alluvial fan sand and sandy gravel upwardly fining to sandy or silty clay by Graymer (2000) and Helley and Graymer (1997). According to Knudsen et al. (2000) and CGS (2003), the site is underlain by Holocene alluvial fan deposits. Regional mapping indicates that elevation of Franciscan bedrock in the vicinity of site is about 800 feet to 850 feet below MSL.



I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	**Geological Map of the Project Site**	Figure 3-4
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 10-133	Date: 08-25-2011

4.0 SUBSURFACE CONDITIONS

4.1 Soil Conditions

Recent field investigation indicates that the subsurface materials at the project site consist predominately of medium stiff to hard layers of lean clay and fat clay with varying amounts of sand and gravel and few interbedded layers of medium dense to very dense clayey sand, silty sand, and sand with gravel down to the exploration termination depth.

The idealized soil profile and design strength parameters for foundation design of each wall are presented in Table 4-1.

Table 4-1. Idealized Soil Profile and Strength Parameters

Approximate Elevation (feet)	Predominant Soil Type	Equivalent SPT Blowcount* (blows/foot)	Friction Angle (degree)	Cohesion / Undrained Shear Strength (psf)
Wall 17 (Borings R-11-030 and R-11-031)				
+17 to +5	Sandy Lean Clay and Fat Clay	(11) to 36 Average = 22	-	2,500
+5 to -5	Lean Clay with Sand and Fat Clay	4 to (24) Average = 11	-	1,500
-5 to -15	Lean Clay, Sandy Lean Clay, and Fat Clay	(7) to (22) Average = 14	-	2,000
-15 to -30	Lean Clay, Sandy Lean Clay, and Fat Clay	9 to 20 Average = 14	-	2,000
-30 to -50	Lean Clay and Sandy Lean Clay	(9) to 41 Average = 20	-	2,500
-50 to -71	Lean Clay and Sandy Lean Clay	(38) to 48 Average = 43	-	4,000
Walls 18 & 19 (Borings R-11-034 and R-11-035 and CPT Sounding CPT-11-033)				
+18 to +5	Sandy Lean Clay and Fat Clay	(8) to 38 Average = 19	-	2,500
+5 to -5	Lean Clay and Lean Clay with Sand	4 to 7 Average = 6	-	750
-5 to -20	Lean Clay and Lean Clay with Sand	10 to 31 Average = 19	-	2,500
-20 to -40	Lean Clay and Sandy Lean Clay	(12) to 40 Average = 20	-	2,500
-40 to -52.5	Lean Clay and Sandy Lean Clay	(20) to 25 Average = 23	-	3,000
-52.5 to -77	Sand and Sand with Silt	38 to 83 Average = 62	38	50

Approximate Elevation (feet)	Predominant Soil Type	Equivalent SPT Blowcount* (blows/foot)	Friction Angle (degree)	Cohesion / Undrained Shear Strength (psf)
Wall 26 (Boring R-11-021)				
+23 to +10	Lean Clay and Lean Clay with Sand	11 to (14) Average = 13	-	2,000
+10 to -2	Lean Clay with Sand and Fat Clay with Sand	(2) to 7 Average = 5	-	750
-2 to -12	Silty Clayey Sand and Gravel with Silt and Sand	21 to (23) Average = 22	33	100
-12 to -28	Lean Clay with Sand and Fat Clay	5 to 18 Average = 12	-	2,000
Walls 28 & 29 (Borings R-11-006 and R-11-008)				
+28 to +13	Lean Clay and Lean Clay with Sand	14 to (30) Average = 21	-	2,000
+13 to -5	Lean Clay and Lean Clay with Sand	4 to (31) Average = 11	-	1,500
-5 to -27	Lean Clay with Sand and Fat Clay	(10) to 35 Average = 19	-	2,500
-27 to -45	Lean Clay with Sand and Sandy Lean Clay	(23) to 45 Average = 32	-	4,000
Walls 228 & 230 (Boring R-11-002 and CPT Soundings CPT-11-001 and CPT-11-003)				
+27 to +14	Lean Clay and Lean Clay with Sand	(11) to 17 Average = 14	-	2,000
+14 to 0	Lean Clay and Lean Clay with Sand	(5) to 18 Average = 13	-	2,000
0 to -15	Lean Clay and Fat Clay	(16) to 34 Average = 25	-	3,000
-15 to -20	Clayey Sand and Silty Sand	35	34	100
-20 to -40	Lean Clay with Sand and Sandy Lean Clay	(13) to (22) Average = 19	-	2,500
-40 to -53	Silty Sand and Sand with Silt	(19) to 50 Average = 38	36	100
Wall 232 (Borings R-11-010 and R-11-014 and CPT Soundings CPT-11-011, CPT-11-013, CPT-11-017, and CPT-11-040)				
+22 to +10	Lean Clay with Sand and Fat Clay with Sand	16 to (21) Average = 19	-	2,500
+10 to -10	Lean Clay with Sand and Fat Clay	7 to (26) Average = 15	-	2,000
-10 to -25	Lean Clay with Sand and Fat Clay	(9) to 14 Average = 13	-	1,750
-25 to -35	Lean Clay with Sand and Fat Clay	(9) to 19 Average = 15	-	2,000
-35 to -54	Lean Clay with Sand and Fat Clay	20 to 32 Average = 24	-	3,000

** Values in ( ) are converted SPT blowcounts corrected for sampler size; correction factor from Modified California Drive sampler blowcounts to SPT blowcounts is 0.5.*

In Table 4-1, the soil strength parameters for sandy soils are based on the correlations with SPT blowcounts (Lam and Martin, 1986) and laboratory direct shear test results; and soil strength parameters for clayey soils are based on CPT sounding data (Robertson and Campanella, 1989) and laboratory unconsolidated undrained triaxial compression test results.

4.2 Groundwater Conditions

During the recent field investigation conducted by EMI between March 28 and April 19, 2011, groundwater was recorded between the depths of 7.5 feet and 11.8 feet below the ground surface, which is between El. +7.2 feet and El. +14.3 feet. During the past field investigation conducted in 1993, groundwater was encountered in two borings at El. -1.5 feet and El. -1.7 feet. Based on California Geological Survey (Division of Mines and Geology, 2003), the recorded highest historical groundwater depth varies from about 5 to 10 feet along the project corridor.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Seismic Design Criteria

Based on the ARS curve presented in the Preliminary Foundation Reports for 23rd Avenue OC Replacement (URS, 2011a) and 29th Avenue OC Replacement (URS, 2011b), a peak ground acceleration (PGA) of 0.72g is obtained. The PGA is the zero-period spectral acceleration in the ARS curve.

For analyzing global slope stability, Section 3.10 of the Caltrans Guidelines for Structures Foundation Reports (Caltrans, 2009) recommends using a horizontal seismic coefficient equal to one-third of the peak acceleration but not exceeding 0.2. Therefore, a horizontal seismic coefficient of 0.2 was used in the slope stability analysis.

As presented in Section 11.8.6 of AASHTO (2007), the seismic earth pressures can be computed using a seismic coefficient equal to half of the peak acceleration. Therefore, a seismic coefficient of 0.36g can be used for the computation of seismic earth pressures for the MSE walls.

5.2 Liquefaction

Liquefaction analysis was performed using the available site-specific subsurface information and the historical high groundwater depth of 5 feet below the existing grade.

The liquefaction potential of the saturated, granular materials below the historical high groundwater table was evaluated using the procedures outlined by Seed et al. (1983), Seed and Harder (1990), and updated by NCEER (1997). Two soil borings R-11-002 and R-11-021 that contain about 5-foot thick isolated coarse-grained soil layers were selected for the liquefaction analyses; other borings have scattered coarse-grained soil layers less than 5 feet thick. These relatively thin soil layers, even if liquefy, will have a minimal impact on the wall foundations.

Results of the liquefaction analysis are included in Appendix C and they show these two isolated layers of coarse-grained soils are not expected to be susceptible to liquefaction. As a result, liquefaction induced ground subsidence is anticipated to be small and soil liquefaction should not have any adverse impact on the wall foundations.

5.3 Soil Corrosivity

Nine soil samples received from borings drilled for wall foundation design were tested for pH, minimum resistivity, soluble chloride content and soluble sulfate content. The test results are summarized in Table 5-1. Minimum resistivities were between 1,200 and 5,900 ohm-cm. The pH values were between 6.5 and 7.6. The soluble sulfate measurements were between 55 and 252 parts per million (ppm), and the soluble chloride measurements were between 158 and 231 ppm.

Table 5-1. Soil Corrosion Test Results

Boring No.	Station Line	Approx. Station	Approx. Offset (feet)	Sample Depth (feet)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
R-11-002	"05" Line	225+11	32RT	5	CL	1,300	7.3	65	219
R-11-006	"A" Line	30+15	50RT	5	CL	1,600	7.6	65	164
R-11-010	"05" Line	234+20	95RT	10	SC	5,900	6.7	55	185
R-11-014	"05" Line	242+02	85RT	5	CH	1,300	6.6	70	158
R-11-021	"B" Line	28+56	50RT	5	CL	1,500	6.5	65	197
R-11-030	"B" Line	20+44	28LT	10	CL	1,200	6.6	80	231
R-11-031	"B" Line	21+80	45RT	5	CH	1,300	6.9	170	221
R-11-034	"A" Line	20+33	45LT	15	CL	2,500	7.1	252	160
R-11-035	"A" Line	19+21	33RT	5	CH	1,400	7.3	90	158

Based on the Caltrans Corrosion Guidelines (2003b), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 2,000 ppm or greater. Based on the test results and the Caltrans criteria, the on-site soils are considered to be non-corrosive to bare metals and concrete.

Based on the above measured chloride concentration, minimum concrete cover over reinforcement should be provided in accordance with Table 8.22.1 of the Caltrans Bridge Design Specifications (BDS) (Caltrans, 2003b) for "Non-corrosive Atmosphere/soil/water". Based on the above measured pH value and sulfate concentration, cement type should be in accordance with Table 8.22.2 of the Caltrans BDS (Caltrans, 2003b) for "Soil or Water pH from 5.6 to 7". Additional corrosion protection requirements for concrete structural members are presented in Section 8.22 of the Caltrans BDS (Caltrans, 2003b).

5.4 Selection of Wall Types

Pertinent details of the retaining walls have been presented earlier in Table 1-1. Except for a Caltrans Standard Type-1 wall on spread footing (i.e. Wall 224), all the remaining wall type is MSE wall. MSE walls were selected based on the following project constraints:

- Pile driving is not allowed due to noise and vibration concerns,
- Tight construction schedule allowing only a 6-month± window for approach embankment construction at some locations per Project Civil Designers,
- Long-term and relatively large settlement is anticipated due to presence of saturated and compressible soils, and
- Construction costs.

MSE walls were also selected because of their ability to tolerate relatively large settlements (Berg et al., 2009). According to AASHTO (2007), MSE wall with welded wire mat reinforcements connected to 5 feet x 5 feet precast wall panels (similar to those shown on the

Caltrans XS-Sheets for MSE walls) can tolerate differential settlements of 1/100 to 1/300 depending on the joint width. For larger settlements and angular distortions, MSE wall using geosynthetic reinforcements or wired mesh looped around the wall face can be used. This loop-around reinforcement system can tolerate larger movements because a full-height precast concrete panel or shotcrete facing is usually constructed after completion of the soil settlement. Berg et al. (2009) and AASHTO (2007) indicate this type of MSE wall system can tolerate a differential settlement of 1/50.

Based on the above settlement criteria, MSE walls using the loop-around geosynthetic reinforcement are recommended for Walls 18 and 19, where relatively large differential settlement could occur; conventional Caltrans-type MSE walls (with welded wire mat reinforcement) are recommended for the remaining MSE walls. We also recommend using "Slip Joints" for the welded wired mat walls.

5.5 Foundation Design for MSE Walls

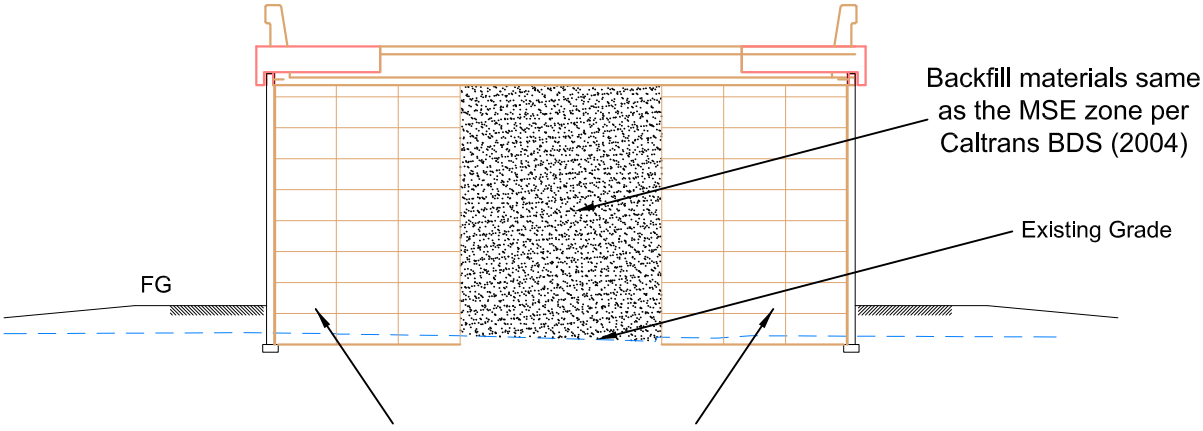
Caltrans MSE Walls: Per Caltrans policy, Caltrans MSE walls should be designed based on the Load and Resistant Factor Design (LRFD) guidelines provided in AASHTO (2007). We recommend a friction angle of 34° and zero cohesion for the reinforced earth zone retained within the full width of the MSE wall according to Section 5.9.2 of the Caltrans BDS (Caltrans, 2004). The corresponding gradation requirements and property requirements are listed in Section 5.9.3 of the Caltrans BDS (Caltrans, 2004). The MSE wall base should be embedded a minimum depth of 0.1H (where H = height of wall in feet), but no less than 2 feet, below the lowest adjacent grade. A minimum horizontal berm width of 0.1H, but no less than 4 feet, should also be provided in front of MSE walls founded on slopes (if applicable) per Section 5.9.1 of the Caltrans BDS (Caltrans, 2004).

Loop-Around Geosynthetic Walls: This wall type has been used by other DOTs, and most of the MSE wall vendors are capable of providing the materials, and design and construction supports. Therefore, this is not a proprietary wall system. We can utilize as much as possible existing Caltrans SSPs for the geosynthetic reinforcement and backfill material requirements.

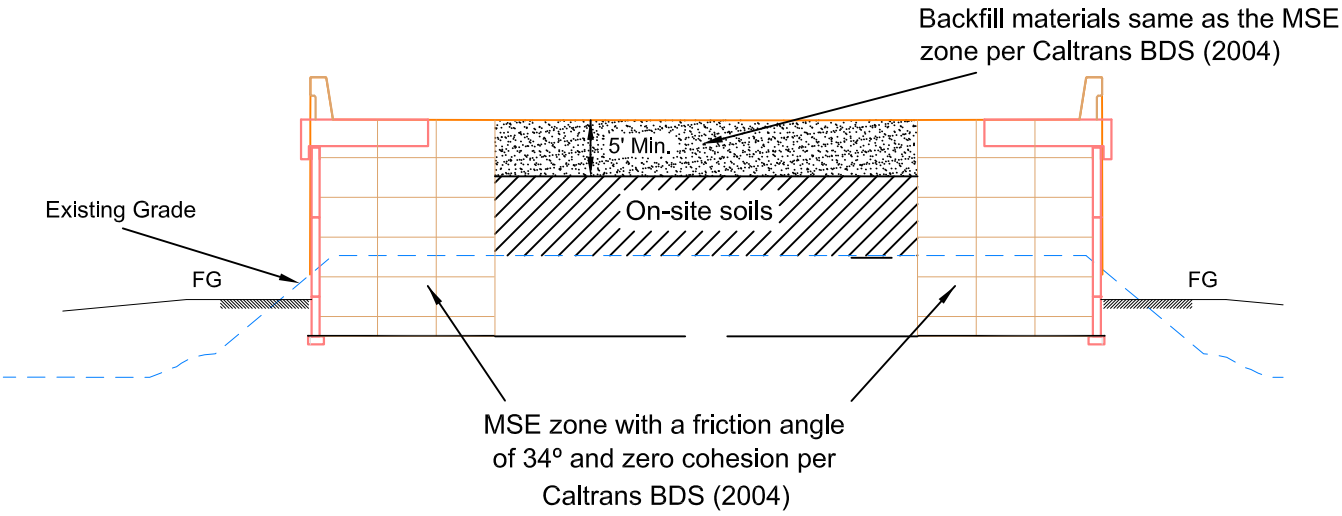
MSE Wall Backfill: For both of the above wall types, the width of the embankments confined by the MSE walls varies from about 50 to 67 feet. MSE wall backfill configuration is shown in Figure 5-1.

At wall locations where there are no existing embankment fills (such as Wall 18 between Stations 21+86 and 22+39, "A" Line), we recommend using the MSE backfill materials per Section 5.9.3 of the Caltrans BDS (Caltrans, 2004) for the entire new fill embankment (See Figure 5-1A). This requirement should reduce differential settlement within the new embankment. This is because the entire new embankment, constructed using MSE backfill materials, will behave as one unit and will tend to settle uniformly. Since this recommendation is applicable to a small portion (i.e., about 55 feet long) of Walls 18 and 19, the added cost is expected to be insignificant. The backfill materials should be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216.

(A) MSE WALL ADJACENT TO NEW ROADWAY EMBANKMENT



(B) MSE WALL ADJACENT TO EXISTING ROADWAY EMBANKMENT



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MSE Wall Backfill Configuration

Figure 5-1

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At other MSE wall locations where the MSE wall retains a sliver widening of an existing embankment and new embankment fill is also placed to raise the existing profile (See Figure 5-1B), settlement should be less and a different configuration can be used to backfill the zone in-between the MSE wall reinforcement (See Figure 5-1B). As shown in Figure 5-1B, the top 5 feet (minimum) of the embankment should consist of the same material as the MSE wall backfill per Section 5.9.3 of the Caltrans BDS (Caltrans, 2004) in order to provide a uniform subgrade for paving.

5.5.1 Bearing Pressures

Maximum bearing pressures exerted by the MSE soil mass were computed by the structural designers and provided in Table 5-2.

Table 5-2. Summary of Maximum Bearing Pressures for MSE Walls

Wall Height (feet)	Base Width (feet)	Maximum Bearing Pressures (ksf)		
		Service-I Limit State	Strength Limit State	Extreme Event Limit State
5	8	1.4	1.9	1.5
7.5	8	1.9	2.5	2.0
10	9	2.4	3.2	2.8
12.5	11	2.8	3.8	3.5
15	13	3.2	4.3	4.2
17.5	14	3.7	5.0	5.3
20	16	4.1	5.5	6.0
22.5	16	4.6	6.2	7.0

5.5.2 Soil Bearing Capacity and Settlement

Per Caltrans LRFD design guidelines provided in the latest Caltrans Memo To Designers (Caltrans, 2008), the Service-I Limit State bearing pressures must be less than the allowable bearing capacity of the foundation soils; the Service-I Limit State bearing pressures were also used to determine the anticipated settlement of the MSE walls. The Strength Limit State and Extreme Event Limit State bearing pressures were used to compare with the factored bearing capacity and ultimate bearing capacity of the foundation soils, respectively. Foundation design recommendations for MSE walls are presented in Table 5-3. Settlement and bearing capacity calculations are included in Appendix C. Due to the presence of compressible soils, remedial removal and recompaction of the soils immediately below the MSE wall base is recommended. As shown in Table 5-3, the soil bearing capacity is larger than the bearing pressures of Table 5-2.

Table 5-3. Foundation Design Recommendations for MSE Walls

Wall No.	Maximum Wall Height (feet)	Maximum Base Width (feet)	Bottom of Footing El. (feet)	Min. Footing Embed. Depth (feet)	LRFD		
					Service	Strength	Extreme Event
					Permissible Net Contact Stress (ksf)	Factored Gross Nominal Bearing Resistance (ksf)	Factored Gross Nominal Bearing Resistance (ksf)
17	20	16	+12.91 to +15.41	2.50	4.2	5.7	12.6
18 & 19	20 and 22.5	16 and 27 [1]	+15.00 to +17.91	2.75	4.7	6.4	14.3
26	15	13	+19.54	2.50	3.3	4.4	9.8
28 & 29	15 and 17.5	13 and 14	+22.44 to +27.44	2.50	4.2	5.7	12.7
228 & 230	12.5 and 17.5	11 and 14	+20.70 to +23.50	2.50	3.8	5.2	11.5

[1] *Based on the plans, a 6.5-foot wide pedestrian ramp is proposed adjacent to Wall 19; thus the base width of Wall 19 is increased.*

Minimum overexcavation depth and resulting settlement for each MSE wall are presented in Table 5-4. Horizontal extents of the overexcavation, and backfill and recompaction requirements are described later in Section 5.7. The MSE reinforcement type: welded wire mat (similar to those shown on Caltrans XS-Sheets for MSE walls) and geosynthetic loop around (with precast wall panels constructed after settlement is complete) are also listed in Table 5-4.

The overexcavation depth was limited to 3 feet below the MSE wall base in order to maintain a reasonable separation from the relatively shallow groundwater depth at some wall locations. It should be noted that an overexcavation depth of 3 feet (measured from the MSE wall base) is actually a minimum of 5 feet below the lowest adjacent finished grade because the minimum wall base embedment is at least 2 feet below the lowest adjacent finished grade (Caltrans BDS, 2004). Due to the limitation on the overexcavation depth, the MSE soil mass and wall panel for each wall will settle by the amounts indicated in Table 5-4.

A deeper overexcavation depth will reduce settlement and settlement period, but there is the potential for the need to handle "wet" subgrades if a deeper excavation depth is recommended, and processing of wet subgrades could add time and cost to the project. In addition, this project has limited right-of-way (horizontal clearance) and vertical clearance in some areas due to the construction staging for replacement of the two existing overcrossings. The construction zone is also congested with criss-crossing overheads and buried utilities and drainage lines. A deeper excavation depth will likely require shoring or the earthwork footprint will increase if no shoring is used; either way, it adds cost and construction time to the project. Further, it should be noted that a deeper overexcavation depth will not lower the settlement estimate by a considerable amount since soil settlement influence zone is deep due to the large footprint of the embankment. For example, if we perform a 3-foot deep overexcavation for Walls 18 and 19, the calculated settlement would be about 5.8 inches (see Table 5-4); a 5-foot deep overexcavation would result in a settlement estimate of about 5.2 inches; and a 7-foot deep overexcavation would result in a

settlement estimate of 4.6 inches. Therefore, a much deeper overexcavation of 7 feet will only lower the settlement estimate by less than 2 inches. Settlement calculations are included in Appendix C.

Table 5-4. Recommended Minimum Overexcavation Depths and Calculated Settlement for MSE Walls

Wall No	MSE Reinforcement Type	Wall Height (feet)	Minimum Overexcavation Depth Below MSE Wall Base (feet)	Calculated Settlement Without Overexcavation (inch)	Calculated Settlement With Overexcavation (inch)
17	Welded Wire Mat	10	3	2.6	2.2
		12.5 and 15	3	2.9	2.5
		17.5 and 20	3	3.8	3.0
18	Geosynthetic Loop Around	7.5	3	2.3	2.0
		10 and 12.5	3	2.6	2.3
		15	3	3.3	3.0
		17.5 and 20	3	6.7	5.8
19	Geosynthetic Loop Around	7.5	3	2.3	2.0
		10	3	2.9	2.6
		15	3	3.2	2.9
		17.5 and 22.5	3	6.7	5.8
26	Welded Wire Mat	12.5 and 15	3	3.3	2.9
28	Welded Wire Mat	7.5	3	3.5	3.0
		10	3	3.5	3.0
		12.5 and 15	3	3.3	2.9
29	Welded Wire Mat	7.5	3	3.5	3.0
		12.5 and 17.5	3	3.3	2.9
228 & 230	Welded Wire Mat	7.5	3	3.4	2.6
		10	3	3.9	3.0
		12.5 to 17.5	3	4.0	3.0

Allowable Settlement and Distortion: As shown in Table 5-4, the calculated settlement (with remedial overexcavation and recompaction) is 3 inches or less, except the calculated maximum settlement for Walls 18 and 19 is less than 6 inches. Walls 18 and 19 will be constructed using the geosynthetic loop around reinforcement with precast wall panels constructed after settlement is complete. This wall type, if constructed properly, should be able to accommodate the anticipated soil settlement. Per FHWA (Berg et al., 2009), the allowable distortion for MSE walls with geosynthetic loop around reinforcement is 1/50.

There are no published guidelines for allowable settlement for Caltrans MSE walls. AASHTO (2007) allows a distortion of 1/100 for a Caltrans MSE wall with a typical joint width of ¾-inch, and this allowable distortion should be larger because we recommend using "slip joints" for this

wall type. However, distortion is difficult to use in actual design because the subsurface stratigraphy and soil properties are usually not uniform along the wall length, and potential localized distortion due to non-uniform subsurface conditions would be difficult to captured in-between soil boring locations. AASHTO (2007) does provide a 2-inch allowable settlement for MSE wall constructed with full-high precast panels. So, the Caltrans MSE walls can be designed for settlements larger than 2 inches because the Caltrans MSE walls use segmental rather than full-high panels. Based on the above information, we settled on using an allowable settlement of 3 inches, which is one inch more than what AASHTO recommends for full-height wall panels.

In addition to limiting the allowable settlement of 3 inches for Caltrans MSE walls with slip joints, the calculated distortions (obtained using the results in Table 5-4 and the wall lengths provided in the wall plans) were compared with the allowable distortions of 1/100 for Caltrans MSE walls and 1/50 for geosynthetic loop around walls. Results of the comparison show the calculated distortions are within the above tolerable limits.

It should be noted that an allowable settlement of 3 inches is considerably larger than most structural foundations for transportation facilities which are generally designed for an allowable settlement of 1-inch or less. However, it is well documented and widely recognized that MSE walls are used to accommodate large settlements. Nevertheless, we recommend close monitoring of the MSE wall construction with strict adherence to Contract Plans and Specifications. Geotechnical consultant should be contacted immediately if any unusual conditions occur in the field. In addition, we do not recommend the use of elaborated aesthetic on the wall panel face because any special aesthetic designs could require a more stringent settlement criterion.

Sliding Stability: A friction coefficient of 0.35 is recommended for checking the sliding stability of the MSE wall.

Bearing Capacity of Leveling Pad: After the overexcavation and recompaction (See Table 5-4) is implemented, the allowable bearing capacity of the leveling pad footing supporting the MSE wall panels is 1.5 ksf provided the width of the pad is at least 1 feet and the embedment (measured from the lowest adjacent grad) is at least 2 feet.

5.5.3 Settlement Period and Monitoring

Calculated minimum settlement periods are presented in Table 5-5. As shown in Table 5-5, the minimum settlement period for Walls 18 and 19 is 9 months. This settlement period can be reduced to:

- 6.5 months if the remaining (long-term) settlement is increased from ½ inch to 1 inch, or
- 6 months if a 5-foot surcharge (above the finished grade) is used.

The surcharge should be placed in such a way that the top of the surcharge covers the entire footprint of the roadway embankment so that the effect of the surcharge is fully felt by the effected underlying soils. This can be accomplished by using a sloping backfill with the top of slope directly above the wall layout line, then sloping down until the toe of the slope matches the finished grade at the lower end of the retaining wall. The vertical distance between the top of slope and the wall layout line is also the thickness of the recommended surcharge.

In addition, due to constraints of the construction staging, wick drains are proposed to accelerate the settlement period at Walls 228 and 230 and the abutment of the 29th Avenue Off-Ramp bridge (URS, 2011b). Per URS, the feasibility and effectiveness of using wick drains in the soil conditions present at this site was confirmed with a specialty wick drain installation contractor. The wick drain design calculation and memorandum are included in Appendix C. These documents were prepared by Mr. Robert Goughnour, a specialist in wick drain design and construction. Mr. Goughnour is a consultant for Hayward-Baker and the author of the computer program PVDRAIN which was used for the wick drain design on this project.

The recommended wick drains layout is 3 feet on-center spacing down to a depth of 37.5 feet. The footprint of the wick drain installation area should extend a minimum of 10 feet from: (1) the outside edge of MSE Walls 228 and 230 in south and north sides, respectively; (2) the face of the 29th Avenue Off-Ramp bridge abutment in the west side; and (3) an imaginary line joining the "Beginning" of the MSE Wall 228 and "Beginning" of MSE Wall 230 in the east side. An 8-foot high surcharge shall be installed at the high end of the embankment (adjacent to the bridge abutment) and the height of surcharge can gradually reduce to 1 foot at the low end of the embankment (i.e., eastern limit of the wick drain installation area). With this wick drain and surcharge loading plan, the calculated settlement period can be reduced to about 30 days.

Table 5-5. Recommended Minimum Settlement Periods for MSE Walls

Wall No.	MSE Reinforcement Type	Calculated Maximum Settlement With Overexcavation (inch)	Minimum Settlement Period (month)	Estimated Remaining Settlement (inch)
17	Welded Wire Mat	3.0	6	0.5
18 & 19	Geosynthetic Loop Around	5.8	9	0.5
26	Welded Wire Mat	2.9	6	0.5
28 & 29	Welded Wire Mat	3.0	4	0.5
228 & 230	Welded Wire Mat	3.0	5	0.5

Based on our experience, calculated settlement periods are approximations of actual field observations. Therefore, the minimum settlement periods presented in Table 5-5 is for estimating purposes only; actual settlement periods should be based on settlement monitoring.

Settlement monitoring devices shall consist of: (1) "nails" firmly attached to the wall panel for the welded wire mat MSE walls; (2) nails firmly attached onto the geosynthetic surface for the wrap-around walls; and (3) settlement hubs placed at the top of the grading plane or top of surcharge (if used). Special care is needed when attaching the nails so that the wall panel and geosynthetic will not be damaged. These settlement monitoring devices shall be installed as construction of the wall progresses from the wall base up to the top of the finished subgrade.

We recommend placing nails at the bottom panel and at the mid-height of welded wire mat MSE walls. For the wrap-around MSE walls, we recommend placing nails at 2 feet above the lowest adjacent grade and at the mid-height of the wrap-around wall. Settlement hubs should be placed behind the wall layout line at a horizontal distance equal to one-half the MSE wall base. The

recommended horizontal spacing of these settlement monitoring devices are presented in Table 5-6.

Settlement monitoring devices are not shown in Table 5-6 for Walls 228 and 230 because wick drains are recommended at these wall locations, and the types and layout of the settlement monitoring devices are included in the foundation report prepared by URS (2011b). According to URS (2001b), piezometers, settlement hubs and vibrating wire settlement sensors are recommended near the 29th Avenue Off-Ramp bridge abutment, near the ends of Walls 228 and 230 and between the bridge abutment and ends of Walls 228 and 230 (which is roughly at the mid-point along Walls 228 and 230 Layout Line).

Initial reading of each settlement devices should be taken at the time of their installations. Settlement monitoring of each settlement devices should continue as follows: two days after the initial reading, one week after the initial reading, and once during each calendar week for a month, and once during every two calendar weeks thereafter until it has been verified by the Engineer that the remaining settlement for the embankment is acceptable.

For the welded wire mat reinforcement MSE walls, the uppermost level of wall facing, coping, roadway pavement, hardscape, and any other nearby improvements should not be constructed until remaining settlement is with acceptable limits (i.e., ½-inch or less). For the geosynthetic loop around reinforcement MSE walls, the entire wall facing, roadway pavement, hardscape and any other nearby improvements should not be constructed until remaining settlement is within acceptable limits (i.e., ½-inch or less).

Table 5-6. Horizontal Spacing of Settlement Monitoring Devices

Wall No.	Wall Type	Approximate Wall Length (feet)	Maximum Wall Height (feet)	Minimum Set of Settlement Monitoring Devices	Horizontal Spacing of Settlement Devices
17	Welded Wire Mat	159.5	20	2	At maximum height and at 70 feet thereafter
18	Geosynthetic Loop Around	275	20	3	At maximum height and at 100 feet thereafter
19		287.9	22.5	3	At maximum height and at 100 feet thereafter
26	Welded Wire Mat	95	15	2	At maximum height and at 70 feet thereafter
28		150	15	2	At maximum height and at 70 feet thereafter
29		113	17.5	2	At maximum height and at 70 feet thereafter

Note: Each set of monitoring devices consist of two "nails" and one settlement hub.

5.5.4 Drainage

Subdrainage should be provided to avoid accumulation of water within the MSE mass during the life of the structures. Surface drainage should also be provided to collect surface runoff such that surface water will not infiltrate into the MSE mass. Drainage must be shown on plans.

5.6 Foundation Design for Soundwall (SW) 232

As mentioned in Table 1-1, a soundwall (SW) is proposed along East 8th Street, north side of I-880 between 29th and 23rd Avenues. Portions of this wall are proposed to be Soundwall on Retaining Wall Type 7SWBP on piles per Caltrans XS Sheet. Remaining portions of this wall are proposed to be Caltrans Standard Soundwall on Barrier Type 736SV. The soundwall height is 14 feet.

For the portion of this wall that is retaining earth materials, materials placed behind the wall should be Structure Backfill per Section 19-3.06 (Caltrans, 2006). The Structure Backfill requirement should be supplemental to the pervious backfill requirement as described in Caltrans Standard Plans (Caltrans, 2010) and Caltrans Standard Specifications (Caltrans, 2006) under Section 19-3.065. The horizontal limits of the Structure Backfill should begin one-foot from edge of the footing bottom and extending upward at a 45-degree imaginary plane until the plane intersects the ground surface. If the 45-degree imaginary plane intersects temporary shoring, then the horizontal limit can be altered to follow the vertical face of the shoring. Backfill should be placed in loose lifts not exceeding 8 inches in thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. The relative compaction should be based on the maximum density determined by California Test 216. Jetting or flooding to compact backfill is not recommended. Heavy compaction equipment should not be used adjacent to the retaining walls in order to avoid damaging the walls due to large lateral earth pressures.

For the portion of this wall that is retaining earth materials, a static active lateral earth pressure of 36 psf per foot of depth is recommended for a free draining, level and compacted backfill. If applicable, a uniform lateral pressure of at least 72 psf due to vehicle loads, equivalent to a vertical pressure produced by at least 2 feet of earth, should be added to the above lateral earth pressure.

Deep foundation is recommended for the proposed soundwall due to the presence of saturated and compressible soils and relatively high load demands. Both driven piles and drilled shafts are feasible. However, drilled shafts were selected because pile driving is not allowed due to noise and vibration concerns. Per Caltrans policy, the LRFD Service-I Limit State and Strength and Extreme Event Limit State load combinations are used for the design of this soundwall.

5.6.1 SW on Barrier Type 736SV

SW on Barrier Type 736SV is supported on a single row of 24-inch diameter Cast-in-Drilled-Hole (CIDH) piles. The barrier will retain up to 4 feet of soil. Pile-head shear, moment, and axial compression loads for a center-to-center pile spacing of 8 feet were provided by the structural engineers for the LRFD load cases, and these loads are summarized in Table 5-7.

Table 5-7. Summary of Pile Foundation Loads for Soundwall on Barrier Type 736SV

Retained Height, H (feet)	LRFD Load Case	Pile Head Shear (kips)	Pile Head Moment (kip-ft)	Axial Compression (kips)
2	Service-I Limit State	14.0	68.0	27.0
3		16.0	72.0	29.0
4		20.0	85.0	32.0
2	Strength Limit State	15.0	54.0	41.0
3		21.0	62.0	44.0
4		27.0	84.0	48.0
2	Extreme Event Limit State	24.0	192.0	33.0
3		28.0	185.0	35.0
4		33.0	176.0	37.0

To simplify the design, pile loads for the maximum retained height of 4 feet were used in the axial and lateral pile analyses.

Axial Pile Analyses: Axial capacity is estimated using the computer program SHAFT Version 6.0 (Ensoft, 2007) and the soil strength parameters in Table 4-1. Results of the axial pile analysis are included in Appendix C. Pile foundation design recommendations are presented in Table 5-8. The Pile Data Table for the Contract Plans is presented in Table 5-9.

Table 5-8. Pile Foundation Design Recommendations for SW on Barrier Type 736SV

Approx. Sta. (Wall LOL Line)	Pile Type	Pile Cut-off El. (feet)	Service-I Limit State Loads per Pile (kips)	Total Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip El. (feet)	Specified Tip El. (feet)
					Strength Limit		Extreme Event			
					Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)		
10+00 to 10+38	24" CIDH	+17.50 to +19.00	32.0	1	48.0	0	37.0	0	+1 (a-I) +4 (a-II) +1 (a-III) -4 (d)	-4
11+99 to 19+19	24" CIDH	+13.25 to +16.25	32.0	1	48.0	0	37.0	0	-2 (a-I) +1 (a-II) -2 (a-III) -7 (d)	-7

Notes:

1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (a-III) Compression (Service-I Limit), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. There are no design tip elevations for Tension and Tolerable Settlement.
3. The specified tip elevations shall not be raised.

Table 5-9. Pile Data Table for SW on Barrier Type 736SV

Approx. Sta. (Wall LOL Line)	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevation (feet)
		Compression	Tension		
10+00 to 10+38	24" CIDH	70	0	+1 (a) -4 (d)	-4
11+99 to 19+19	24" CIDH	70	0	-2 (a) -7 (d)	-7

Notes:
1. Design tip elevations are controlled by the following demands: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
2. There are no design tip elevations for Tension and Tolerable Settlement.
3. The specified tip elevations shall not be raised.

The maximum pile-head settlement due to the nominal resistances is estimated to be less than 1-inch for a minimum pile length of 12 feet. Therefore, no design pile tip elevation is required for settlement.

The on-center pile spacing is 8 feet. Per Section 10.8.3.6.3 of AASHTO (2007), a pile group efficiency factor (GEF) of 1.0 can be used for the axial capacity calculations. The pile capacity is based on soil resistance only and may be further limited by the pile-head connection details and the strength of the pile materials.

Lateral Pile Analyses: Lateral pile solutions were performed using the computer program LPILE (Ensoft, 2010), the soil strength parameters in Table 4-1, and a combined pile-head shear and overturning moment in Table 5-7. The soil resistance versus pile deflection (p-y) curves for sandy soils were developed using the API criteria (API, 2000), and the p-y curves for clayey soils were developed using the Matlock criteria (1970). A cracked sectional modulus (EI) of the CIDH pile equal to one-half the gross EI was used. Based on an on-center pile spacing of 8 feet, a GEF of 1.0 was used for the lateral pile solutions.

Lateral pile analyses were performed to determine the minimum pile length for allowable pile-head deflection under Service-I Limit State condition, and to size the minimum required pile reinforcement under the larger of the Strength or Extreme Limit State load conditions. Results of the lateral pile analyses in terms of maximum shear, bending moment, and lateral deflection along the pile length for a free-head condition are included in Appendix C. A summary is presented in Table 5-10.

Table 5-10. Lateral Pile Solutions for SW on Barrier Type 736SV

Selected LRFD Case	Maximum Pile-Head Deflection (in)	Maximum Shear (kip)	Depth to Max. Shear from Pile Top (feet)	Maximum Moment (kip-ft)	Depth to Max. Moment from Pile Top (feet)
Service-I Limit State	0.23	22	7.8	123	3.0
Strength Limit State	0.70	41	9.4	262	4.0

5.6.2 SW on Retaining Wall (RW) Type 7SWBP

The majority of this SW on L-shaped retaining wall (RW) is supported on two rows of 24-inch diameter CIDH piles, except between approximate Stations 22+20 and 23+10 (Wall LOL Line). Between this stationing, the SW on RW has to span over a utility corridor and the resulting pile layout is different.

The following sections provide the axial pile demands, the foundation recommendations and pile data table for the SW on RW supported on two rows of piles, followed by the utility corridor segment in Section 5.6.3. The maximum retained height of the wall is 6 feet. Single pile loads are provided by the structural designers and presented in Table 5-11.

Table 5-11. Summary of Pile Foundation Loads for SW on Type 7SWBP

Retained Height, H (feet)	LRFD Load Case	Pile Head Shear (kips)	Compression (kips)	Tension (kips)
5	Service-I Limit State	25.0	65.0	0
6		26.0	78.0	0
5	Strength Limit State	27.0	90.0	22.0
6		35.0	106.0	28.0
5	Extreme Event Limit State	30.0	81.0	53.0
6		38.0	97.0	71.0

Pile foundation loads for the maximum retained height of 6 feet were used in the axial and lateral pile analyses.

Axial Pile Analyses: Results of the axial pile analysis are included in Appendix C. Pile foundation design recommendations are presented in Table 5-12. The Pile Data Table for the Contract Plans is presented in Table 5-13.

Based on the pile layout provided by the structural designers, GEF's of 0.8 was used for the analysis. The pile capacity is based on soil resistance only and may be further limited by the pile-head connection details and the strength of the pile materials.

Table 5-12. Pile Foundation Design Recommendations for SW on Type 7SWBP

Approx. Sta. (Wall LOL Line)	Pile Type	Cut-off El. (feet)	Service-I Limit State Loads per Pile (kips)	Total Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip El. (feet)	Specified Tip El. (feet)
					Strength Limit		Extreme Event			
					Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)		
10+38 to 11+99	24" CIDH	+11.25	78.0	1	106.0	0	97.0	71.0	-19 (a-I) -14 (a-II) -20 (a-III) -14 (b-II) -9 (d)	-20
19+19 to 22+20 and 23+10 to 26+19	24" CIDH	+9.00 to +10.00	78.0	1	106.0	0	97.0	71.0	-22 (a-I) -17 (a-II) -23 (a-III) -17 (b-II) -12 (d)	-23

Notes:
1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (a-III) Compression (Service-I Limit), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. There is no design tip elevation for Tolerable Settlement.
3. The specified tip elevation shall not be raised.

Table 5-13. Pile Data Table for SW on Type 7SWBP

Approx. Sta. (Wall LOL Line)	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevation (feet)
		Compression	Tension		
10+38 to 11+99	24" CIDH	160	80	-20 (a) -14 (b) -9 (d)	-20
19+19 to 22+20 and 23+10 to 26+19	24" CIDH	160	80	-23 (a) -17 (b) -12 (d)	-23

Notes:
1. Design tip elevations are controlled by the following demands: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
2. There is no design tip elevation for Tolerable Settlement.
3. The specified tip elevation shall not be raised.

The maximum pile-head settlement due to the nominal resistances is estimated to be less than 1-inch for a minimum pile length of 12 feet. Therefore, no design pile tip elevation is required for settlement.

Lateral Pile Analyses: Lateral pile solutions were performed using the computer program LPILE (Ensoft, 2010), the soil strength parameters in Table 4-1, and the pile-head shear in Table 5-11. The soil resistance versus pile deflection (p-y) curves for sandy soils were developed using the API criteria (API, 2000), and the p-y curves for clayey soils were developed using the Matlock criteria (1970). A cracked sectional modulus (EI) of the CIDH pile equal to one-half the gross EI was used. Based on the pile layout provided by the structural designers, a GEF of 0.77 was used for the lateral pile solutions.

Lateral pile analyses were performed to determine the minimum pile length for allowable pile-head deflection under Service-I Limit State condition, and to size the minimum required pile reinforcement under the larger of the Strength or Extreme Limit State load conditions. Results of the lateral pile analyses in terms of maximum shear, bending moment, and lateral deflection along the pile length for a free-head condition are included in Appendix C. A summary is presented in Table 5-14.

Table 5-14. Lateral Pile Solutions for SW on RW Type 7SWBP

Selected LRFD Case	Maximum Pile-Head Deflection (in)	Maximum Shear (kip)	Depth to Max. Shear from Pile Top (feet)	Maximum Moment (kip-ft)	Depth to Max. Moment from Pile Top (feet)
Service-I Limit State	0.13	26	0.0	64	4.8
Strength Limit State	0.45	50	0.0	150	5.8

5.6.3 SW on RW Type 7SWBP (Utility Corridor)

Based on the latest plans provided by the designers, a utility corridor is located across the SW No. 232 between approximate Sta. 22+20 and 23+10 (Wall LOL Line). Single pile loads for this utility corridor segment are provided by the structural designers and presented in Table 5-15.

Table 5-15. Summary of Pile Foundation Loads for SW on 7SWBP (Utility Corridor)

LRFD Load Case	Pile Head Shear (kips)	Compression (kips)	Tension (kips)
Service-I Limit State	28.0	140.0	0
Strength Limit State	39.0	185.0	0
Extreme Event Limit State	38.0	124.0	28.0

Results of the axial pile analysis are included in Appendix C. Pile foundation design recommendations are presented in Table 5-16. The Pile Data Table for the Contract Plans is presented in Table 5-17.

Based on the pile layout provided by the structural designers, GEF's of 0.8 was used for the analysis. The pile capacity is based on soil resistance only and may be further limited by the pile-head connection details and the strength of the pile materials.

Table 5-16. Pile Foundation Design Recommendations for SW on 7SWBP (Utility Corridor)

Approx. Sta. (Wall LOL Line)	Pile Type	Cut-off El. (feet)	Service-I Limit State Loads per Pile (kips)	Total Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip El. (feet)	Specified Tip El. (feet)
					Strength Limit		Extreme Event			
					Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)		
22+20 to 23+10	24" CIDH	+9.0	140.0	1	185.0	0	124.0	28.0	-36.5 (a-I) -18.5 (a-II) -37.5 (a-III) -8.5 (b-II) -26 (c) -11 (d)	-37.5

Notes:
1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (a-III) Compression (Service-I Limit), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. The specified tip elevation shall not be raised.

Table 5-17. Pile Data Table for SW on Type 7SWBP (Utility Corridor)

Approx. Sta. (Wall LOL Line)	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevation (feet)
		Compression	Tension		
22+20 to 23+10	24" CIDH	280	30	-37.5 (a) -8.5 (b) -26 (c) -11 (d)	-37.5

Notes:
1. Design tip elevations are controlled by the following demands: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
2. The specified tip elevation shall not be raised.

Lateral Pile Analyses: Lateral pile solutions were performed using the computer program LPILE (Ensoft, 2010), the soil strength parameters in Table 4-1, and the pile-head shear in Table 5-15. The soil resistance versus pile deflection (p-y) curves for sandy soils were developed using the API criteria (API, 2000), and the p-y curves for clayey soils were developed using the Matlock criteria (1970). A cracked sectional modulus (EI) of the CIDH pile equal to one-half the gross EI was used. Based on the pile layout provided by the structural designers, a GEF of 0.77 was used for the lateral pile solutions.

Lateral pile analyses were performed to determine the minimum pile length for allowable pile-head deflection under Service-I Limit State condition, and to size the minimum required pile reinforcement under the larger of the Strength or Extreme Limit State load conditions. Results of the lateral pile analyses in terms of maximum shear, bending moment, and lateral deflection along the pile length for a free-head condition are included in Appendix C. A summary is presented in Table 5-18.

Table 5-18. Lateral Pile Solutions for SW Type 7SWBP (Utility Corridor)

Selected LRFD Case	Maximum Pile-Head Deflection (in)	Maximum Shear (kip)	Depth to Max. Shear from Pile Top (feet)	Maximum Moment (kip-ft)	Depth to Max. Moment from Pile Top (feet)
Service-I Limit State	0.17	28	0.0	70	5.0
Strength Limit State	0.67	56	0.0	182	6.4

5.7 Overexcavation at Wall Foundations

Minimum overexcavation depths below the base of the MSE wall have been presented in Table 5-4.

The horizontal limits of the overexcavation should begin one foot from each edge of the footing bottom (or edge of MSE wall base) and extending downward at a 45-degree imaginary plane until the plane intersects the recommended minimum excavation depth presented in Table 5-4 for each wall height. In some areas, the 45-degree imaginary plane would intersect temporary shoring. In this case only, the horizontal limit of the overexcavation should begin from the edge of the footing bottom and extending out a minimum of 1 foot and down until the plane intersects the recommended excavation depths. A sketch showing the limits of the overexcavation is included in Figure 5-2. As shown in Figure 5-2A, MSE walls adjacent to new roadway embankment (for example, a portion of Wall 18 located between Stations 21+86 and Sta. 22+39, "A" Line) require overexcavation across the entire embankment. The remaining MSE walls (for example, Wall 17 that are located adjacent to existing roadway embankment) require overexcavation only below the MSE mass (See Figure 5-2B).

The excavated materials are likely to be fine-grained soils. This material, under normal circumstances, is not suitable for re-use as backfill. However, this excavated material contains aerially deposited lead (Ninyo and Moore, 2009) and must be either capped or transport to a Class-I landfill. Exporting the soils to a Class-I landfill will be cost prohibited. Therefore, we are recommended re-using the excavated soil as backfill below the MSE wall base. The backfill material should be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. The overexcavation bottom should be proof rolled prior to backfilling. Further, the overexcavation bottom should be inspected by a qualified geotechnical engineer or technician to confirm the presence of an unyielding and competent surface.

5.8 Global Stability Analyses

Global stability analyses were performed using the computer program SLIDE 5.0 (Rocscience, 2006) for both static and pseudostatic conditions and the results are presented in Appendix C. The maximum wall heights (H_{max}) at each of the following retaining wall locations were analyzed:

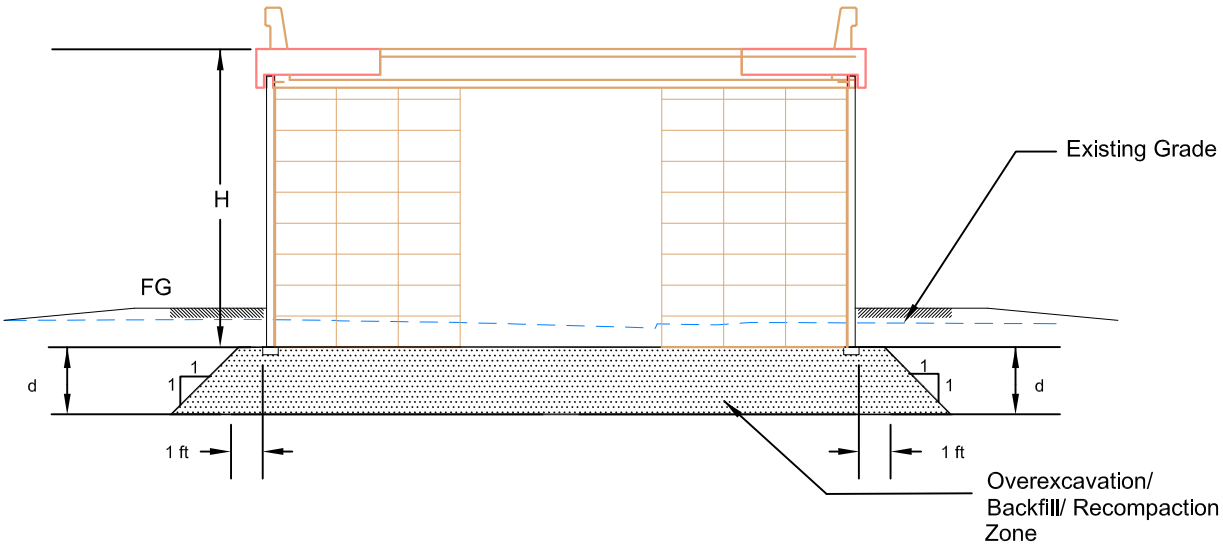
- MSE Wall 17 at about Station 20+15 ("B" Line), H_{max} = 20 feet

- MSE Walls 18 and 19 at about Station 22+28 ("A" Line), H_{max} = 22.5 feet
- MSE Wall 26 at about Station 28+32 ("B" Line), H_{max} = 15 feet
- MSE Walls 28 and 29 at about Station 28+66 ("A" Line), H_{max} = 17.5 feet
- MSE Walls 228 and 230 at about Station 30+25 ("A1" Line), H_{max} = 17.5 feet

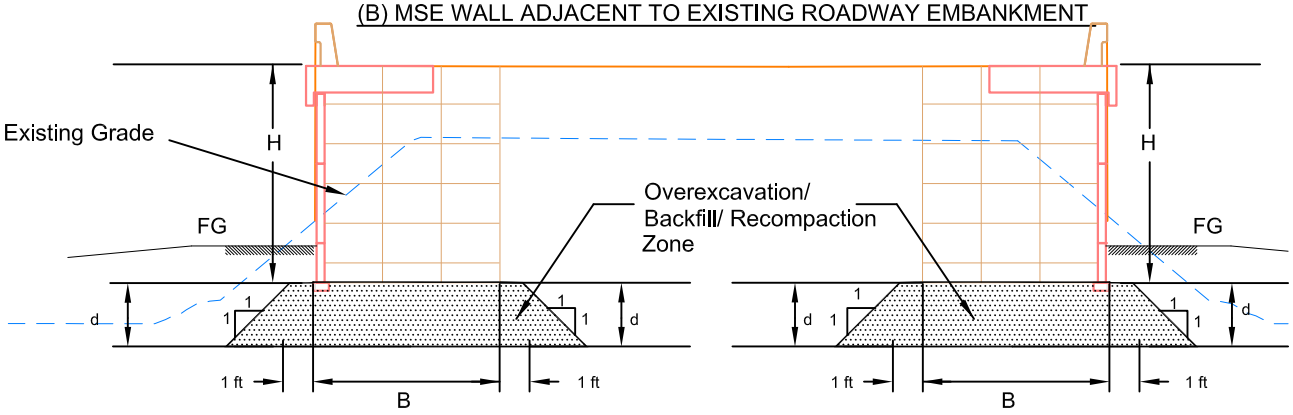
MSE wall backfill has a friction angle of 34°. Shear strengths of existing fill material and in-situ native soils vary and are provided in Table 4-1.

Slope stability analyses were conducted for the static condition including a 2 feet soil surcharge (i.e., 250 psf) to represent traffic loading. Results of the analyses indicate that the global stability for the proposed MSE walls meet the required minimum factor-of-safety of 1.5 for a deep-seated failure. Slope stability analysis under pseudo-static condition was performed using a seismic coefficient equal to 0.2g. Analysis indicates that the calculated factor of safety is greater than the required minimum of 1.1.

(A) MSE WALL ADJACENT TO NEW ROADWAY EMBANKMENT



(B) MSE WALL ADJACENT TO EXISTING ROADWAY EMBANKMENT



Note: The backfill material should be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216.

d = Minimum overexcavation depth below MSE base
(See Table 5-3 for magnitudes of "d").

Earth Mechanics, Inc. Geotechnical & Earthquake Engineering	I-880 Operational and Safety Improvements	
Project No. 10-133 / Date: 01-05-12	Limits of Overexcavation	Figure 5-2

6.0 CONSTRUCTION RECOMMENDATIONS

6.1 Earthwork

Earthwork should be performed in accordance with Caltrans Standard Specifications, Section 19 (Caltrans, 2006). Appropriate measures should be taken to prevent damage to adjacent structures and utilities. Any design and construction of temporary sloping, sheeting, or shoring should be made the contractor's responsibility. It should be noted that it is the responsibility of the contractor to oversee the safety of the workers in the field during construction. The contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented in this section. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

During the recent field investigation conducted between March 28 and April 19, 2011, groundwater was encountered between 7.5 feet and 13.5 feet below the ground surface. Groundwater was also encountered at depths of 11.5 and 17.5 feet below the ground surface in 1993. Based on California Geological Survey (Division of Mines and Geology, 2003), the recorded highest historical groundwater depth varies from about 5 feet to about 10 feet along the project corridor. Using the above groundwater measurements, groundwater may be encountered during footing construction. Groundwater encountered during footing construction should be controlled in accordance with Section 19-3.04 of the Caltrans Standard Specifications (Caltrans, 2006). If wet subgrade conditions are encountered during construction, the soft bottom will require stabilization prior to any earthwork. Subgrade stabilization can be accomplished by using a combination of geotextile, geogrid, gravel, or aggregate base. In addition, low ground pressure earthmoving equipment may be necessary during excavation and relatively lightweight equipment may be needed to compact the select material to minimize the potential for soil pumping.

The MSE backfill and embankment fill should be protected from infiltration of surface water and rainfall during construction. Full or partial saturation of the MSE backfill and embankment fill will increase the bearing pressures which could distress the MSE wall. This recommended protection is of particular importance during the rainy seasonal and during the MSE wall settlement period.

6.2 Pile Construction

Twenty-four-inch diameter CIDH piles will be used to support the soundwalls on barriers and soundwalls on retaining walls located along East 8th Street between 29th Avenue and 23rd Avenue. A wet construction is anticipated for these CIDH piles. As a standard Caltrans practice for wet-constructions, PVC tubings should be installed within the reinforcement cage for gamma-ray testing.

Construction of CIDH piles should follow Section 49-4, "Cast-in-Place Concrete Piles" of the Caltrans Standard Specifications (2006). The Contractor should be required to drill the bottom of the shaft boring with a clean-out bucket to ensure adequate removal of loose soils. Both clean-out and concrete placement should be addressed in the specifications. The shaft borings should

be inspected and approved by the Resident Engineer prior to installation of reinforcement. Per latest Caltrans requirement, 3-inch of concrete cover over reinforcement should be provided to improve construction of the CIDH piles.

Onsite soils are generally fine-grained and contain pockets of granular soils. These granular soils are susceptible to caving. The use of temporary casing is at the contractor's discretion. If a casing is deployed, vibratory and oversized predrilling techniques for casing installation are not allowed. The temporary casing should be placed tight in the borehole. The casing should be pulled as the concrete is being poured while always maintaining at least a 5-foot head of concrete inside the casing. In the event that any boring becomes bell-shaped and cannot be advanced due to severe caving, all loose material should be removed from the bottom of the boring and the caved region filled with a low strength sand-cement slurry. Drilling may continue when the slurry has reached its initial set.

6.3 Review of Construction Plans

Recommendations contained in this report are based on preliminary plans. The geotechnical consultant should review the final construction plans and specifications in order to confirm that the general intent of the recommendations contained in this report have been incorporated into the final construction documents. Recommendations contained in this report may require modification or additional recommendations may be necessary based on the final design.

6.4 Geotechnical Observation and Testing

It is recommended that inspections and testing be performed by the geotechnical consultant during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill
- Shoring installation
- Spread and pile footing excavations and constructions
- Backdrain installation and backfilling of walls
- Removal or installation of support of buried utilities or structures
- When any unusual subsurface conditions are encountered

7.0 LIMITATIONS

This report is intended for the use of Alameda County Transportation Commission (ACTA), RBF Consulting, and Caltrans for the proposed Non-Standard Retaining Walls and Soundwall within the I-880 Operational and Safety Improvements Project. This report is based on the project as described and the information obtained from the exploratory borings and CPT soundings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings and CPT soundings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings and CPT soundings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI has no responsibility for construction means, methods, techniques, sequences, or procedures; for safety precautions or programs in connection with the construction; for the acts or omissions of the CONTRACTOR or any other person performing any of the construction; or for the failure of any worker to carry out the construction in accordance with the Final Construction Drawings and Specifications.

Services performed by EMI have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

8.0 REFERENCES

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Appendix A

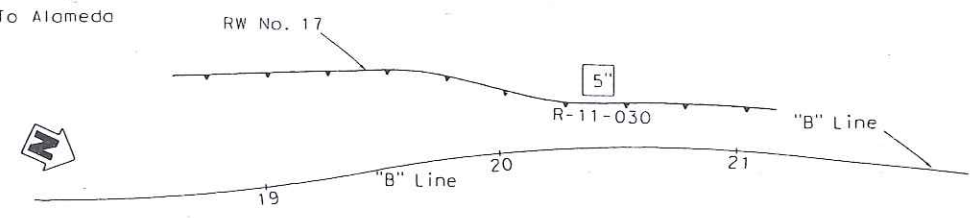
LOG OF TEST BORINGS SHEETS

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.
DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.
DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

L. CHEANG NO. GE 2345 EXP. 9-30-13 REGISTERED PROFESSIONAL ENGINEER GEOTECHNICAL STATE OF CALIFORNIA

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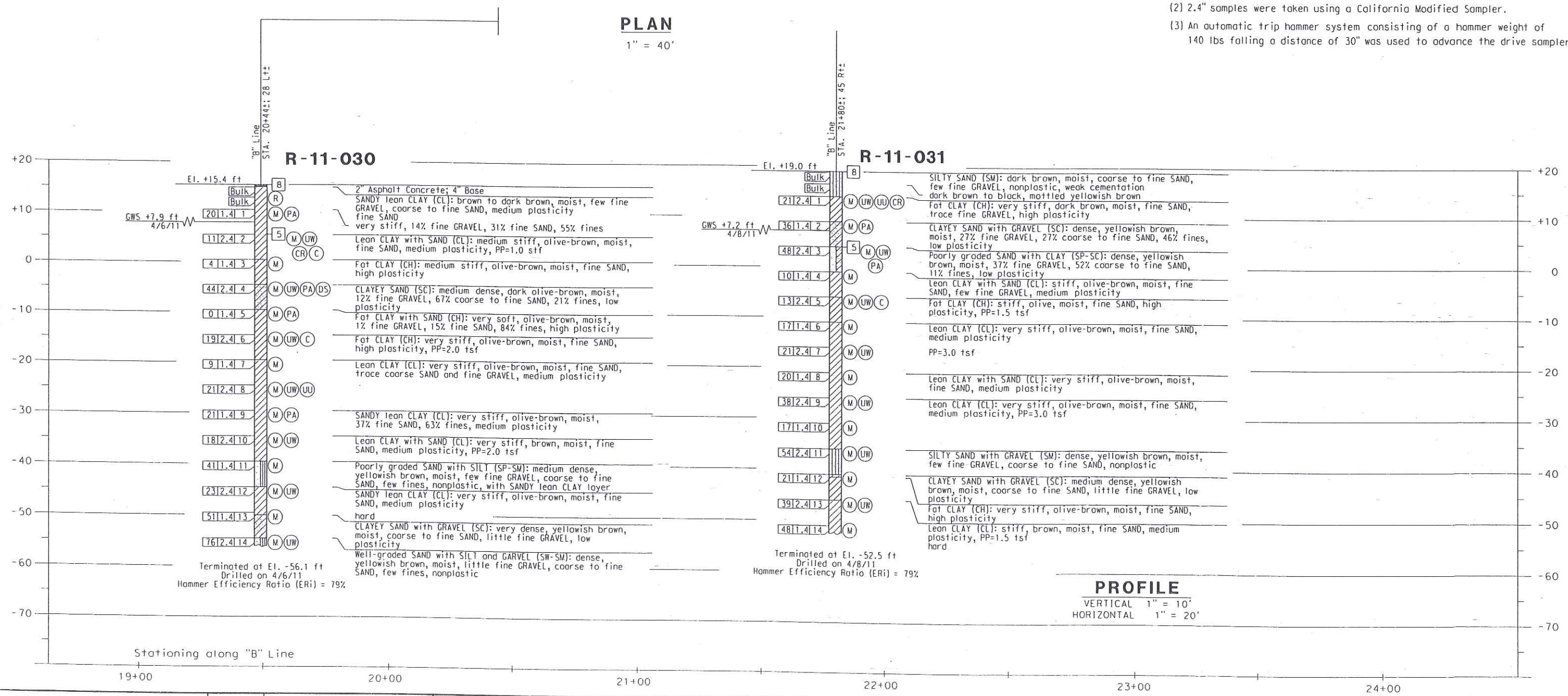
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).
(2) 2.4" samples were taken using a California Modified Sampler.
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

PLAN

1" = 40'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601	POST MILES Varies

RETAINING WALL No. 17

LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

DATE PLOTTED = 6/25/12
FILE PLOTTED AS 8x11

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
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Philip J Meym — REGISTERED CIVIL ENGINEER — 3/30/12 DATE

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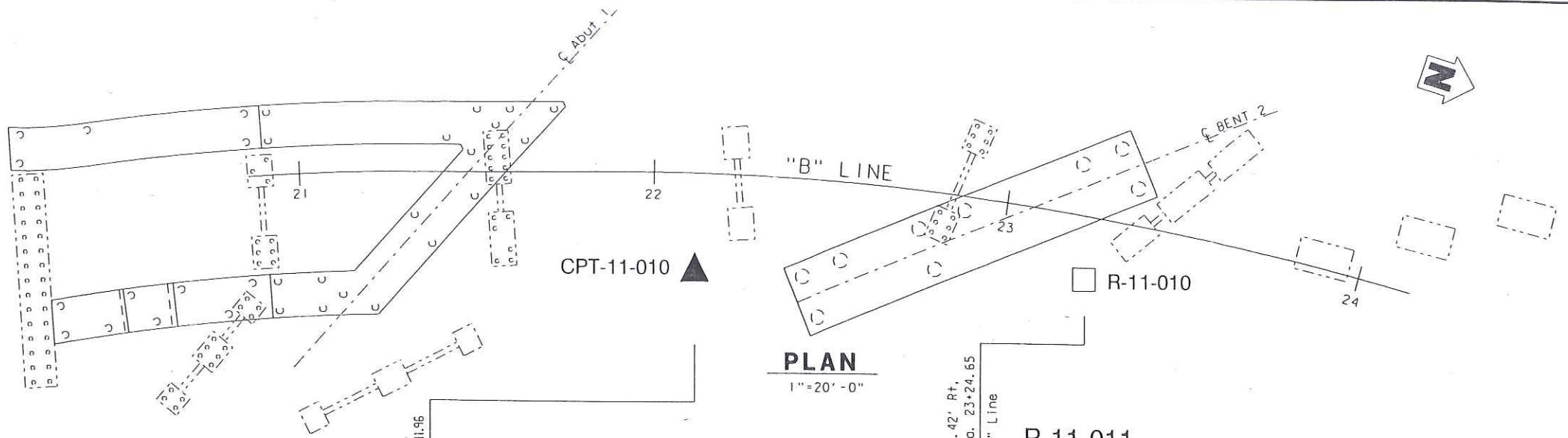
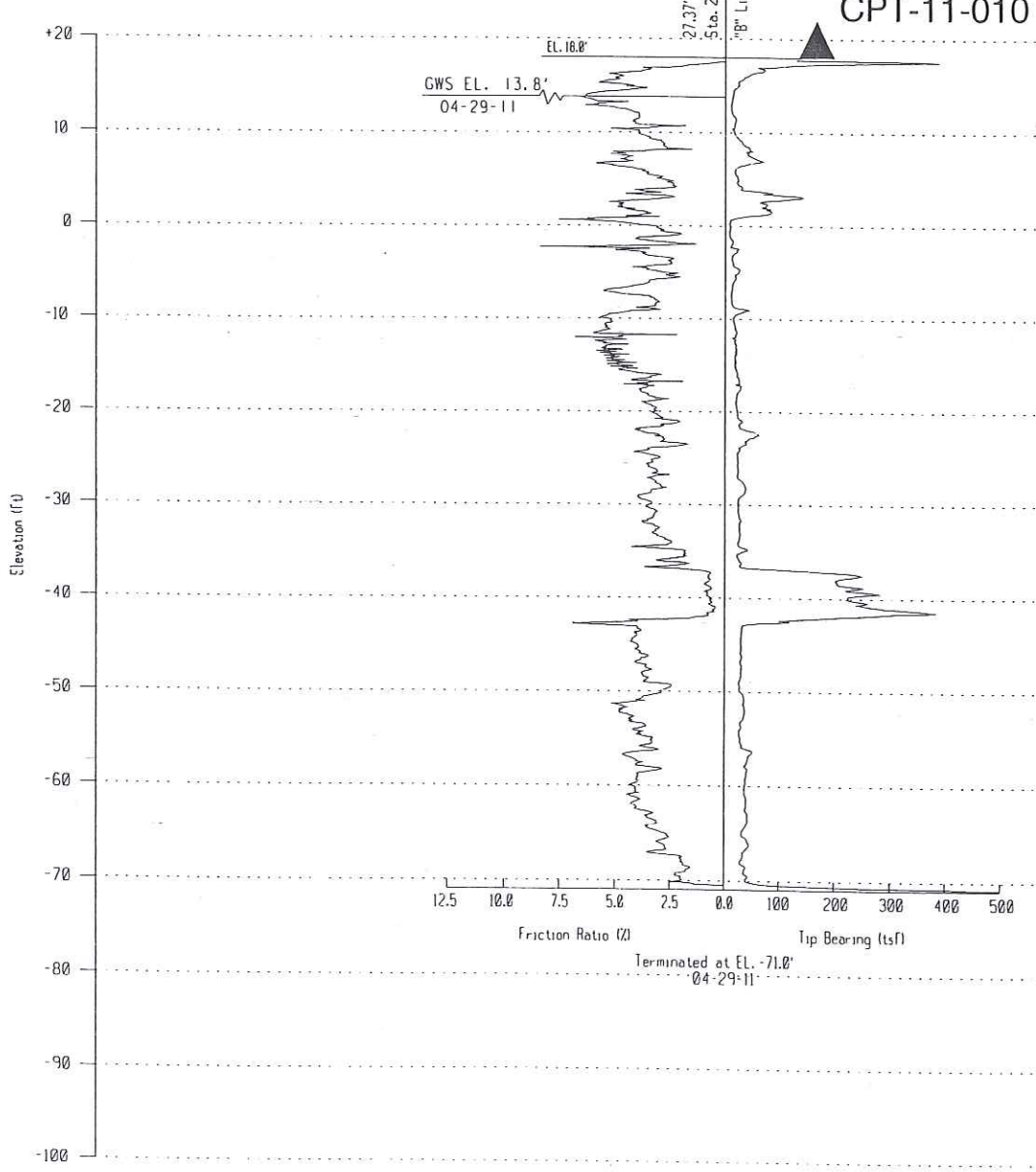
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

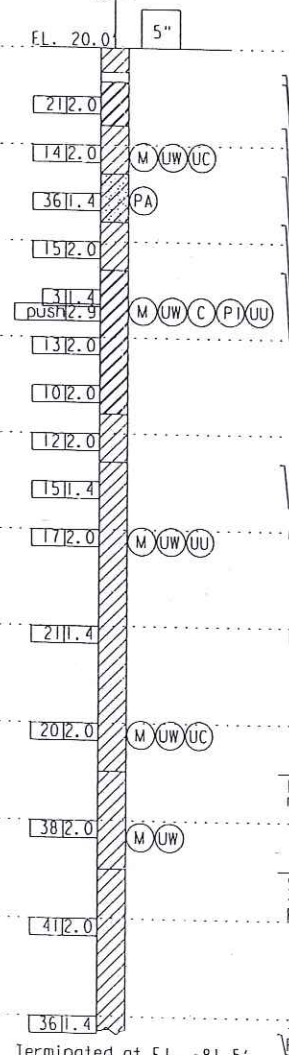


PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.





SANDY lean CLAY with GRAVEL (CL); brown; dry to moist; about 10% COBBLES; about 10% subangular to subrounded GRAVEL, max. 1 in. dia.; about 40% coarse to medium SAND; about 40% medium plasticity fines; subrounded; (FILL).
CONCRETE.
Fat CLAY (CH); very stiff; dark gray; moist; trace fine SAND; medium to high plasticity, very high dry strength fines; Orange and brown mottling; metal debris in hand auger cuttings.
PP=2.25 tsf (ALLUVIUM).
Lean CLAY with SAND (CL); stiff; medium brown; moist; about 25% fine SAND; about 75% low plasticity fines; PP=3.75 tsf.
CLAYEY SAND with GRAVEL (SC); dense; dark brown; moist; about 34% angular to subangular GRAVEL, max. 1 in. dia.; about 49% medium to fine SAND; about 17% low plasticity fines.
Lean CLAY with SAND (CL); stiff; brown; moist; about 10% subangular GRAVEL, max. 1/2 in. dia.; about 25% fine SAND; about 65% low plasticity fines; PP=2.75 tsf.
Fat CLAY (CH); medium stiff; light brown; moist; about 10 to 15% fine SAND; about 80% high plasticity fines; PP=0.75 tsf.
-very stiff; PP=2.50 tsf.
-about 5-10% fine sand; medium to high plasticity fines; PP=2.75 tsf.
-stiff; about 20% fine sand; thin shell lens at 36 ft; PP=1.75 tsf.
SANDY lean CLAY (CL); stiff; medium brown; moist; trace GRAVEL; about 40% fine SAND; about 60% low plasticity fines; shells at 41 ft; depositional transition; sand grain size increasing with depth; PP=1.5 tsf.
Lean CLAY with SAND (CL); stiff; medium brown; moist; about 20% fine SAND; about 80% medium plasticity fines; PP=1.5-2.25 tsf.
-very stiff; PP=2.5 tsf.
PP=3.75 tsf.
-stiff; PP=2.5 tsf.
Lean CLAY (CL); hard; medium brown; moist; trace fine SAND; medium plasticity fines; PP=>4.5 tsf.
SANDY lean CLAY (CL); very stiff; medium brown; moist; about 40% fine SAND; about 60% low to medium plasticity fines; PP=3.5 tsf.
-about 50% fine sand; about 50% medium plasticity fines; PP=2.0 tsf.

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Lino Cheang — CERTIFIED ENGINEERING GEOLOGIST — 6/25/12 DATE

RETAINING WALL No. 17

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	

Sheet | of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 4 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
9-9-11	1-18-12	3-30-12	6-25-12	47	51

DATE PLOTTED = 6-25-12
FILE PLOTTED = ATTHP

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
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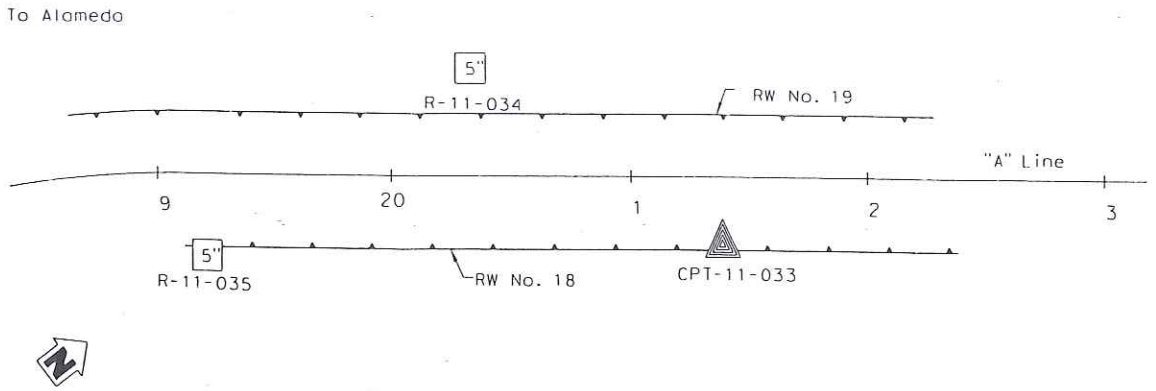

PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/15/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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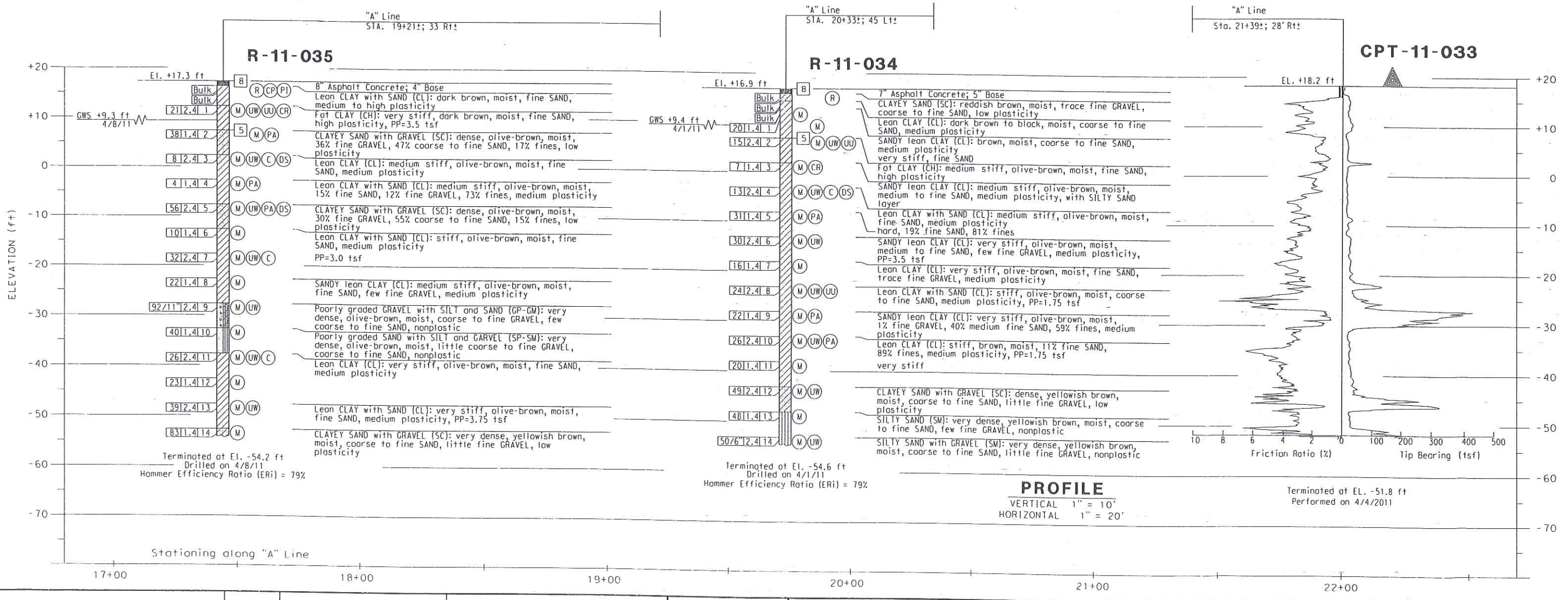

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL No. 18 and 19
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011				POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
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Philip J. Meymand — REGISTERED CIVIL ENGINEER — 6/25/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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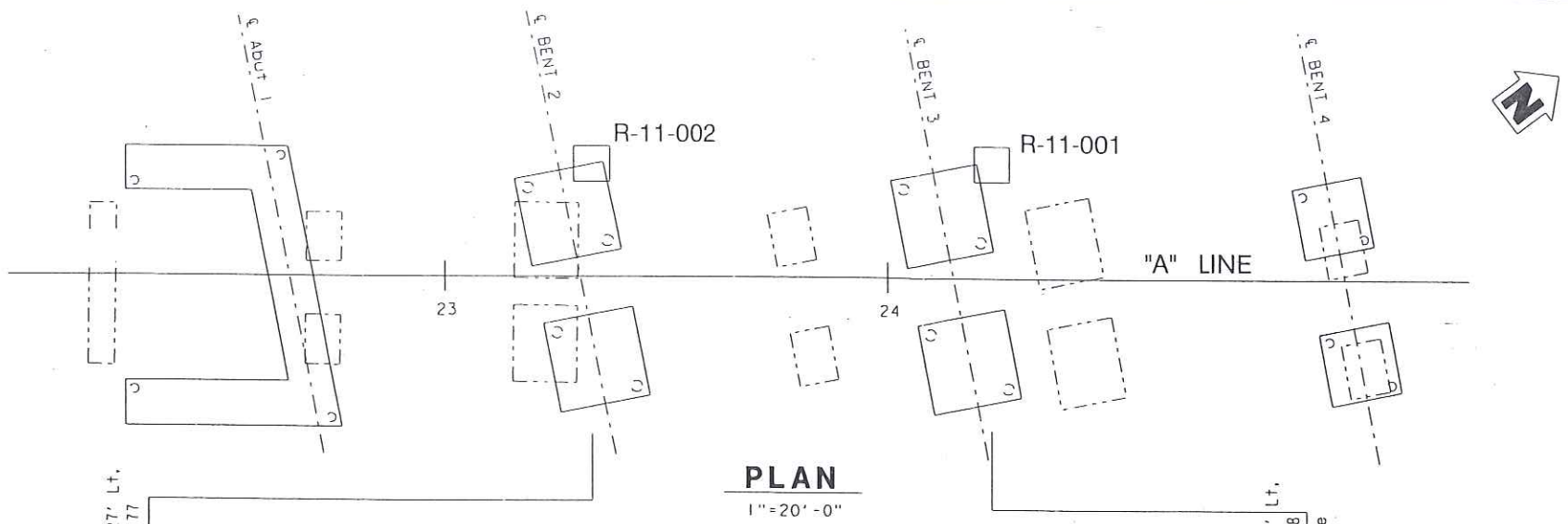

PLAN
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NOTES:

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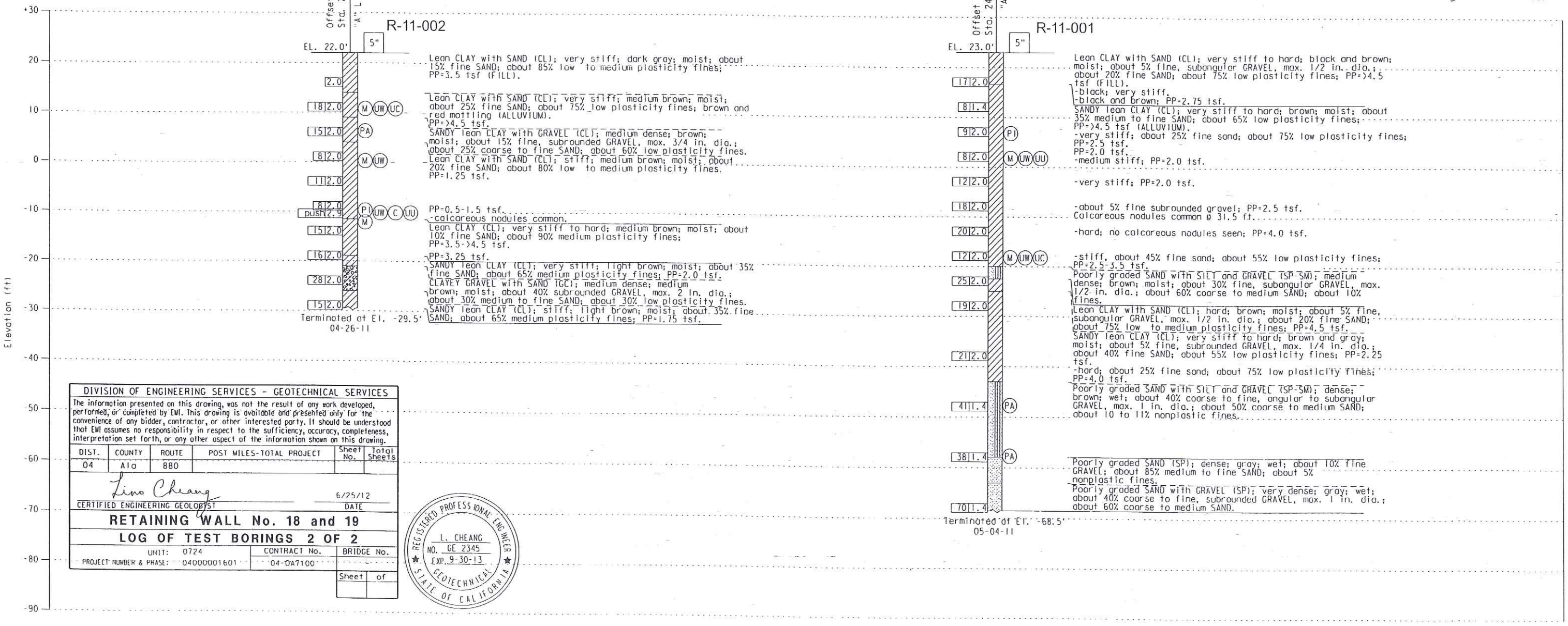

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Alo	880			

Lino Cheang — CERTIFIED ENGINEERING GEOLOGIST — 6/25/12 DATE

RETAINING WALL No. 18 and 19

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	
		Sheet / of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DESIGN OVERSIGHT — SIGN OFF DATE

DRAWN BY: N. HUTTON
CHECKED BY: C. TSAI

S. JANOWSKI
FIELD INVESTIGATION BY:
DATE: 04-25-11 TO 05-04-11

PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Jon Hueser
PROJECT ENGINEER

BRIDGE NO. 33-0751
POST MILES 28.69

29TH AVENUE OC (REPLACE)

LOG OF TEST BORINGS 4 OF 9

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
3-24-11	1-10-12	3-30-12	6-25-12	55	60

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DATE PLOTTED = 25-JUN-2012
TIME PLOTTED = 15:27

BENCH MARK:

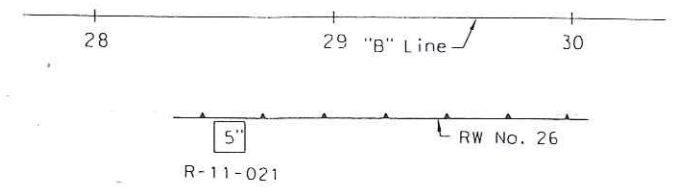
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

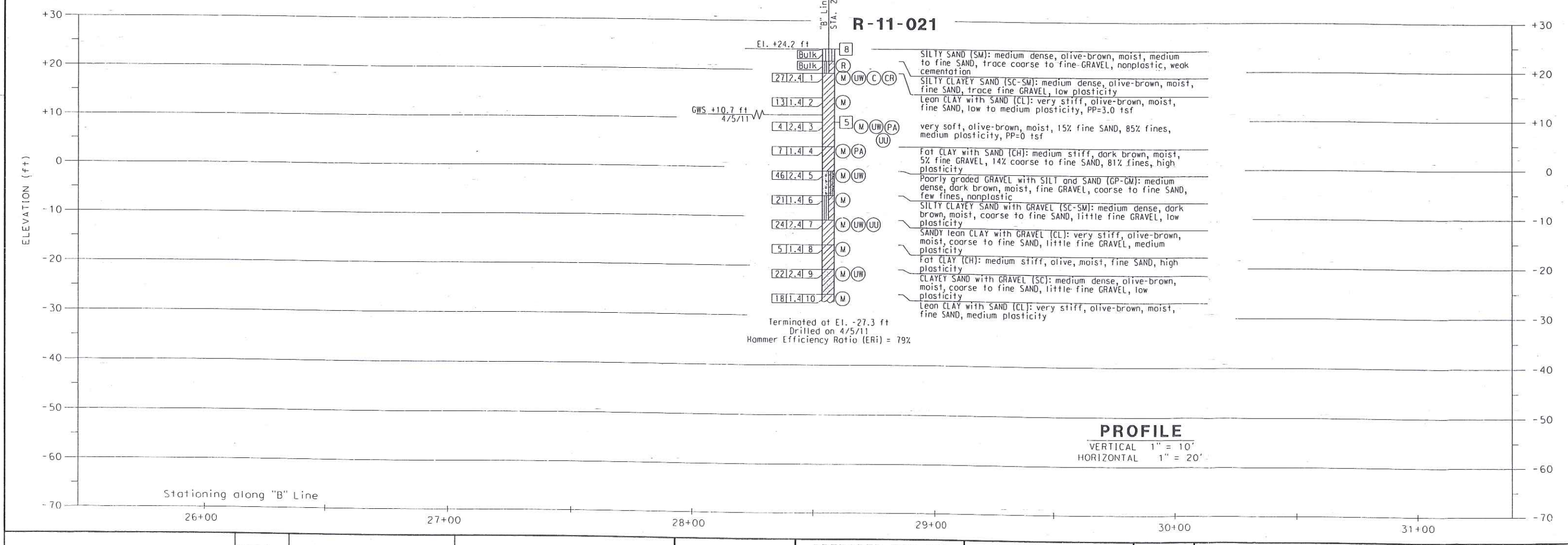
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			PROJECT ENGINEER	POST MILES Varies
GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601	DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES

RETAINING WALL No. 26
LOG OF TEST BORING 1 OF 2

SHEET OF

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
The information presented on this drawing was not the result of any work developed, performed, or completed by EWI. This drawing is available and presented only for the convenience of any bidder, contractor, or other interested party. It should be understood that EWI assumes no responsibility in respect to the sufficiency, accuracy, completeness, interpretation set forth, or any other aspect of the information shown on this drawing.					
DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880			

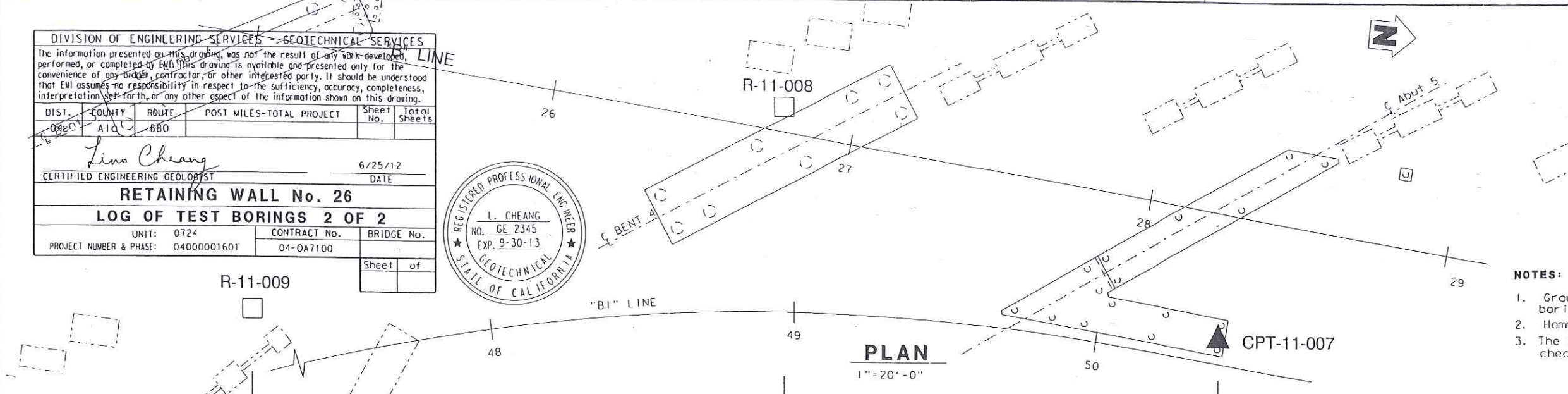
Lino Cheang — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

RETAINING WALL No. 26

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-
		Sheet / of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA



PLAN
1"=20'-0"

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	A10			

Philip J. Meymand — 3/30/12
REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.

R-11-009

88.57' Rt. Sta. 25+14 "B" Line — 5" — EL. 17.0

Elevation (ft)			
16	12.0	M UW UC	Fat CLAY (CH); very stiff; dark gray; dry to moist; about 10% fine SAND; about 90% medium to high plasticity, very high dry strength fines; PP=2.5 tsf (FILL).
22	12.0		SANDY lean CLAY (CL); very stiff; medium to dark brown; dry to moist; about 10% coarse, angular GRAVEL; about 40% medium SAND; about 50% low plasticity fines; PP=3.5 tsf.
18	12.0	M UW UC	SANDY lean CLAY (CL); very stiff; medium brown; moist; about 30% fine SAND; about 70% medium plasticity fines; trace coarse sand; PP=2.75 tsf (ALLUVIUM).
12	12.0		Lean CLAY with SAND (CL); stiff; medium brown; moist; trace coarse GRAVEL; about 20% fine SAND; about 80% medium plasticity fines; sample disturbed; PP=3.0 tsf.
13	12.0		-very stiff about 15% subrounded gravel up to 1/2 in; black and red mottles; PP=3.25-3.75 tsf.
17	12.0		-no evident gravel; black; mottles very common; stiff; about 15% fine sand; PP=1.75 tsf.
8	12.0	M UW UU	-very stiff; trace angular gravel to 1/2 in; PP=3.5 tsf.
35	11.4	PA	Lean CLAY (CL); very stiff; medium brown; moist; about 5% fine SAND; about 95% medium plasticity fines; PP=3.0 tsf.
38	11.4		SANDY lean CLAY (CL); medium stiff; brown and gray; moist; about 25% fine SAND; about 75% medium plasticity fines; PP=1.75 tsf.
15	12.0	M PI	Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; wet; about 26% subangular GRAVEL, max. 3/4 in. dia.; about 63% coarse to medium SAND; about 11% nonplastic fines.
40	12.0	M UW	Fat CLAY (CH); very stiff; gray; moist; about 5% fine SAND; about 95% medium to high plasticity, very high dry strength fines; PP=2.0-3.0 tsf.
27	12.0		Lean CLAY with SAND (CL); hard; greenish-gray; dry to moist; about 5% fine, subangular GRAVEL; about 25% fine SAND; about 70% low plasticity fines; PP=>4.5 tsf.
40	12.0	M PI	-brown; very stiff; about 10% fine sand; medium plasticity fines; PP=3.0 tsf.
28	11.4		SANDY lean CLAY (CL); very stiff to hard; brown and gray; moist; about 35% fine SAND; about 65% low plasticity fines; PP=>4.5 tsf.
38	12.0	M UW UU	-very stiff; occasional black mottles; PP=3.0 tsf.
			-hard coarse sand lens at 90.5 ft; <1 in thick; PP=4.25 tsf.
			-very stiff; about 45% fine sand; about 55% low plasticity fines; PP=3.25 tsf.

Terminated at El. -84.5'
04-28-11

R-11-008

8.18' Lt. Sta. 26+75.7 "B" Line — 5" — EL. 19.0'

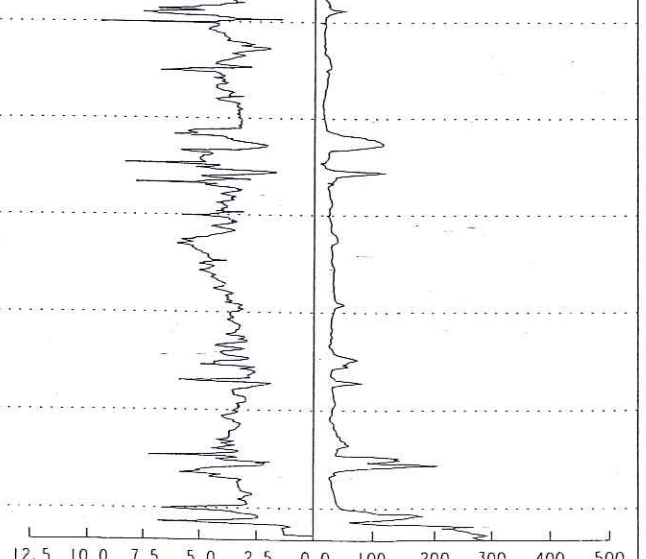
Elevation (ft)			
26	12.0	M UW UC	Fat CLAY (CH); dark gray; dry; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; (FILL).
12	12.0	C PI	-hard; moist; PP=4.25 tsf.
9	11.4		Lean CLAY with SAND (CL); hard; medium brown; moist; about 5% fine, subangular to subrounded GRAVEL; about 15% fine SAND; about 80% medium plasticity fines; light brown mottles; PP=3.25-4.25 tsf; (ALLUVIUM).
12	12.0	M UW UC	-stiff; PP=1.75 tsf.
11	12.0	M UW	SANDY lean CLAY with GRAVEL (CL); stiff to very stiff; medium brown; moist; about 20% subrounded GRAVEL, max. 1/2 in. dia.; about 40% medium to fine SAND; about 40% medium plasticity fines; PP=1.5-2.0 tsf.
19	12.0		Lean CLAY with SAND (CL); stiff; medium brown; moist; about 15% fine, subangular to subrounded GRAVEL; about 15% fine SAND; about 80% medium plasticity fines; PP=1.75 tsf.
14	12.0	M PI	Lean CLAY (CL); stiff to very stiff; medium brown; moist; about 5% fine SAND; about 95% medium plasticity fines; PP=1.0-2.0 tsf.
32	12.0	PA	-PP=3.0 tsf.
12	11.4		SANDY lean CLAY (CL); very stiff; medium brown; moist; about 40% fine SAND; about 60% low plasticity fines; PP=2.5 tsf.
55	12.0		Fat CLAY (CH); very stiff; medium brown; moist; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; PP=2.0-2.75 tsf.
47	12.0		SILTY SAND with GRAVEL (SM); medium dense; brown; moist; about 40% subrounded GRAVEL, max. 1 in. dia.; about 43% coarse to medium SAND; about 17% nonplastic fines.
14	11.4		SANDY lean CLAY (CL); stiff; medium brown; moist; about 35% fine SAND; about 65% medium plasticity fines; PP=1.0 tsf.
35	12.0	M UW UU	Poorly graded SAND with SILT (SP-SM); dense; medium brown; moist; trace GRAVEL, max. 1/4 in. dia.; about 90% coarse to medium SAND; about 10% nonplastic fines; PP=>4.5 tsf.
22	11.4		SANDY lean CLAY (CL); very stiff; medium brown; moist; about 45% fine SAND; about 55% medium plasticity fines.
30	11.4		SILTY SAND (SM); dense; medium brown; moist; about 85% medium SAND; about 15% low plasticity fines.
			SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace subangular GRAVEL, max. 1/3 in. dia.; about 30% fine SAND; about 70% medium plasticity fines; Manganese and iron staining; PP=2.25-2.75 tsf.
			-stiff; sand lens 81 to 81.25 ft; PP=4.5 tsf.
			-very stiff; PP=3.5 tsf.
			PP=2.25 tsf.

Terminated at El. -82.5'
04-27-11

CPT-11-007

39.31' Rt. Sta. 28+30.1 "B" Line — EL. 25.0'

GWS EL. 10.9'
04-29-11



Terminated at EL. -63.3'
04-29-11

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		Jon Hueser PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 5 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
9-8-11	1-30-12	3-30-12	6-25-12	48	51

BENCH MARK:

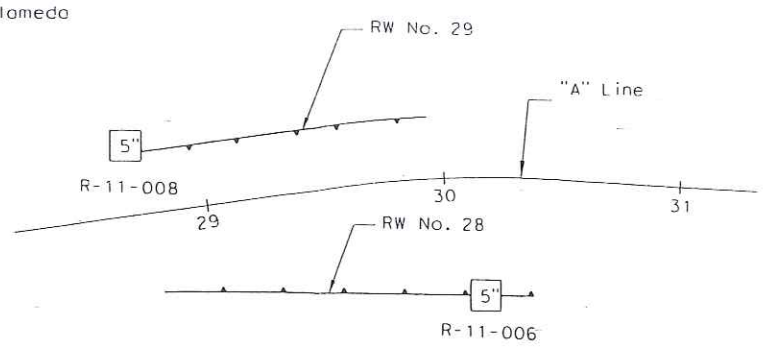
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

L. Cheang 6/15/12
REGISTERED ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

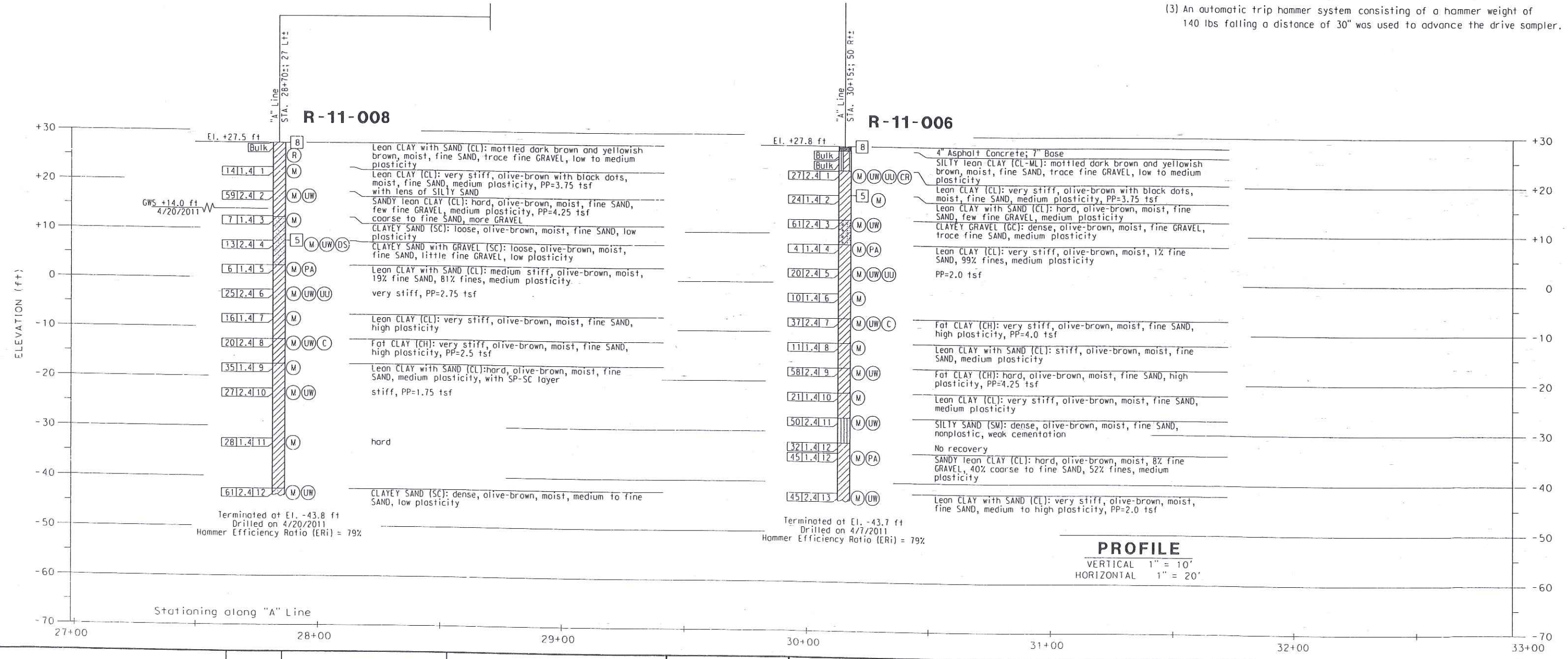
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies

RETAINING WALL No. 28 and 29
LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	A10			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 6/25/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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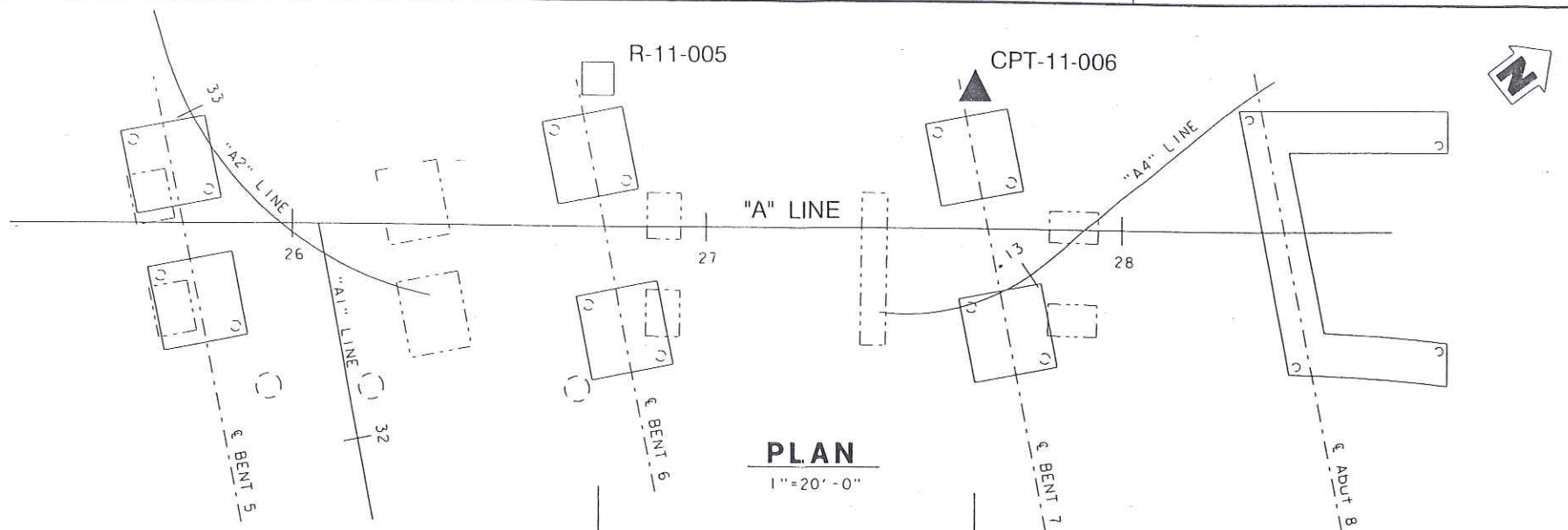
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

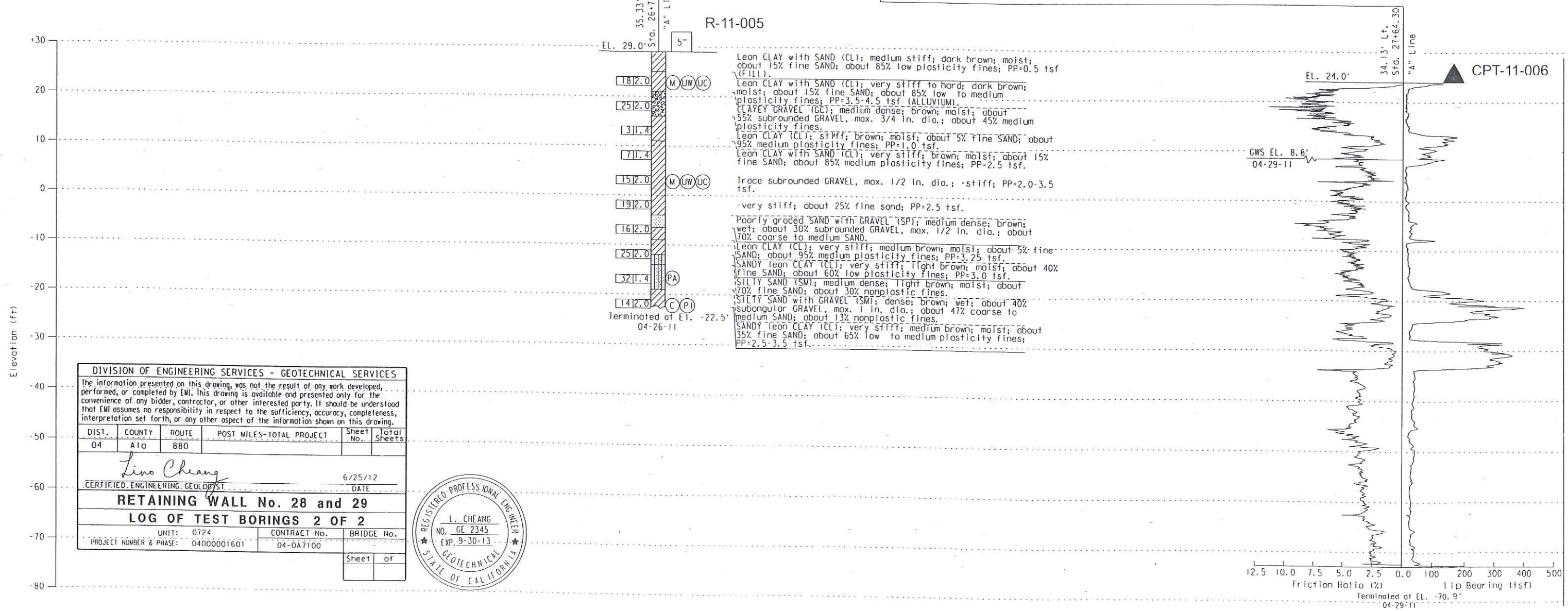
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Lino Cheang — CERTIFIED ENGINEERING GEOLOGIST — 6/25/12 DATE

RETAINING WALL No. 28 and 29

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	
	Sheet	of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser PROJECT ENGINEER	BRIDGE NO. 33-0751	29TH AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11			POST MILES 28.69	LOG OF TEST BORINGS 5 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 3-9-11 | 3-16-12 | 3-30-12 | 4-25-12

SHEET 56 OF 60

THE PLOTTED 24" SCALE

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

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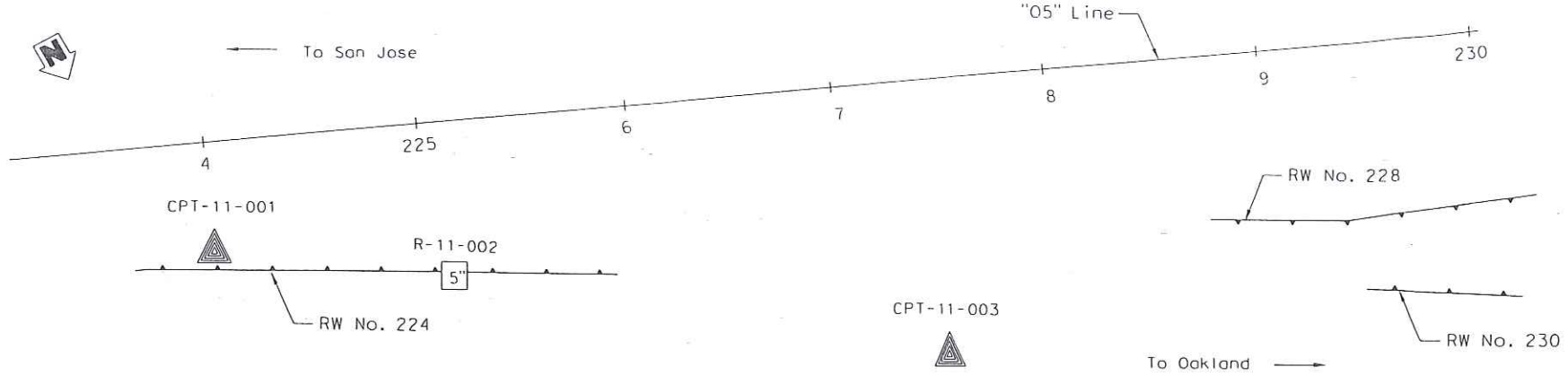
DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/27/11

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

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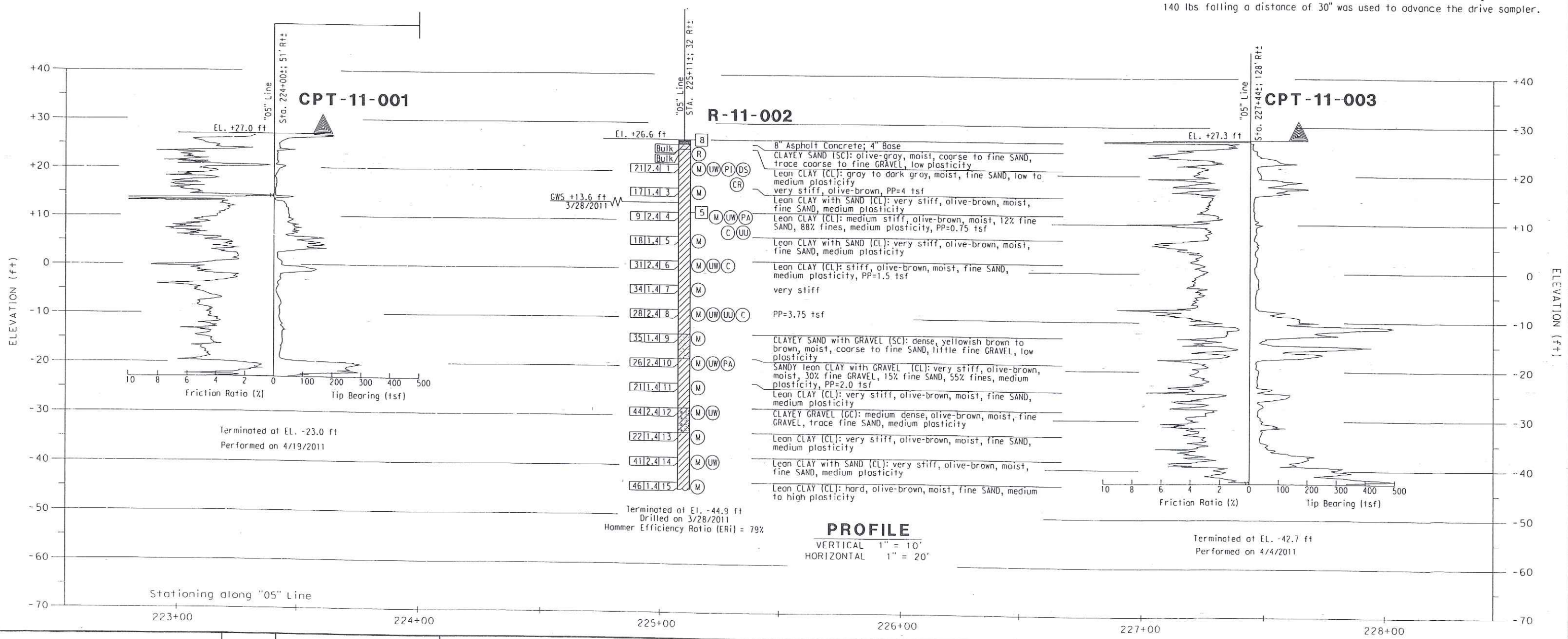
(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 224, 228 and 230
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY:			PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 2
GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)			DATE: 3/2011, 4/2011	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES / SHEET OF

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

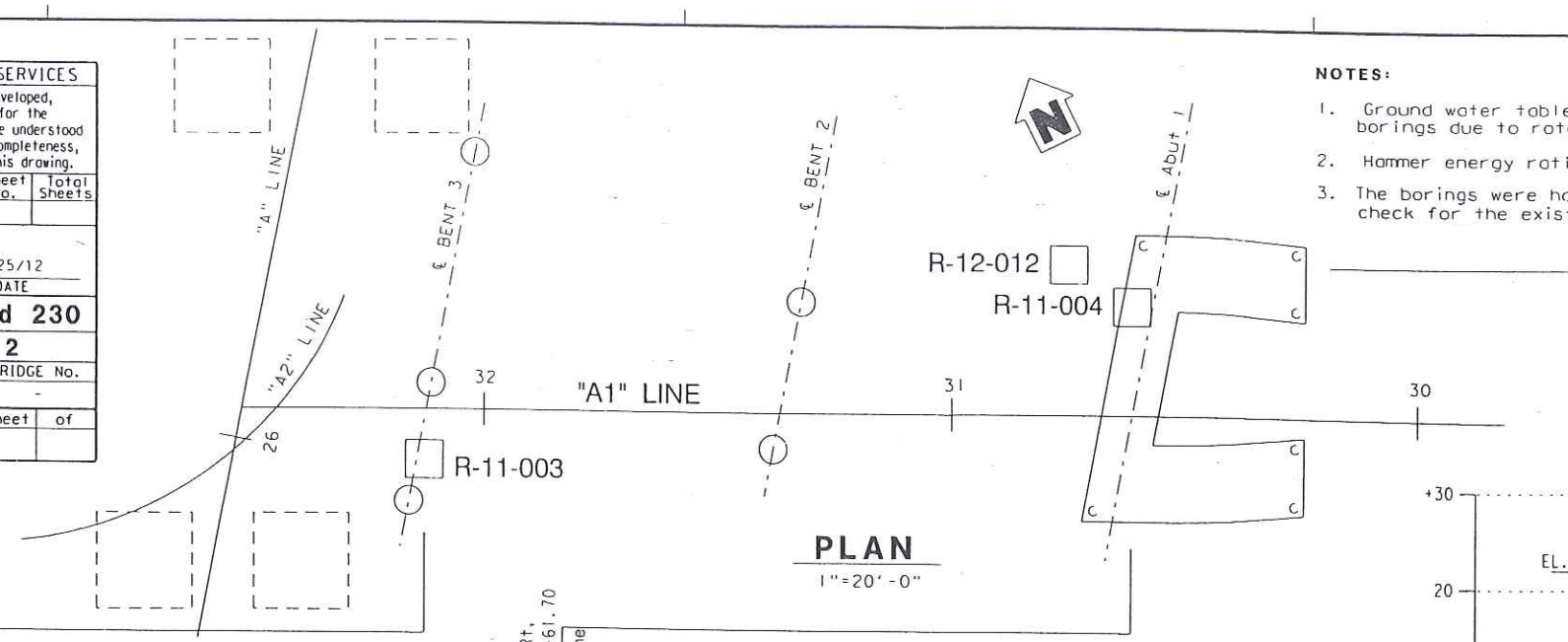
Lino Cheang — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

RETAINING WALL No. 224, 228 and 230

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-
		Sheet / of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

Philip J. Meymd — REGISTERED CIVIL ENGINEER — 6/25/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymond — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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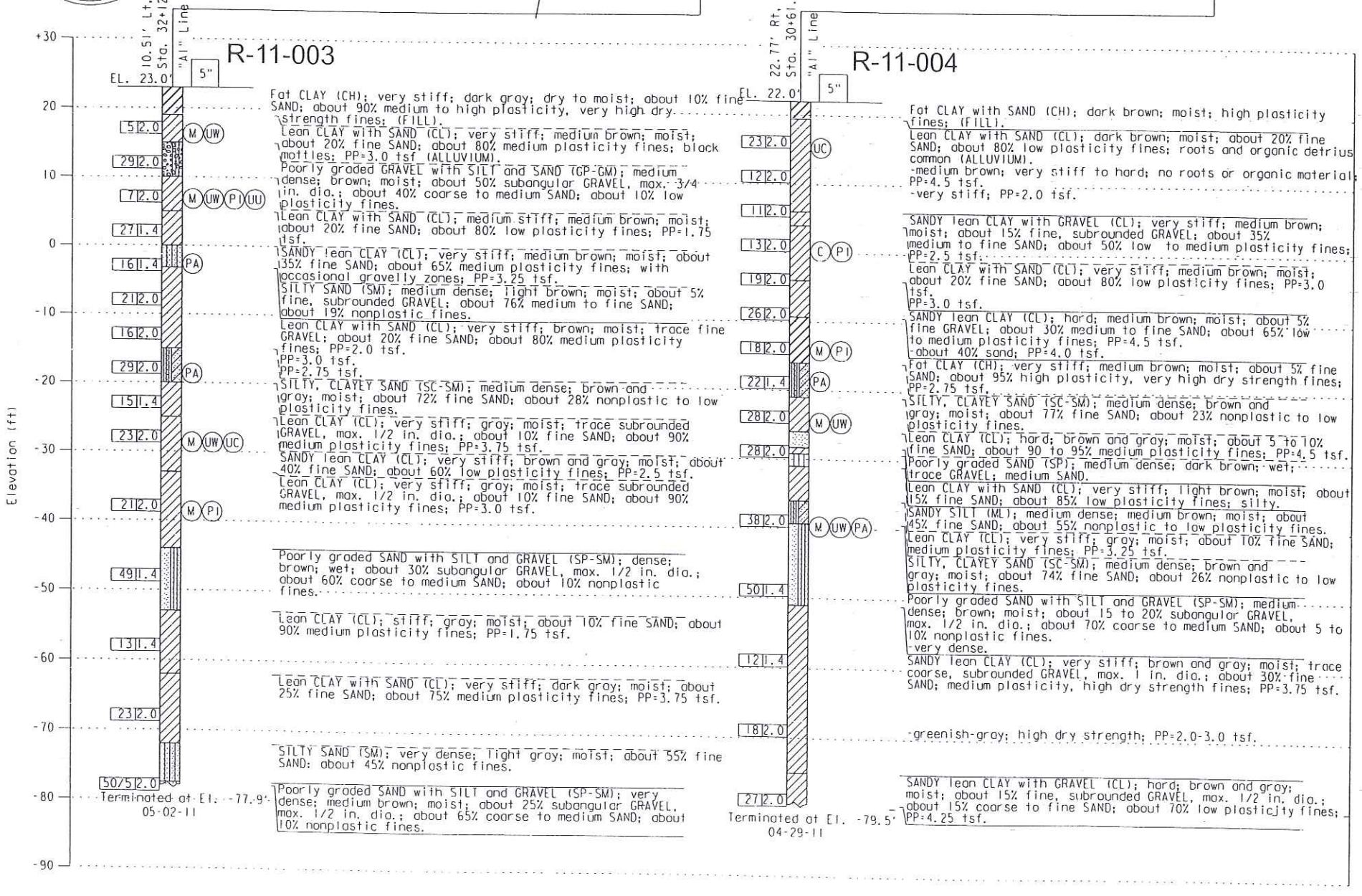
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	29TH AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11	Jan Hueser PROJECT ENGINEER	33-0751	LOG OF TEST BORINGS 6 OF 9
					POST MILES 28.69	

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
5-5-11	3-30-12	3-30-12	6-15-12	57	60

BENCH MARK:

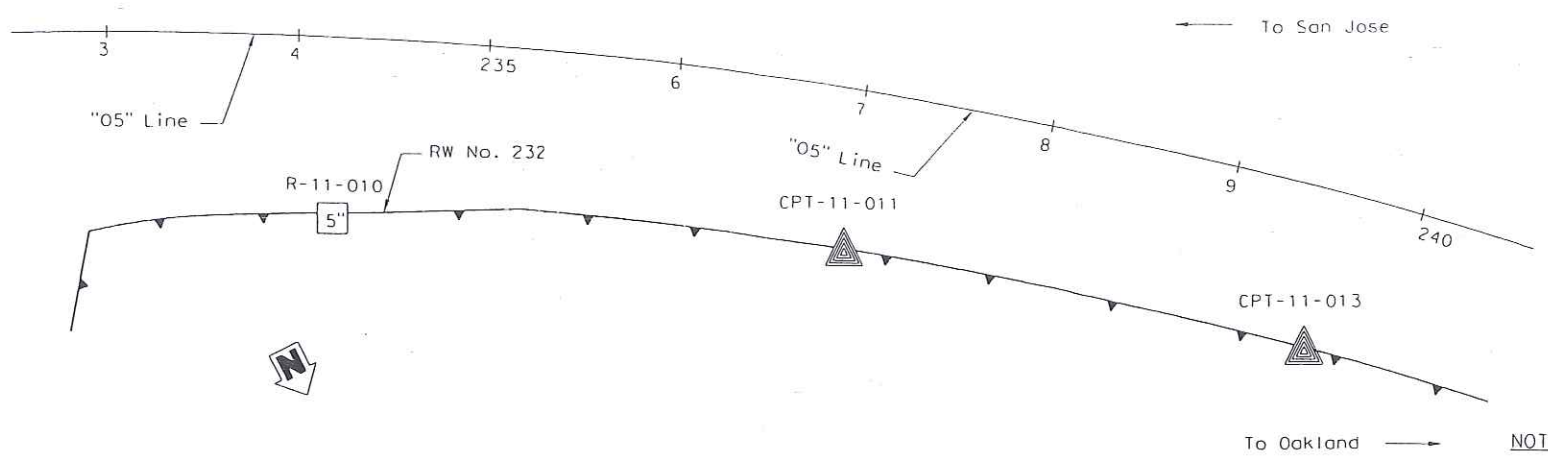
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN

1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/15/12

L. CHEANG
NO. GE 2345
EXP. 9-30-13
REGISTERED PROFESSIONAL ENGINEER
GEOTECHNICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

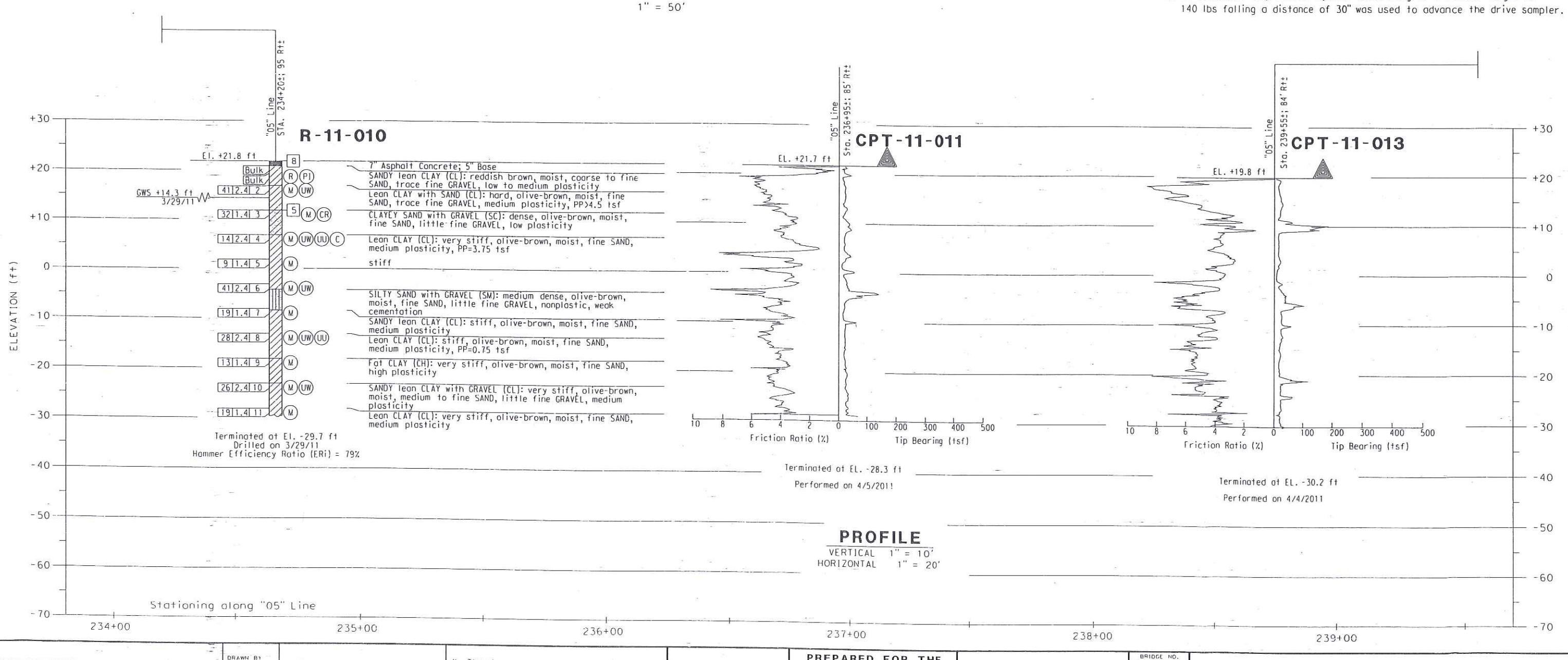
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011				POST MILES Varies

RETAINING WALL No. 232

LOG OF TEST BORINGS 1 OF 3

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

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FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

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FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

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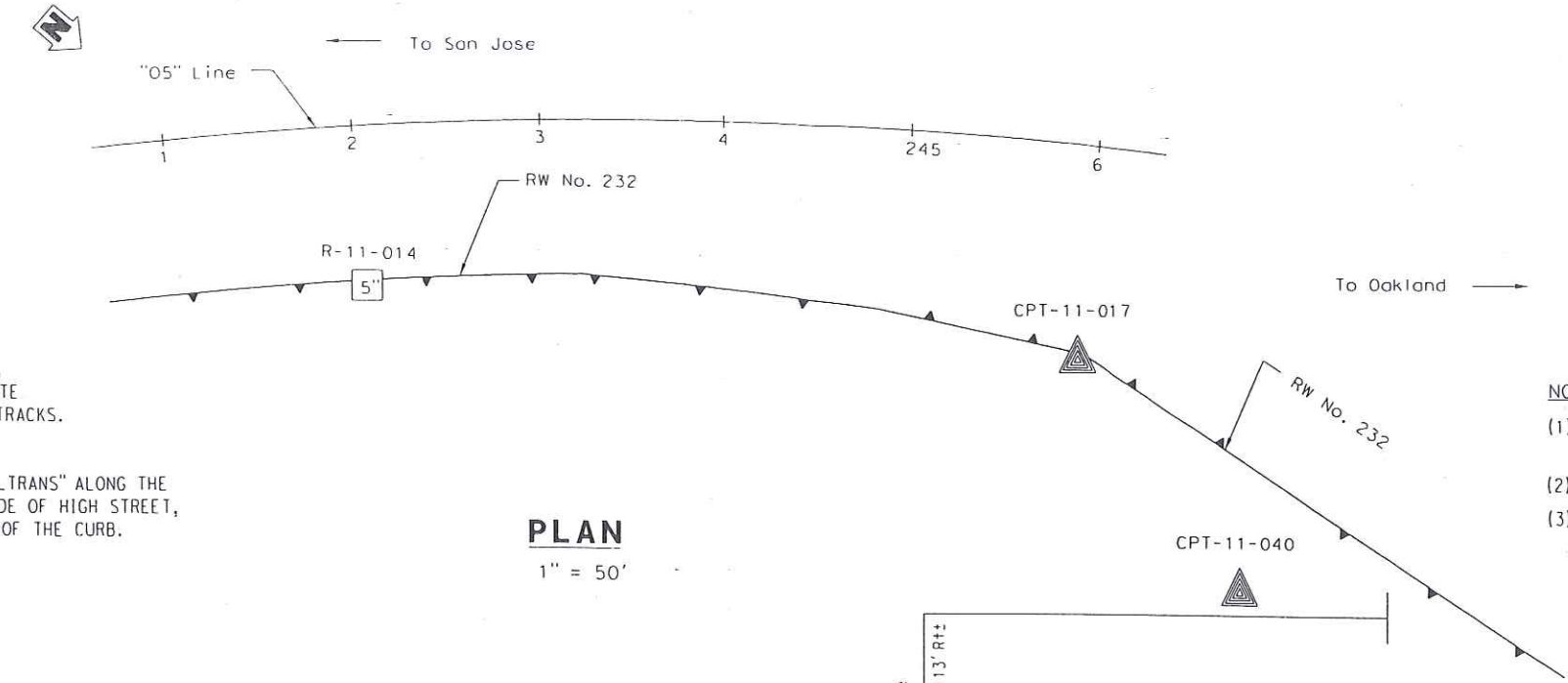
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

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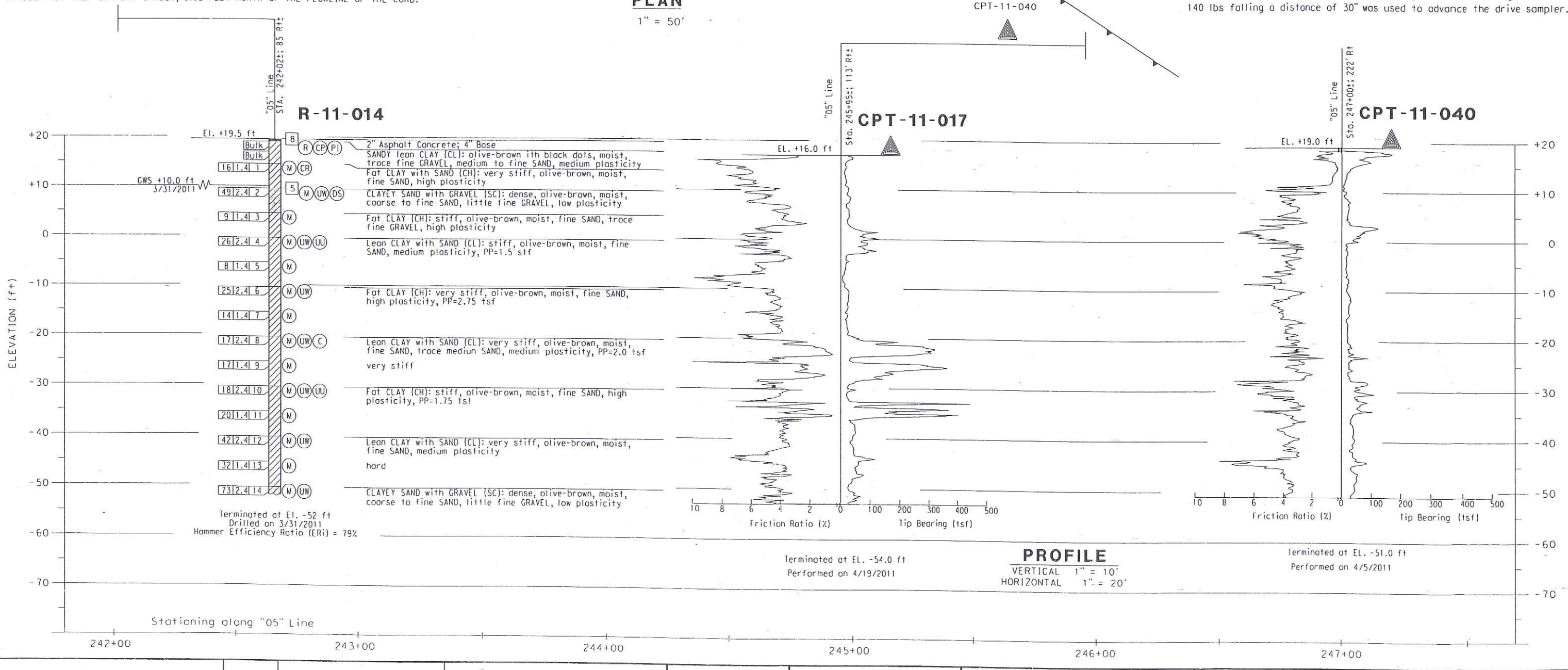

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L.Cheang	BRIDGE NO. -	RETAINING WALL No. 232
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 2 OF 3

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880			

Lino Cheang — CERTIFIED ENGINEERING GEOLOGIST — 6/25/12 DATE

RETAINING WALL No. 232

LOG OF TEST BORINGS 3 OF 3

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 040000001601	04-0A7100	-
		Sheet / of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	A10			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 3/30/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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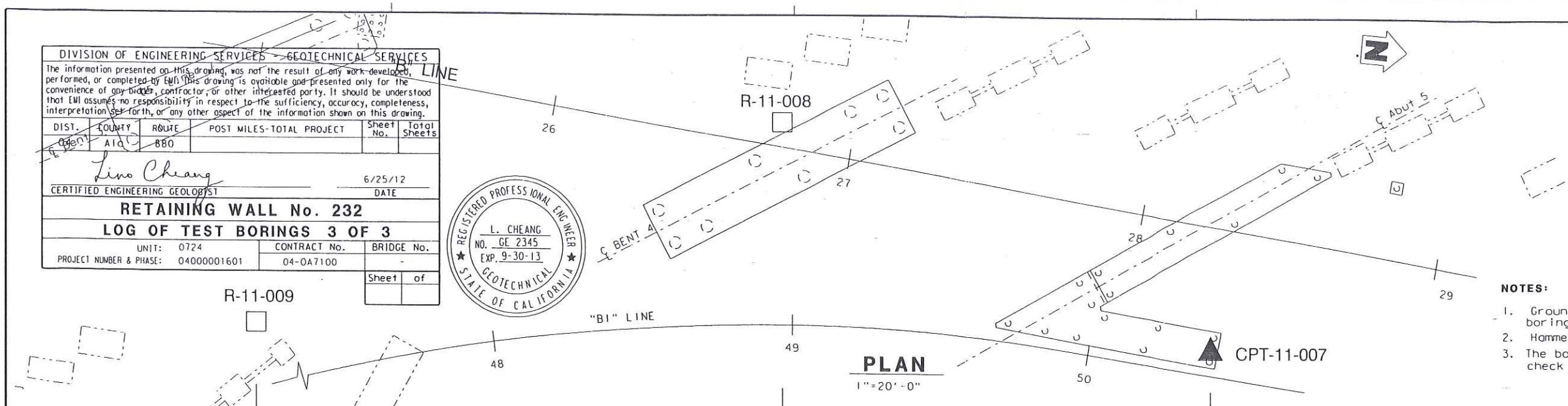
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



PLAN
1"=20'-0"

R-11-009

88.57' Rt., Sta. 25+14 "B" Line — EL. 17.0'

16	2.0		Fat CLAY (CH); very stiff; dark gray; dry to moist; about 10% fine SAND; about 90% medium to high plasticity, very high dry strength fines; PP=2.5 tsf (FILL).
22	2.0		SANDY lean CLAY (CL); very stiff; medium to dark brown; dry to moist; about 10% coarse, angular GRAVEL; about 40% medium SAND; about 50% low plasticity fines; PP=3.5 tsf.
18	2.0	M UW UC	SANDY lean CLAY (CL); very stiff; medium brown; moist; about 30% fine SAND; about 70% medium plasticity fines; trace coarse sand; PP=2.75 tsf (ALLUVIUM).
12	2.0		Lean CLAY with SAND (CL); stiff; medium brown; moist; trace coarse GRAVEL; about 20% fine SAND; about 80% medium plasticity fines; sample disturbed; PP=3.0 tsf.
			-very stiff about 15% subrounded gravel up to 1/2 in; black and red mottles; PP=3.25-3.75 tsf.
13	2.0		-no evident gravel; black; mottles very common; stiff; about 15% fine sand; PP=1.75 tsf.
17	2.0		-very stiff; trace angular gravel to 1/2 in; PP=3.5 tsf.
			Lean CLAY (CL); very stiff; medium brown; moist; about 5% fine SAND; about 95% medium plasticity fines; PP=3.0 tsf.
8	2.0	M UW UU	SANDY lean CLAY (CL); medium stiff; brown and gray; moist; about 25% fine SAND; about 75% medium plasticity fines; PP=1.75 tsf.
35	1.4	PA	Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; wet; about 26% subangular GRAVEL, max. 3/4 in. dia.; about 63% coarse to medium SAND; about 11% nonplastic fines.
38	1.4		
15	2.0	M PI	Fat CLAY (CH); very stiff; gray; moist; about 5% fine SAND; about 95% medium to high plasticity, very high dry strength fines; PP=2.0-3.0 tsf.
			Lean CLAY with SAND (CL); hard; greenish gray; dry to moist; about 5% fine, subangular GRAVEL; about 25% fine SAND; about 70% low plasticity fines; PP=>4.5 tsf.
40	2.0	M UW	
27	2.0		-brown; very stiff; about 10% fine sand; medium plasticity fines; PP=3.0 tsf.
			SANDY lean CLAY (CL); very stiff to hard; brown and gray; moist; about 35% fine SAND; about 65% low plasticity fines; PP=>4.5 tsf.
40	2.0	M PI	-very stiff; occasional black mottles; PP=3.0 tsf.
28	1.4		-hard coarse sand lens at 90.5 ft; <1 in thick; PP=4.25 tsf.
38	2.0	M UW UU	-very stiff; about 45% fine sand; about 55% low plasticity fines; PP=3.25 tsf.

Terminated at El. -84.5' 04-28-11

R-11-008

8.18' Lt., Sta. 26+75.7 "B" Line — EL. 19.0'

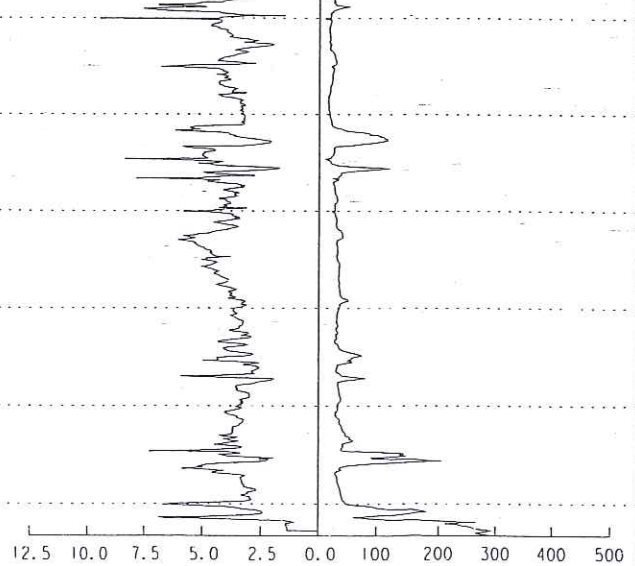
26	2.0	M UW UC	Fat CLAY (CH); dark gray; dry; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; (FILL).
			-hard; moist; PP=4.25 tsf.
12	2.0	C PI	Lean CLAY with SAND (CL); hard; medium brown; moist; about 5% fine, subangular to subrounded GRAVEL; about 15% fine SAND; about 80% medium plasticity fines; light brown mottles; PP=3.25-4.25 tsf; (ALLUVIUM).
9	1.4		-stiff; PP=1.75 tsf.
			SANDY lean CLAY with GRAVEL (CL); stiff to very stiff; medium brown; moist; about 20% subrounded GRAVEL, max. 1/2 in. dia.; about 40% medium to fine SAND; about 40% medium plasticity fines; PP=1.5-2.0 tsf.
12	2.0	M UW UC	
			Lean CLAY with SAND (CL); stiff; medium brown; moist; about 15% fine, subangular to subrounded GRAVEL; about 15% fine SAND; about 80% medium plasticity fines; PP=1.75 tsf.
11	2.0	M UW	
19	2.0		Lean CLAY (CL); stiff to very stiff; medium brown; moist; about 5% fine SAND; about 95% medium plasticity fines; PP=1.0-2.0 tsf.
			PP=3.0 tsf.
14	2.0	M PI	SANDY lean CLAY (CL); very stiff; medium brown; moist; about 40% fine SAND; about 60% low plasticity fines; PP=2.5 tsf.
32	2.0	PA	Fat CLAY (CH); very stiff; medium brown; moist; about 5% fine SAND; about 95% high plasticity, very high dry strength fines; PP=2.0-2.75 tsf.
12	1.4		SILTY SAND with GRAVEL (SM); medium dense; brown; moist; about 40% subrounded GRAVEL, max. 1 in. dia.; about 43% coarse to medium SAND; about 17% nonplastic fines.
55	2.0		SANDY lean CLAY (CL); stiff; medium brown; moist; about 35% fine SAND; about 65% medium plasticity fines; PP=1.0 tsf.
			Poorly graded SAND with SILT (SP-SM); dense; medium brown; moist; trace GRAVEL, max. 1/4 in. dia.; about 90% coarse to medium SAND; about 10% nonplastic fines; PP=>4.5 tsf.
47	2.0		SANDY lean CLAY (CL); very stiff; medium brown; moist; about 45% fine SAND; about 55% medium plasticity fines.
14	1.4		SILTY SAND (SM); dense; medium brown; moist; about 85% medium SAND; about 15% low plasticity fines.
			SANDY lean CLAY (CL); very stiff; brown and gray; moist; trace subangular GRAVEL, max. 1/3 in. dia.; about 30% fine SAND; about 70% medium plasticity fines; Manganese and iron staining; PP=2.25-2.75 tsf.
35	2.0	M UW UU	-stiff; sand lens 81 to 81.25 ft; PP=4.5 tsf.
22	1.4		-very stiff; PP=3.5 tsf.
30	1.4		PP=2.25 tsf.

Terminated at El. -82.5' 04-27-11

CPT-11-007

39.31' Rt., Sta. 28+30.1 "B" Line — EL. 25.0'

GWS EL. 10.9' 04-29-11



Terminated at EL. -63.3' 04-29-11

Elevation (ft): +20, 10, 0, -10, -20, -30, -40, -50, -60, -70, -80, -90

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 5 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724 PROJECT NUMBER & PHASE: 040000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
3-1-11	1-30-12	3-30-12	6-25-12	48	51

FILE PLOTTED BY: STEVE
DATE PLOTTED: 6/25/2012
FILENAME: S:\DESIGN\...

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Alc	880	28.4/29.2		

REGISTERED ENGINEER — DATE 4/25/12

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

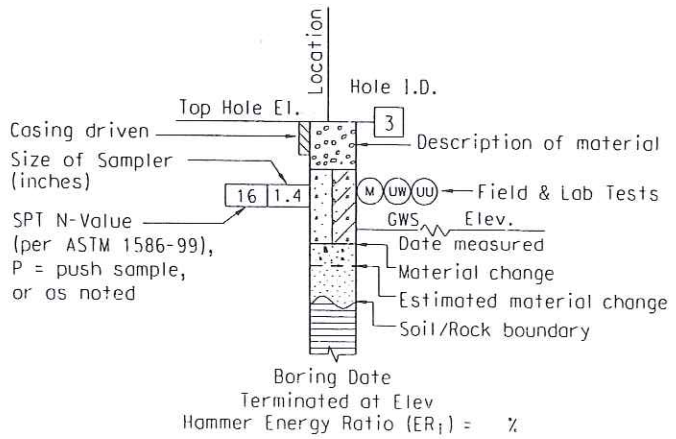
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R	Rotary drilled boring (conventional)
	RW	Rotary drilled with self-casing wire-line
	RC	Rotary core with continuously-sampled, self-casing wire-line
	P	Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD	Hand driven (1-inch soil tube)
	HA	Hand Auger
	D	Dynamic Cone Penetration Boring
	CPT	Cone Penetration Test (ASTM D 5778)
	O	Other (note on LOTB)

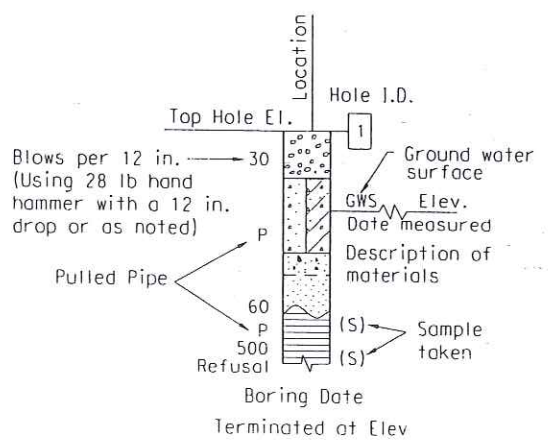
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

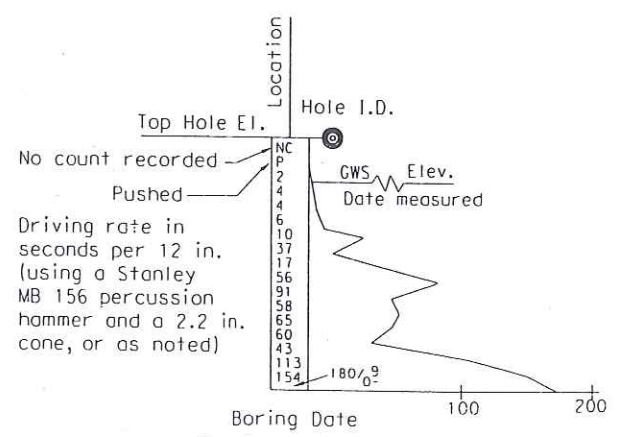
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



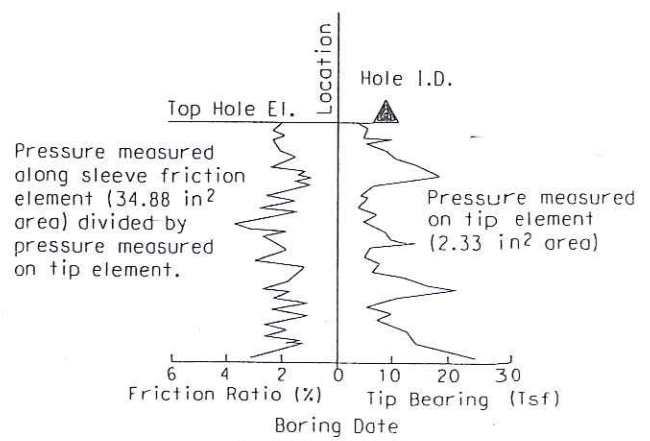
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	SOIL LEGEND
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/15/11

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

DESIGN OVERSIGHT
SIGN OFF DATE
DRAWN BY: J. Fang
CHECKED BY: G. J. Gunaranjan
K. Thant — FIELD INVESTIGATION BY:
DATE: 3/2011, 4/2011

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

L. Cheang — PROJECT ENGINEER

BRIDGE NO. -
POST MILES Varies

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

SOIL LEGEND
LOG OF TEST BORINGS 2 OF 2

Appendix B

LABORATORY TEST RESULTS

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS FOR RETAINING WALLS (1 OF 4)

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil-pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-002	D-1	5	CL	17.8	127.9	4.0				41/17/24	1300	7.3	65	219
R-11-002	S-3	10	CL	17.9										
R-11-002	D-4	15	CL	25.9	124.0	0.75		0:12:88						
R-11-002	S-5	20	CL	17.1										
R-11-002	D-6	25	CL	19.6	128.9	1.5								
R-11-002	S-7	30	CL	20.7										
R-11-002	D-8	35	CL	19.3	130.3	3.75								
R-11-002	S-9	40	SC	13.3										
R-11-002	D-10	45	CL	23.4	128.3	2.0		30:15:55						
R-11-002	S-11	50	CL	19.6										
R-11-002	D-12	55	GC	11.9	141.4									
R-11-002	S-13	60	CL	33.8										
R-11-002	D-14	65	CL	20.9	130.0	2.0								
R-11-002	S-15	70	CL	29.1										
R-11-006	D-1	5	CL	17.6	128.5	3.75					1600	7.6	65	164
R-11-006	S-2	10	CL	13.1										
R-11-006	D-3	15	GC	10.7	136.0									
R-11-006	S-4	20	CL	32.0				0:1:99						
R-11-006	D-5	25	CL	21.4	129.8	2.0								
R-11-006	S-6	30	CL	20.4										
R-11-006	D-7	35	CH	22.3	128.0	4.0								
R-11-006	S-8	40	CL	24.3										
R-11-006	D-9	45	CH	27.0	125.0	4.25								
R-11-006	S-10	50	CL	21.9										
R-11-006	D-11	55	SM	21.7	128.2									
R-11-006	S-12	62	CL	16.8				8:40:52						
R-11-006	D-13	70	CL	21.3	127.8	2.0								
R-11-008	S-1	5	CL	19.4										
R-11-008	D-2	10	CL	12.2	130.3	4.25								
R-11-008	S-3	15	CL	24.1										
R-11-008	D-4	20	SC	12.5	136.7									
R-11-008	S-5	25	CL	26.1				0:19:81						
R-11-008	D-6	30	CL	37.8	132.4	2.75								
R-11-008	S-7	35	CL	18.1										

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS FOR RETAINING WALLS (2 OF 4)

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-008	D-8	40	CH	29.7	120.1	2.5								
R-11-008	S-9	45	CL	24.4										
R-11-008	D-10	50	CL	24.8	125.5	1.75								
R-11-008	S-11	60	CL	18.2										
R-11-008	D-12	70	SC	18.7	130.8									
R-11-010	S-1	2.5	CL	14.3										
R-11-010	D-2	5	CL	14.9	131.3	>4.5								
R-11-010	S-3	10	SC	11.0							5900	6.7	55	185
R-11-010	D-4	15	CL	22.0	127.9	3.75								
R-11-010	S-5	20	CL	26.9										
R-11-010	D-6	25	SM	9.8	144.2									
R-11-010	S-7	30	CL	20.8										
R-11-010	D-8	35	CL	24.2	98.2	0.75								
R-11-010	S-9	40	CH	33.0										
R-11-010	D-10	45	CL	19.5	129.3	3.25								
R-11-010	S-11	50	CL	26.0										
R-11-014	S-1	5	CH	17.6							1300	6.6	70	158
R-11-014	D-2	10	SC	10.3	144.6									
R-11-014	S-3	15	CH	30.9										
R-11-014	D-4	20	CL	14.3	133.0	1.5								
R-11-014	S-5	25	CL	28.4										
R-11-014	D-6	30	CH	28.4	125.2	2.75								
R-11-014	S-7	35	CH	26.9										
R-11-014	D-8	40	CL	22.8	127.9	2.0								
R-11-014	S-9	45	CL	22.1										
R-11-014	D-10	50	CH	27.5	123.8	1.75								
R-11-014	S-11	55	CH	19.6										
R-11-014	D-12	60	CL	18.9	131.6	3.0								
R-11-014	S-13	65	CL	21.3										
R-11-014	D-14	70	SC	12.5	133.7									
R-11-021	D-1	5	CL	18.8	122.8	3.0					1500	6.5	65	197
R-11-021	S-2	10	CL	19.5										
R-11-021	D-3	15	CL	21.7	128.2	0.0		0:15:85						
R-11-021	S-4	20	CH	31.0				5:14:81						
R-11-021	D-5	25	GP-GM	7.4	147.3									
R-11-021	S-6	30	SC-SM	12.5										
R-11-021	D-7	35	CL	7.7	137.5									
R-11-021	S-8	40	CH	35.2										
R-11-021	D-9	45	SC	17.2	135.2	2.25								
R-11-021	S-10	50	CL	25.7										

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS FOR RETAINING WALLS (3 OF 4)

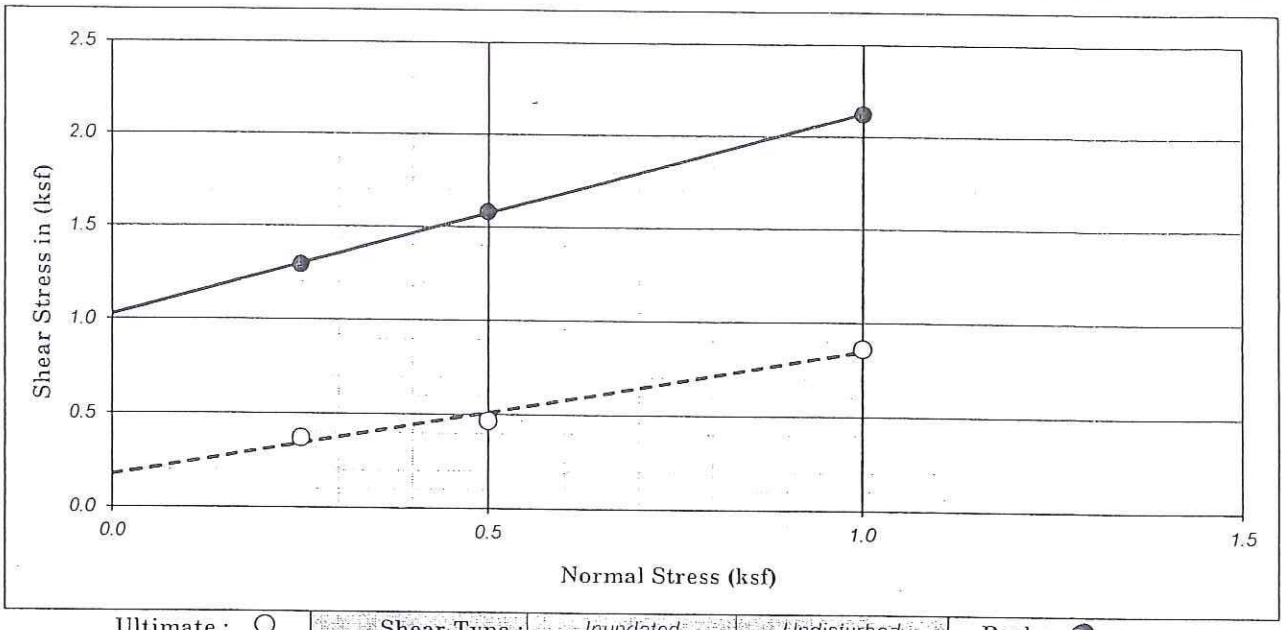
Project No. : *10-133* Project Name : I-880 Operational and Safety Improvement Project

Boring No .	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-030	*S-1*	5	CL	13.7				14:31:55						
R-11-030	*D-2*	10	CL	30.9	121.0	1.0				47/21/26	1200	6.6	80	231
R-11-030	*S-3*	15	CH	29.0										
R-11-030	*D-4*	20	SC	14.7	135.9			12:67:21						
R-11-030	*S-5*	25	CH	44.3				1:15:84						
R-11-030	*D-6*	30	CH	34.1	115.2	2.0								
R-11-030	*S-7*	35	CL	38.6										
R-11-030	*D-8*	40	CL	30.2	118.5	2.25								
R-11-030	*S-9*	45	CL	24.3				0:37:63						
R-11-030	*D-10*	50	CL	20.6	125.5	2.0								
R-11-030	*S-11*	55	CL	14.8										
R-11-030	*D-12*	60	CL	25.0	122.9	2.0								
R-11-030	*S-13B*	65	SC	15.1										
R-11-030	*S-13A*	65	CL	19.9										
R-11-030	*D-14*	70	SW-SM	11.7	141.6									
R-11-031	*D-1*	5	CH	20.8	120.4	3.25					1300	6.9	170	221
R-11-031	*S-2*	10	SC	12.2				27:27:46						
R-11-031	*D-3*	15	SP-SC	11.8	143.8			37:52:11						
R-11-031	*S-4*	20	CL	22.3										
R-11-031	*D-5*	25	CH	27.4	113.0	1.75				52/22/30				
R-11-031	*S-6*	30	CL	23.2										
R-11-031	*D-7*	35	CL	27.7	117.3	3.0								
R-11-031	*S-8*	40	CL	26.0										
R-11-031	*D-9*	45	CL	22.4	124.2	3.0								
R-11-031	*S-10*	50	CL	31.1										
R-11-031	*D-11*	55	SM	19.8	129.9									
R-11-031	*S-12T*	60	CH	21.5										
R-11-031	*S-12B*	60	SC	15.4										
R-11-031	*D-13*	65	CL	18.6	129.8	1.5								
R-11-031	*S-14*	70	CL	15.3										
R-11-034	*S-1*	5	CL	15.5										
R-11-034	*D-2*	10	CH	29.2	119.7	0.75								
R-11-034	*S-3B*	15	CL	19.0							2500	7.1	252	160
R-11-034	*S-3T*	15	SM	19.9										
R-11-034	*D-4*	20	CL	20.3	127.5									
R-11-034	*S-5*	25	CL	30.5				0:19:81						
R-11-034	*D-6*	30	CL	15.8	132.9	3.5								
R-11-034	*S-7*	35	CL	22.3										
R-11-034	*D-8*	40	CL	18.6	129.8	1.75								
R-11-034	*S-9*	45	CL	19.7				1:40:59						

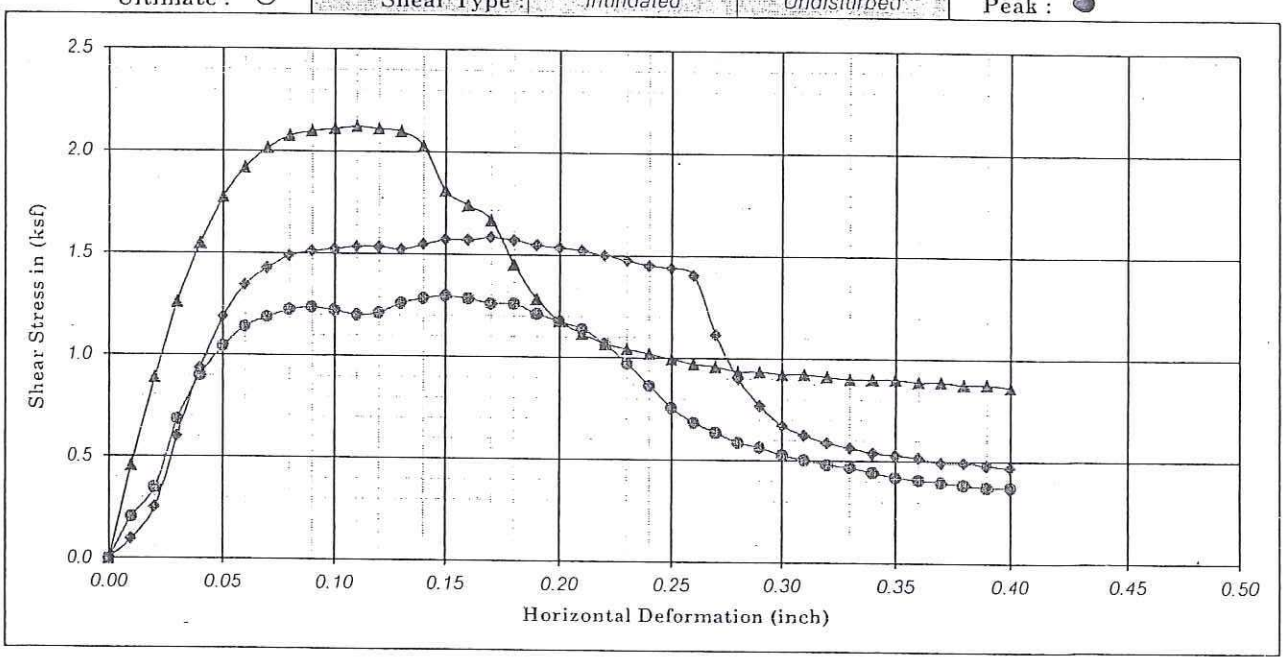
TABLE B1 SUMMARY OF LABORATORY TEST RESULTS FOR RETAINING WALLS (4 OF 4)

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No .	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-034	D-10	50	CL	20.1	128.4	1.75		0:11:89						
R-11-034	S-11	55	CL	23.1										
R-11-034	D-12	60	SC	15.7	133.2									
R-11-034	S-13	65	SM	22.6										
R-11-034	D-14	70	SM	12.8	137.0									
R-11-035	D-1	5	CH	17.6	125.0	3.5					1400	7.3	90	158
R-11-035	S-2	10	SC	12.2				36:47:17						
R-11-035	D-3	15	CL	27.5	120.1									
R-11-035	S-4	20	CL	29.8				12:15:73						
R-11-035	D-5	25	SC	11.5	139.7			30:55:15						
R-11-035	S-6	30	CL	21.9										
R-11-035	D-7	35	CL	18.9	129.0	3.0								
R-11-035	S-8	40	SC	20.8										
R-11-035	D-9	45	GP-GM	8.4	142.7									
R-11-035	S-10	50	SP-SM	10.0										
R-11-035	D-11	55	CL	21.7	122.7	2.75								
R-11-035	S-12	60	CL	18.2										
R-11-035	D-13	65	CL	23.3	125.8	3.25								
R-11-035	S-14	70	SC	13.0										



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-002		Strength Intercept (C) :	1.03	(ksf)	Peak	0.17	(ksf)	Ultimate
Sample No. : D-1			49.12	(kPa)		8.33	(kPa)	
Depth (ft/m) : 5.0	0.00	Friction Angle (ϕ) :	47.74	Degree		34.04	Degree	
Description : olive-brown/black, yellow dots, Lean CLAY (CL)					Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	24.35	103.22	16.25	0.63	0.25	11.97	1.30	62.05	0.37	17.81
◆	22.75	104.52	16.45	0.61	0.50	23.94	1.58	75.84	0.47	22.41
▲	24.46	101.82	16.03	0.66	1.00	47.88	2.12	101.70	0.86	41.37

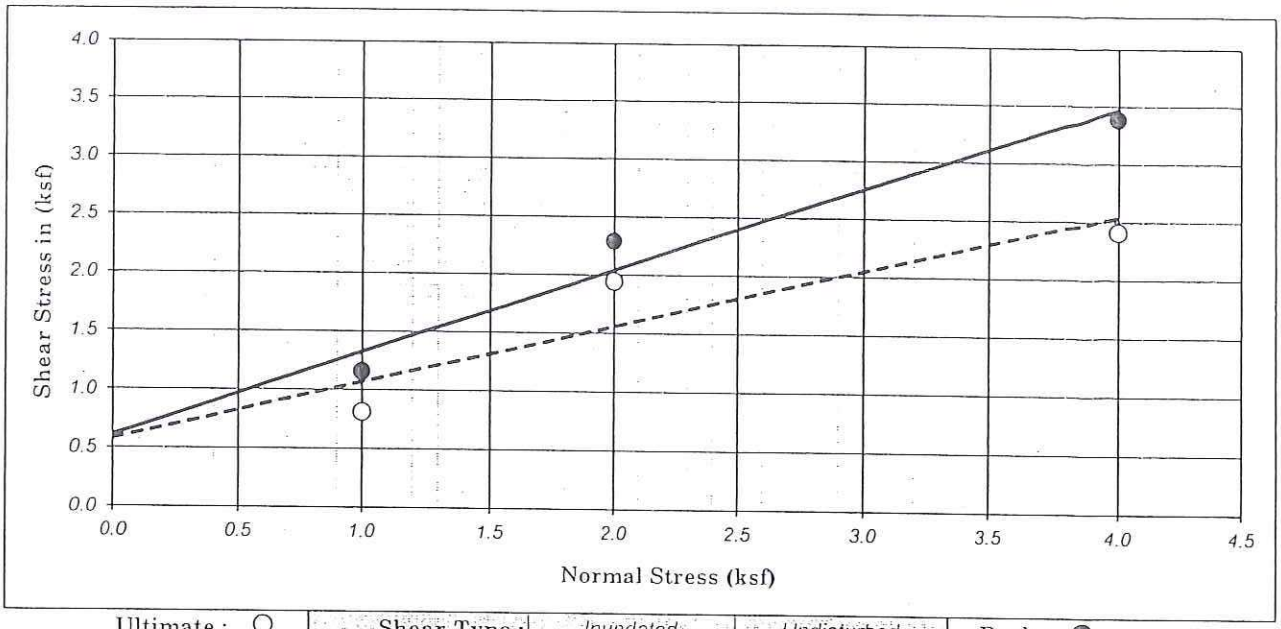
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 North safety and Operational Improvement

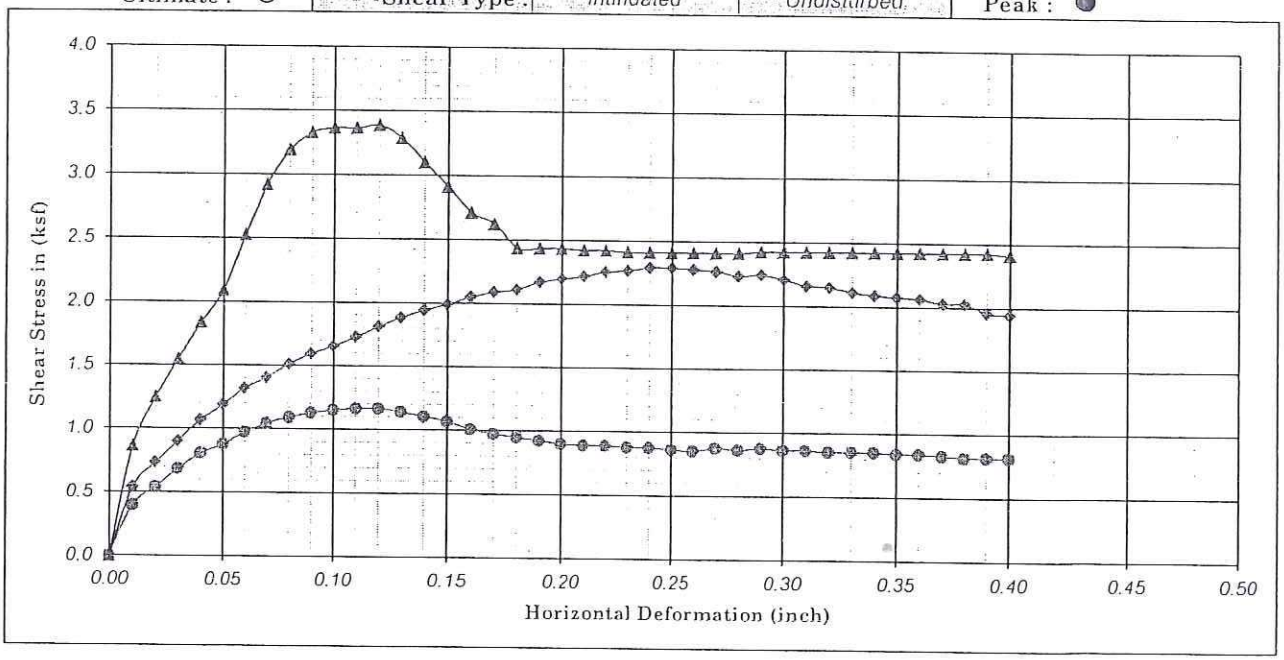
Project No. : 10-133 | Date : 06/09/11

DIRECT SHEAR TEST (ASTM D-3080)

Figure No. :



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-008	Strength Intercept (C) :	0.62	(ksf)		0.58	(ksf)		
Sample No. : D-4		29.49	(kPa)	Peak	27.87	(kPa)	Ultimate	
Depth (ft/m) : 20.0 | 0.00	Friction Angle (ϕ) :	35.52	Degree		26.08	Degree		

Description : Dark yellowish brown, CLAYEY SAND with GRAVEL (SC) — Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.60	105.23	16.56	0.60	1.00	47.88	1.16	55.73	0.82	39.07
◆	21.21	111.76	17.59	0.51	2.00	95.76	2.29	109.74	1.94	93.09
▲	25.46	101.06	15.91	0.67	4.00	191.52	3.39	162.22	2.41	115.49

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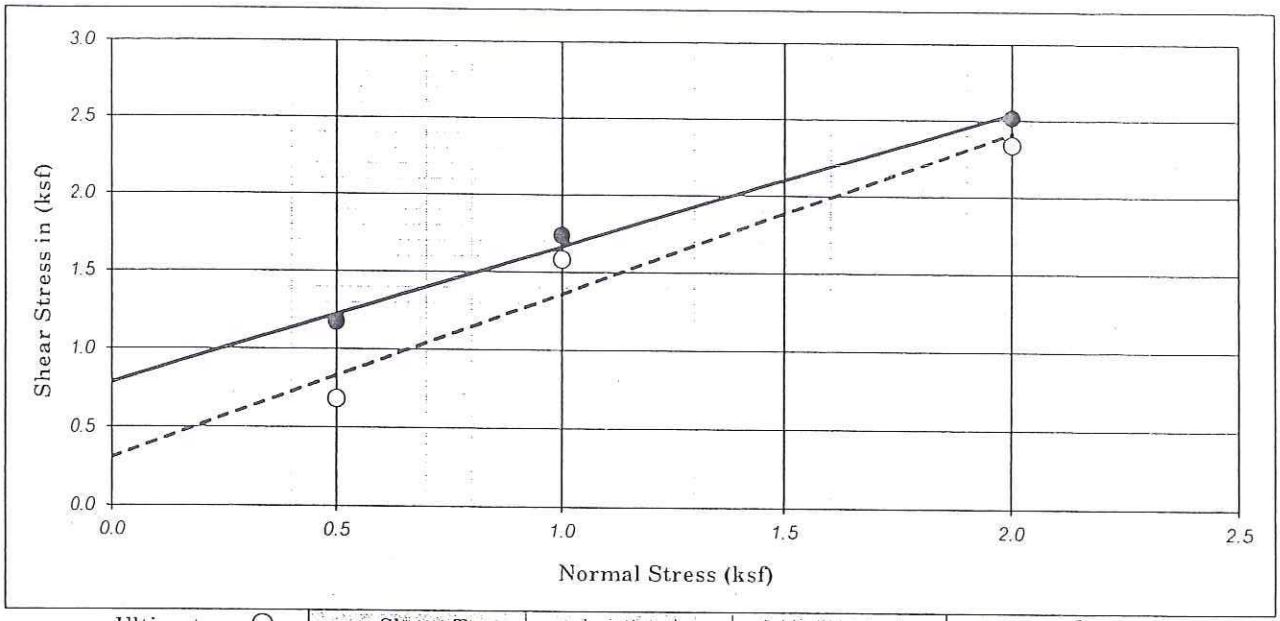
Geotechnical and Earthquake Engineering

I-880 North safety and Operational Improvement

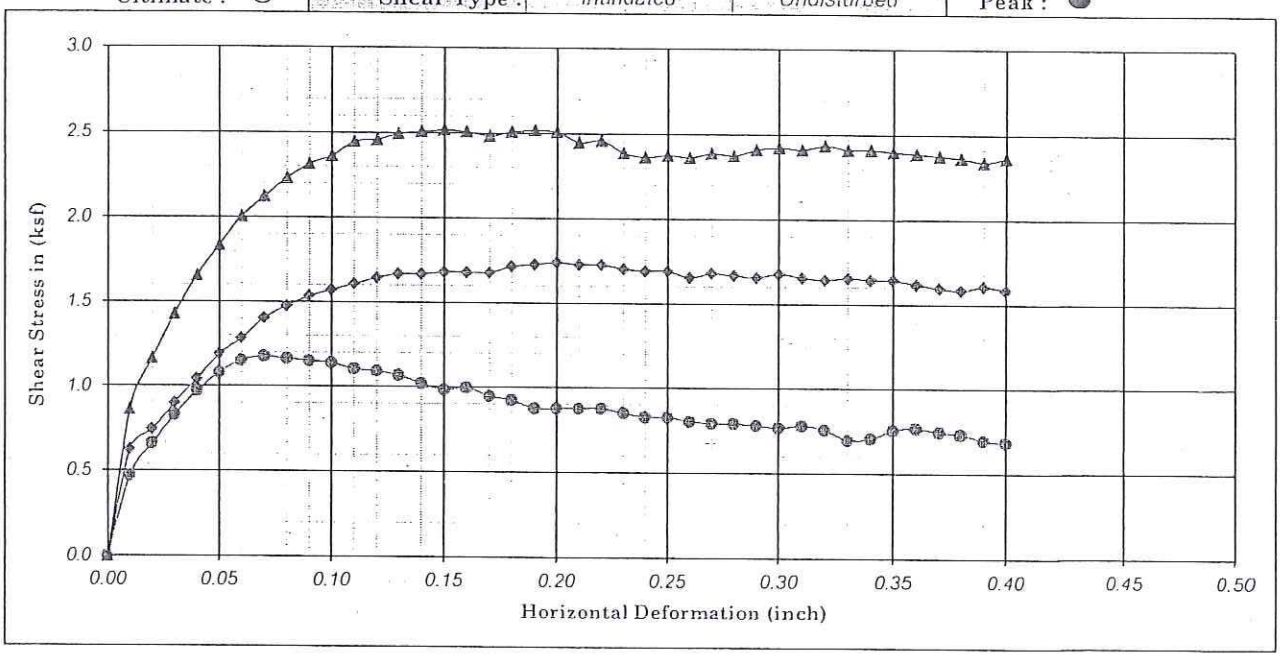
Project No. : 10-133 | Date : 06/09/11

DIRECT SHEAR TEST (ASTM D-3080)

Figure No. :



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-014	Strength Intercept (C) :	0.79	(ksf)	Peak	0.31	(ksf)	Ultimate
Sample No. : D-2		37.63	(kPa)		14.65	(kPa)	
Depth (ft/m) : 10.0 | 0.00	Friction Angle (ϕ) :	41.33	Degree		46.51	Degree	

Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC) Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	15.98	120.37	18.95	0.40	0.50	23.94	1.18	56.31	0.68	32.75
◆	16.15	125.97	19.83	0.34	1.00	47.88	1.74	83.31	1.58	75.64
▲	16.43	121.54	19.13	0.39	2.00	95.76	2.52	120.66	2.34	112.04

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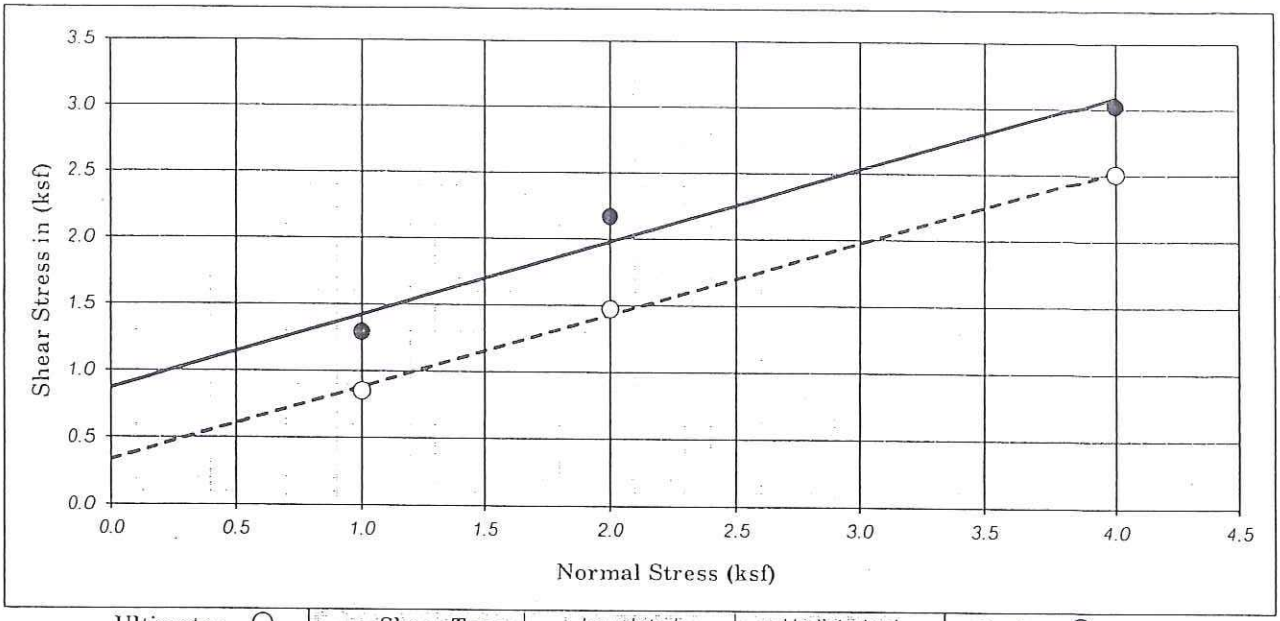
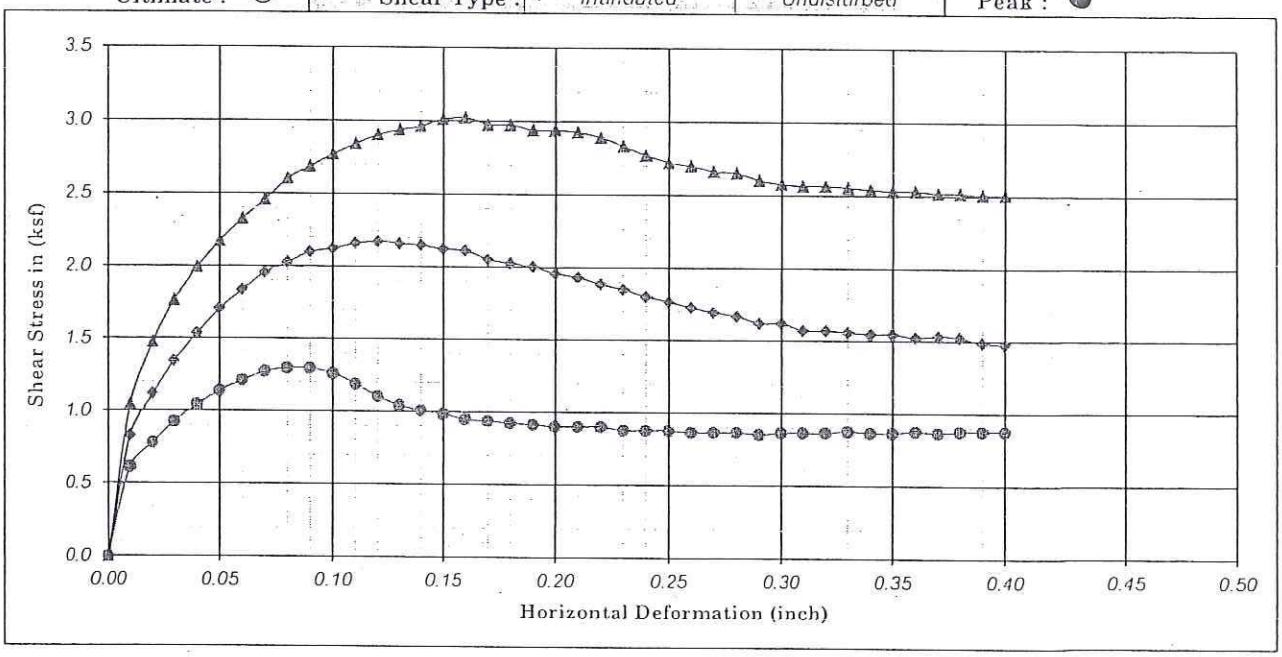


Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-030	Strength Intercept (C) :	0.87	(ksf)	Peak	0.34	(ksf)	Ultimate
Sample No. : D-4		41.66	(kPa)		16.09	(kPa)	
Depth (ft/m) : 20.0 | 0.00	Friction Angle (ϕ) :	29.01	Degree		28.67	Degree	

Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC) — Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.83	106.74	16.80	0.58	1.00	47.88	1.30	62.05	0.85	40.79
◆	20.46	114.18	17.97	0.48	2.00	95.76	2.17	104.00	1.48	70.67
▲	21.80	110.09	17.33	0.53	4.00	191.52	3.02	144.79	2.51	120.08

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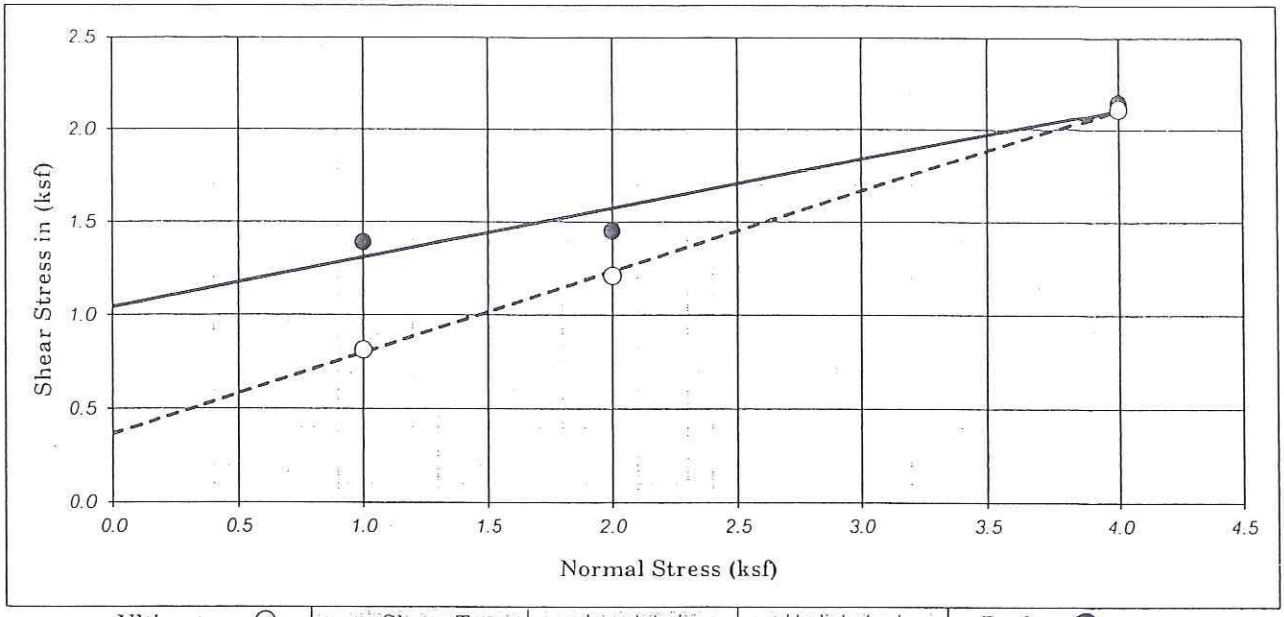
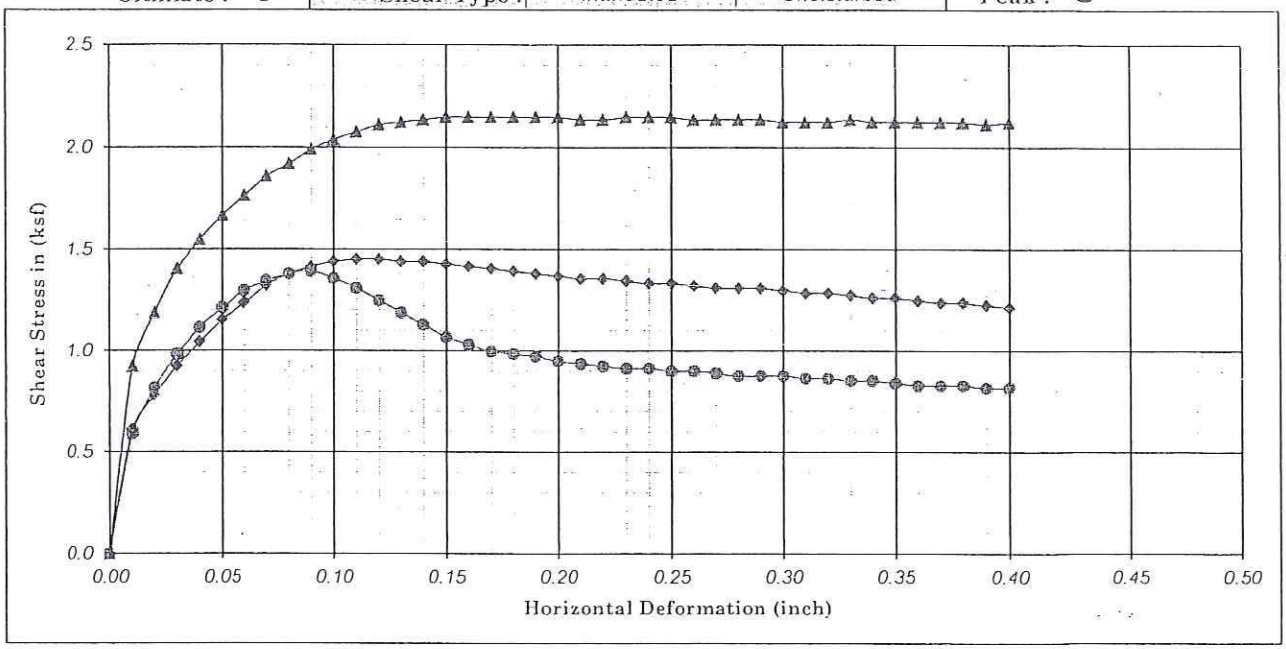
DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 10-133 | Date : 06/09/11 | Figure No. :



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-034		Strength Intercept (C) :	1.04	(ksf)		0.37	(ksf)		
Sample No. : D-4			49.99	(kPa)	Peak	17.52	(kPa)	Ultimate	
Depth (ft/m) : 20.0	0.00	Friction Angle (ϕ) :	14.88	Degree		23.49	Degree		
Description : Olive-brown, Lean CLAY with SAND (CL)							Shear Rate (inch/minute) :	0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	25.28	102.13	16.07	0.65	1.00	47.88	1.39	66.65	0.82	39.07
◆	26.70	96.47	15.18	0.75	2.00	95.76	1.45	69.52	1.21	58.03
▲	24.26	100.75	15.86	0.67	4.00	191.52	2.15	102.85	2.11	101.12

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DIRECT SHEAR TEST (ASTM D-3080)

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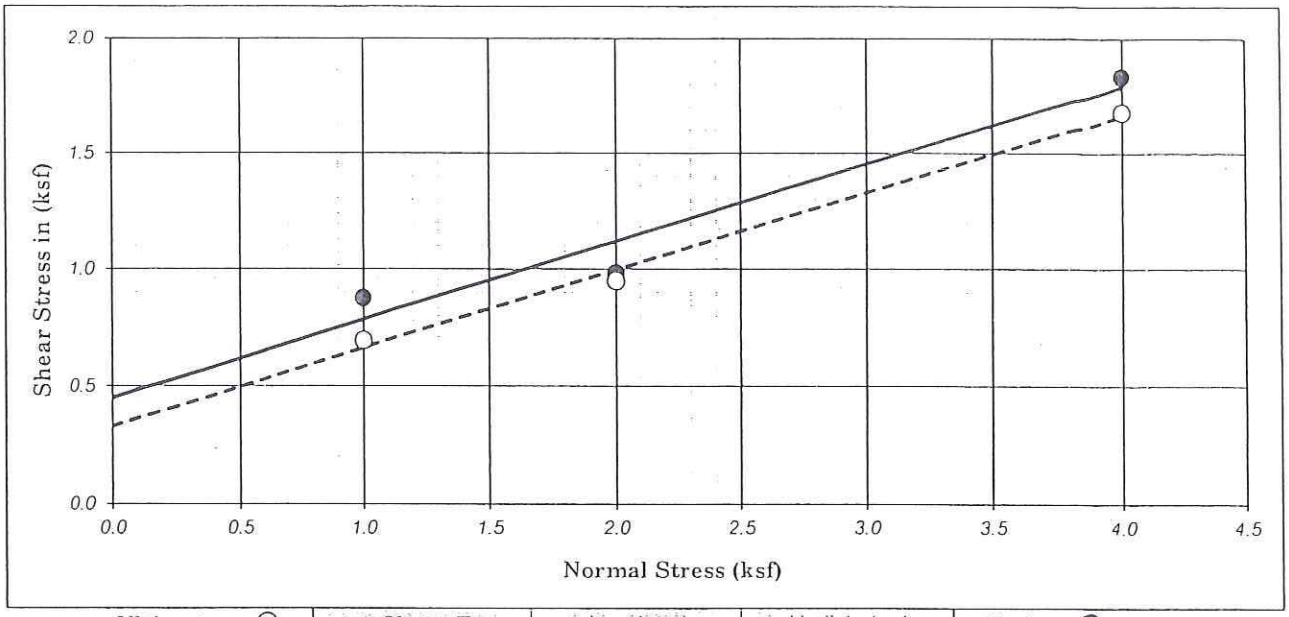
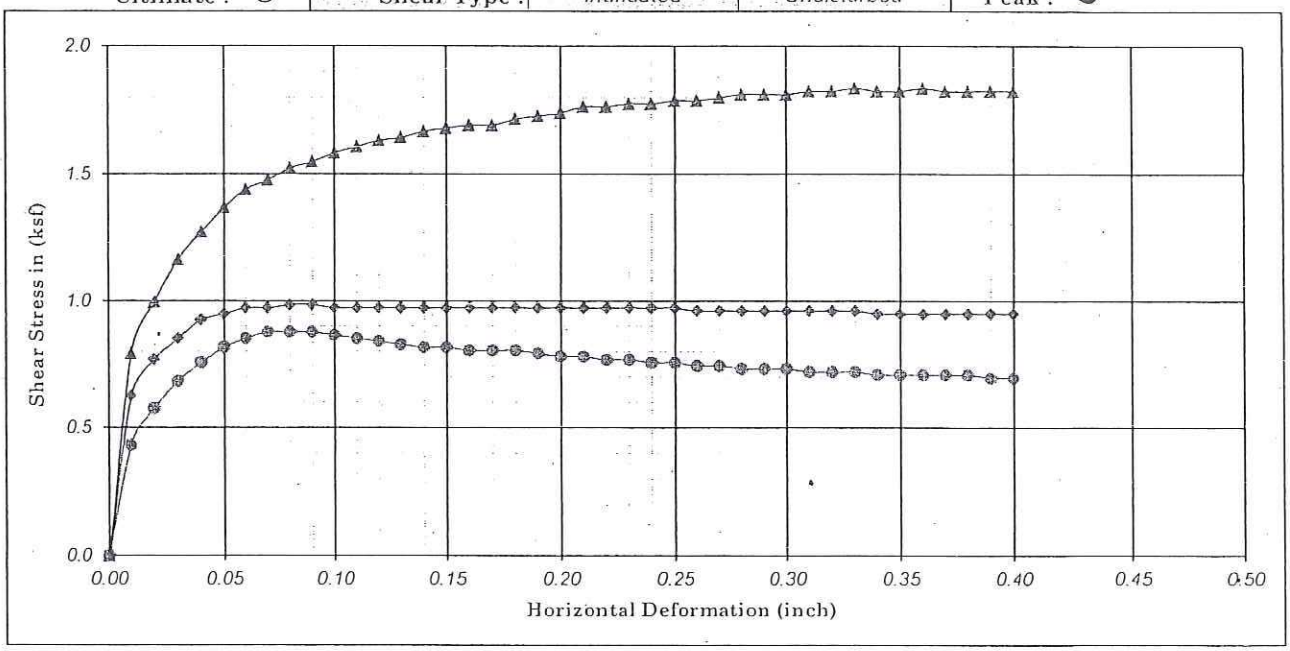


Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-035	Strength Intercept (C) :	0.45	(ksf)	Peak	0.33	(ksf)	Ultimate
Sample No. : D-3		21.55	(kPa)		15.80	(kPa)	
Depth (ft/m) : 15.0 | 0.00	Friction Angle (ϕ) :	18.53	Degree		18.44	Degree	

Description : Yellowish brown, Lean CLAY (CL) — Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	33.89	87.00	13.69	0.94	1.00	47.88	0.88	41.94	0.70	33.32
◆	33.36	86.55	13.94	0.90	2.00	95.76	0.98	47.11	0.95	45.39
▲	29.73	92.56	14.57	0.82	4.00	191.52	1.84	87.91	1.68	80.44

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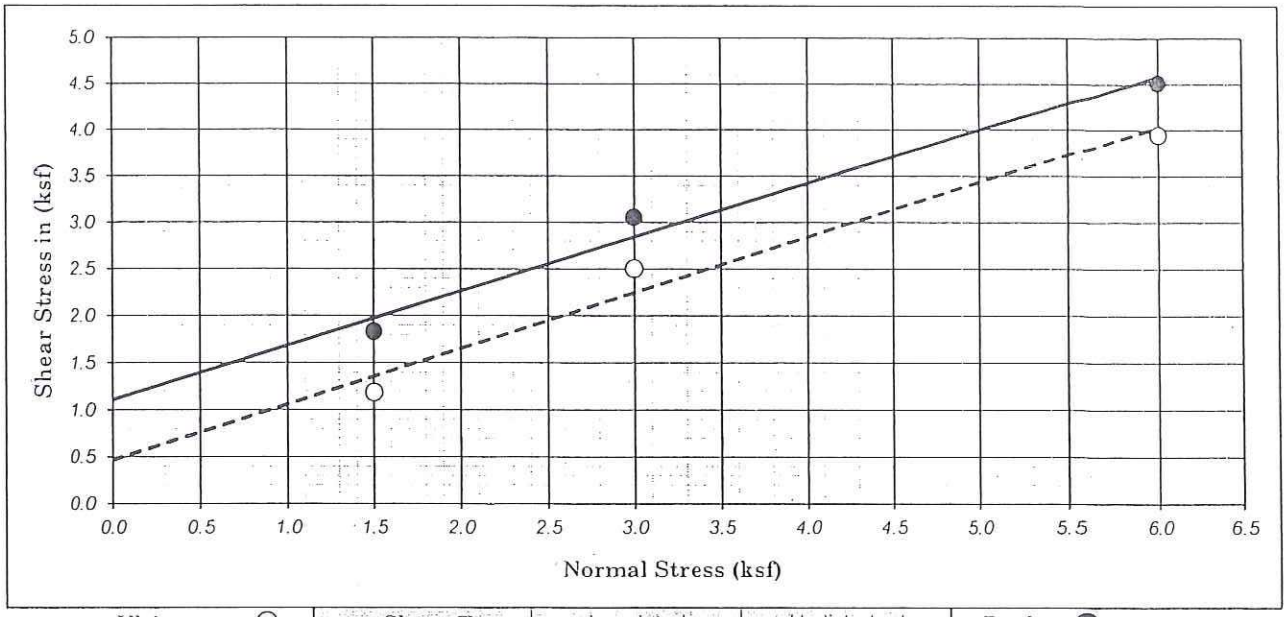
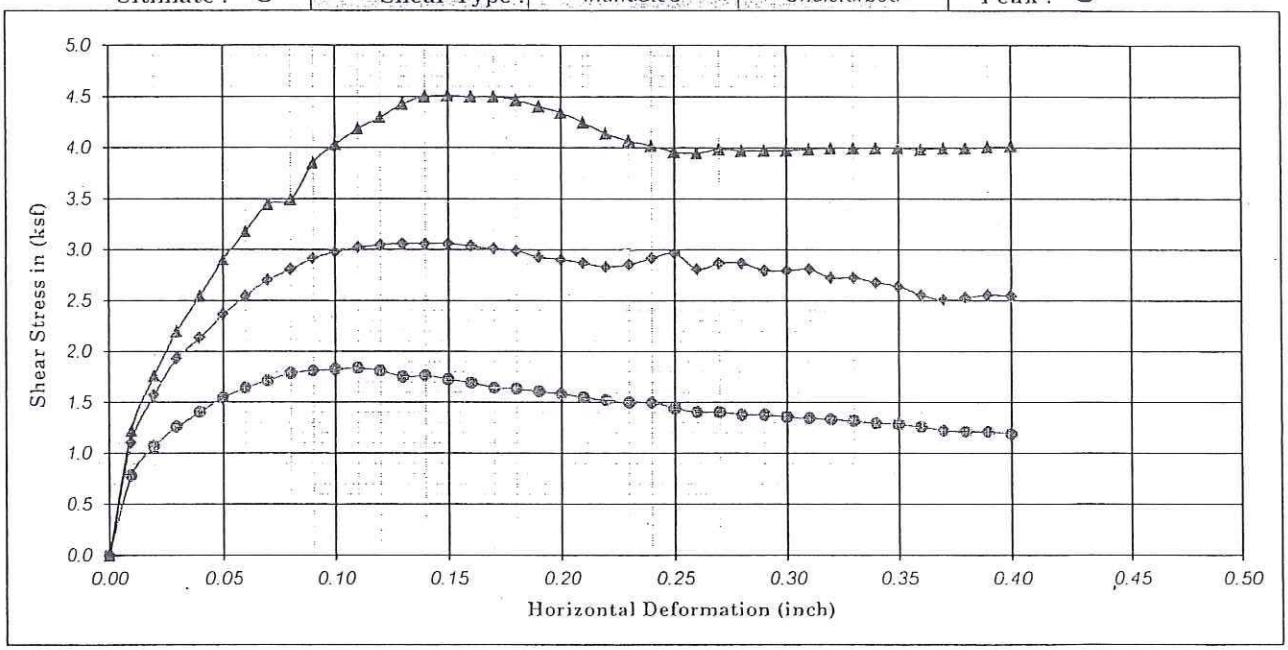


Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-035		Strength Intercept (C) :	1.11	(ksf)	Peak	0.47	(ksf)	Ultimate
Sample No. : D-5			53.15	(kPa)		22.41	(kPa)	
Depth (ft/m) : 25.0	0.00	Friction Angle (ϕ) :	30.06	Degree		30.72	Degree	
Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC)					Shear Rate (inch/minute) :			0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	17.52	119.58	18.82	0.41	1.50	71.82	1.84	87.91	1.19	56.88
◆	16.86	116.90	18.40	0.44	3.00	143.64	3.06	146.51	2.51	120.08
▲	16.88	118.41	18.64	0.42	6.00	287.28	4.51	216.03	3.95	189.03

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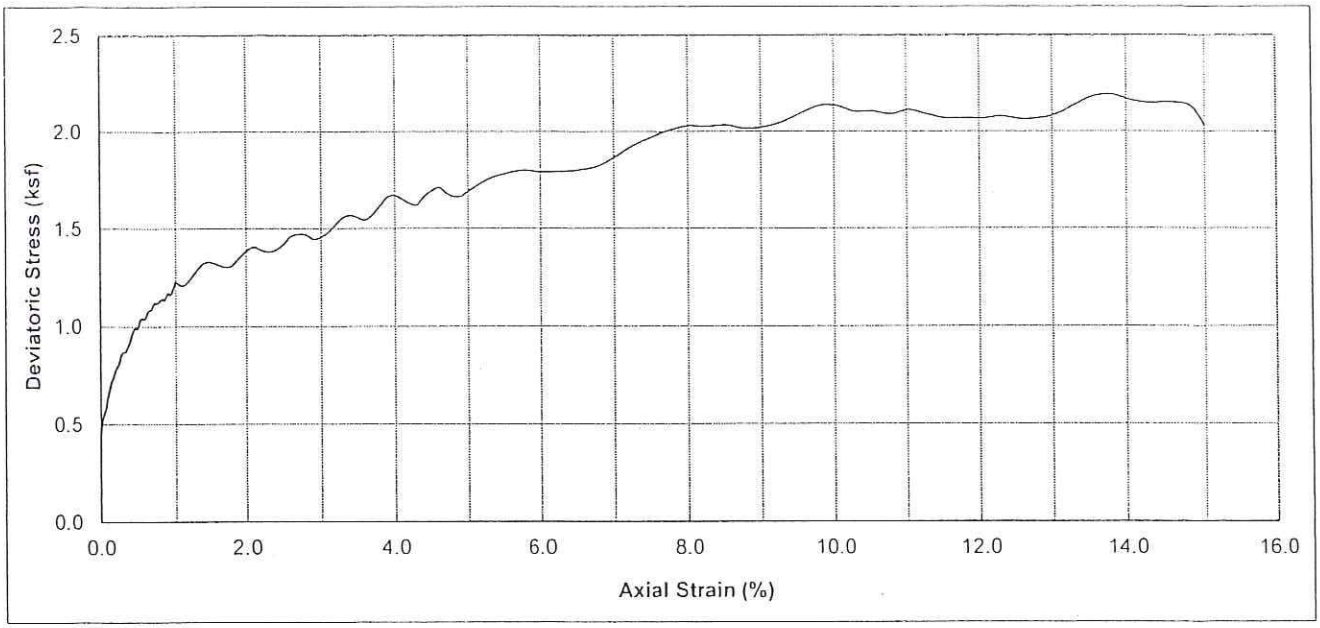
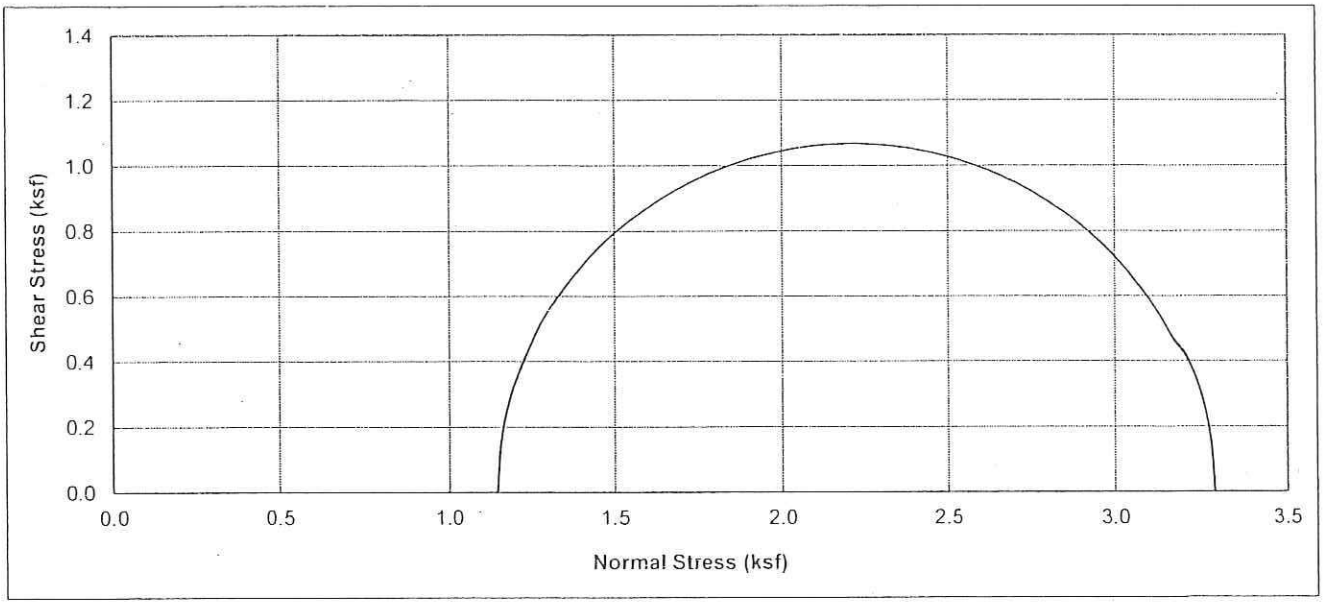
DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 10-133 | Date : 06/09/11 | Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-002	D-4	15	Olive Brown, LEAN CLAY (CL)	96.8	25.92	1.15	2.13	94.5

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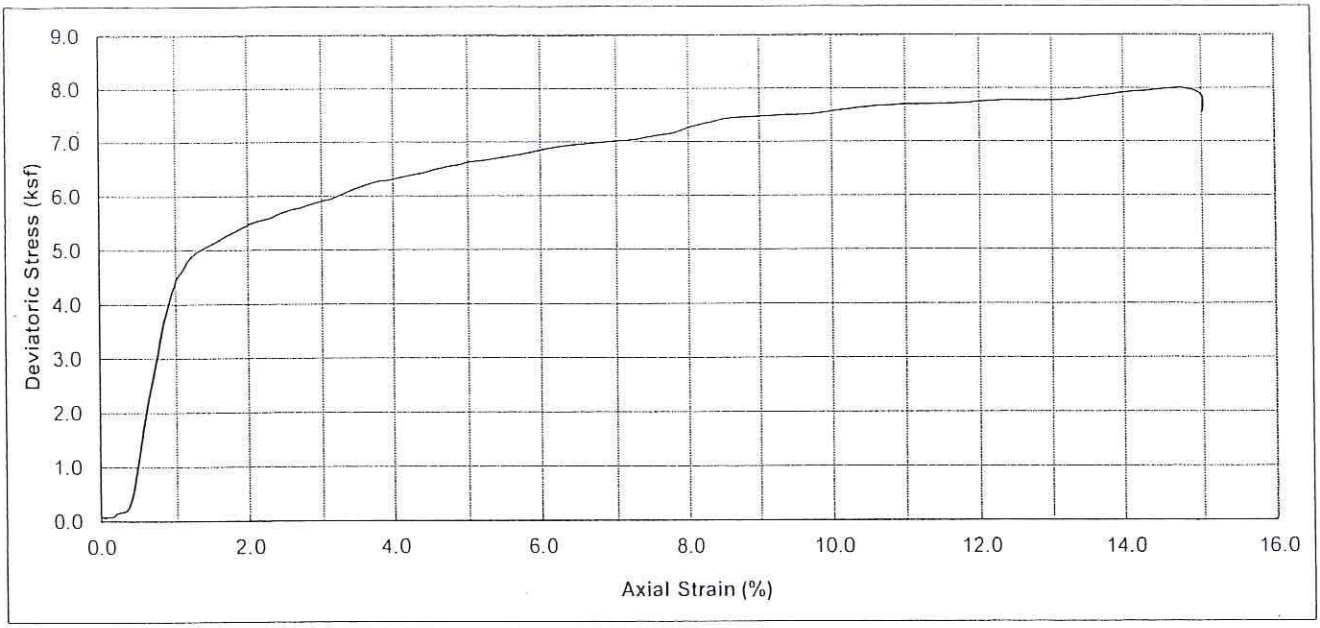
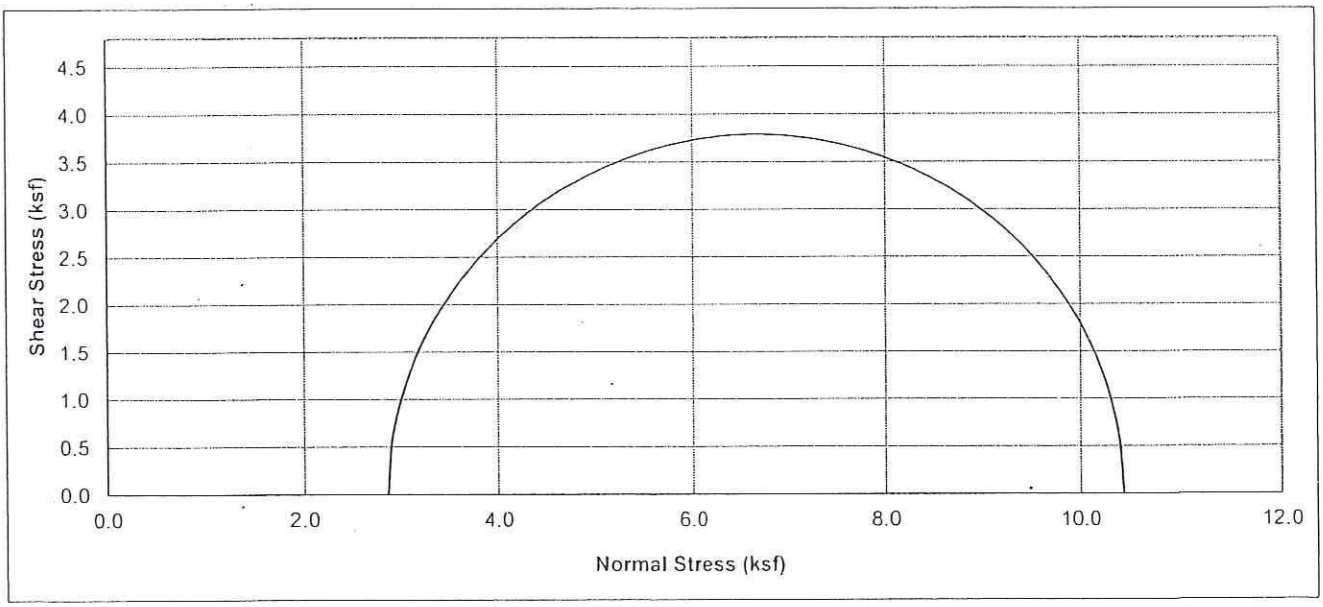
		UNCONSOLIDATED UNDRAINED TEST
Project No.: 10-133	Date: 06/06/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-002	D-8	35	Olive Brown, LEAN CLAY (CL)	107.9	19.30	2.87	7.58	92.8

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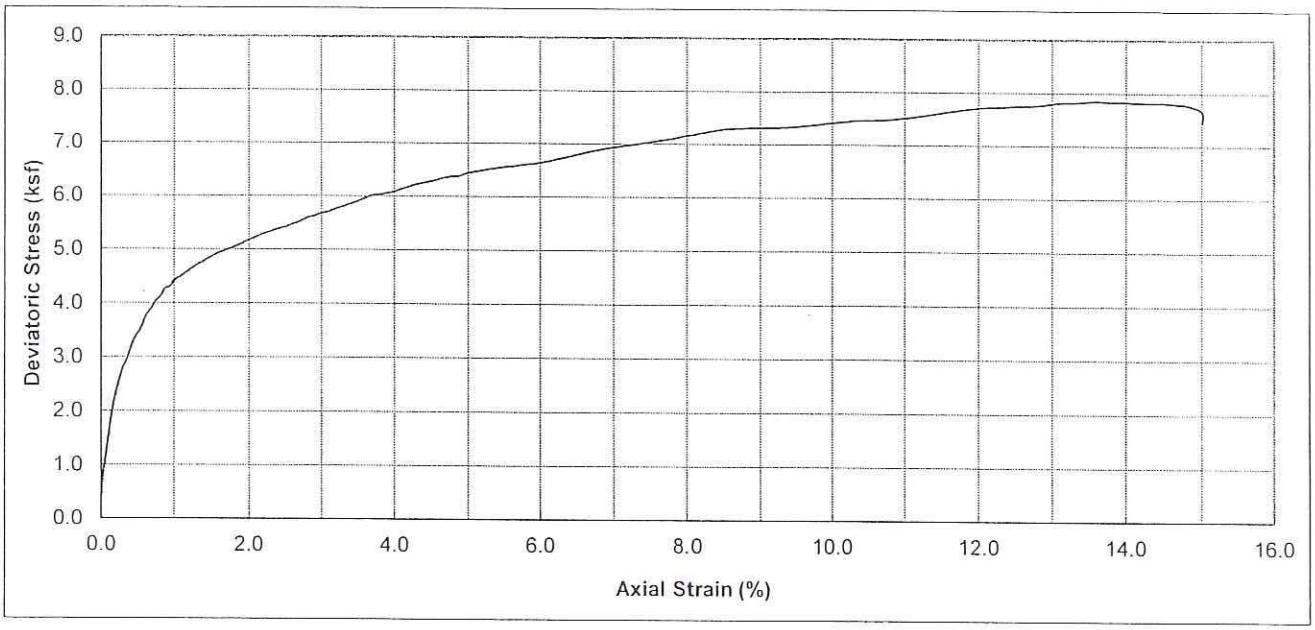
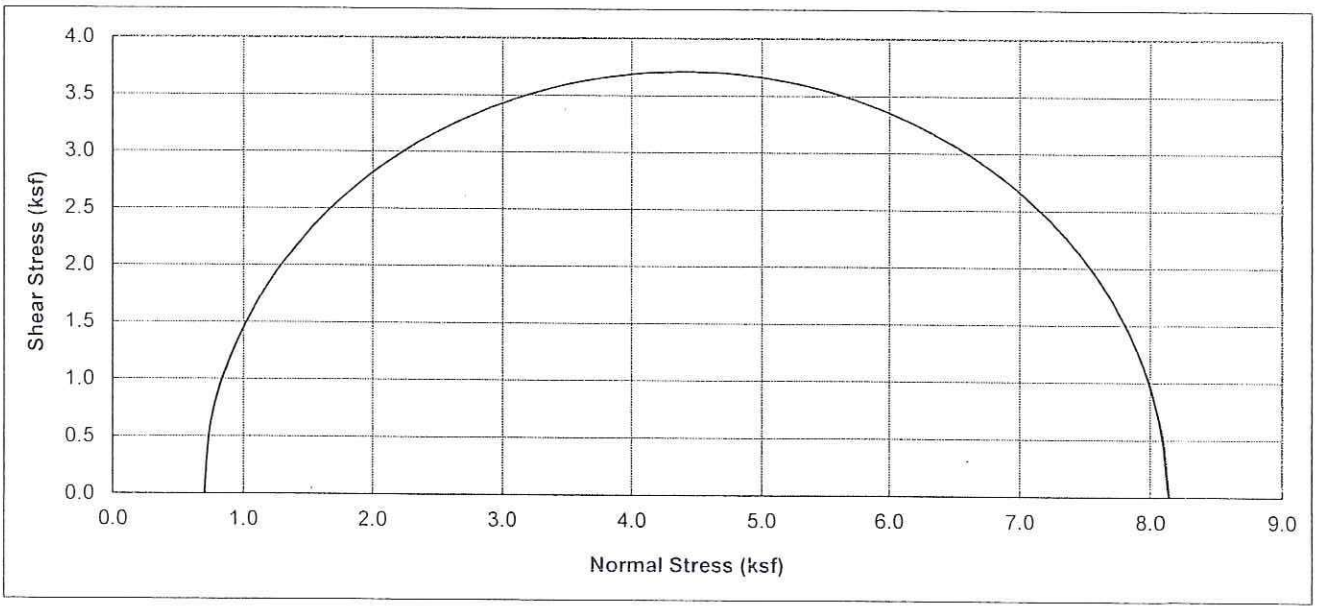
	UNCONSOLIDATED UNDRAINE D TEST
Project No. : 10-133 Date : 06/07/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-006	D-1	5	Olive Brown, LEAN CLAY(CL)	110.0	17.63	0.70	7.42	89.6

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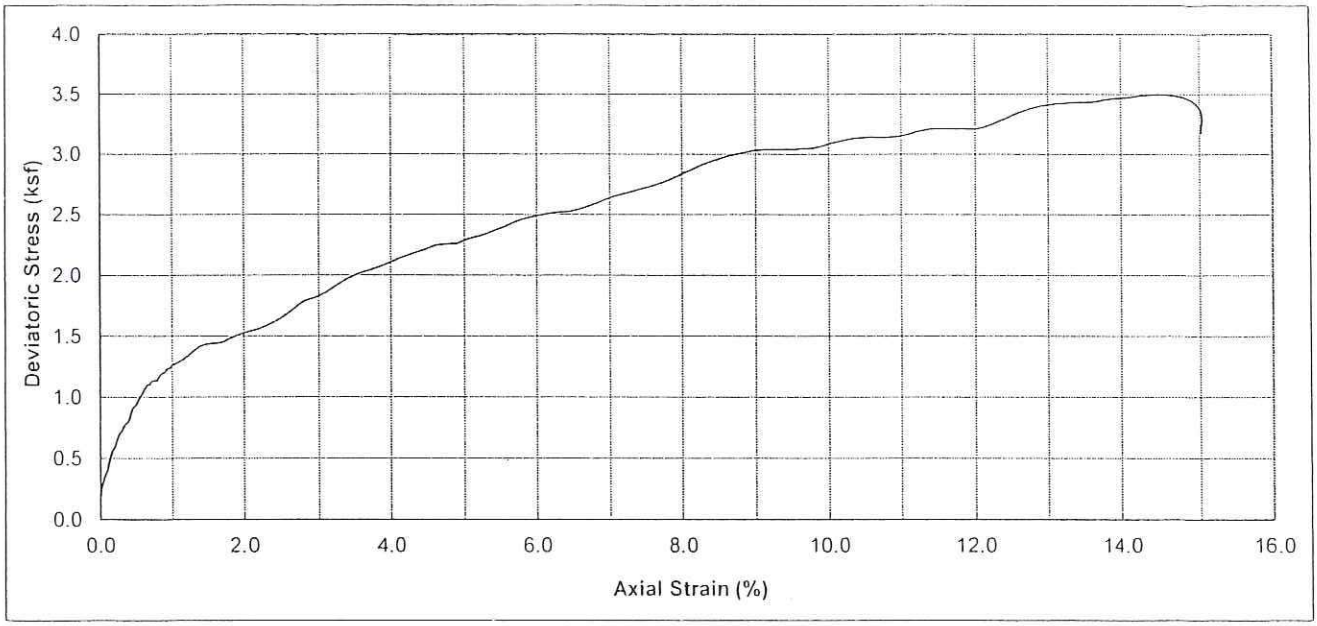
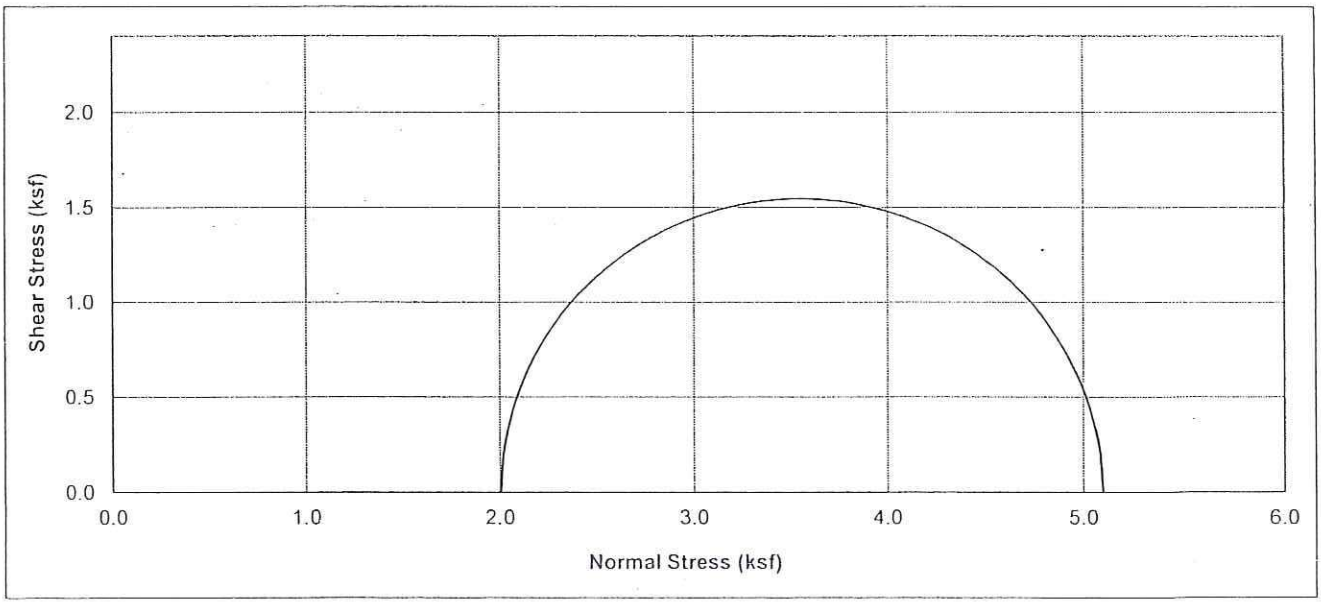
Project No. : 10-133 Date : 06/07/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-006	D-5	25	Olive Brown , LEAN CLAY (CL)	106.8	21.41	2.00	3.09	100.1

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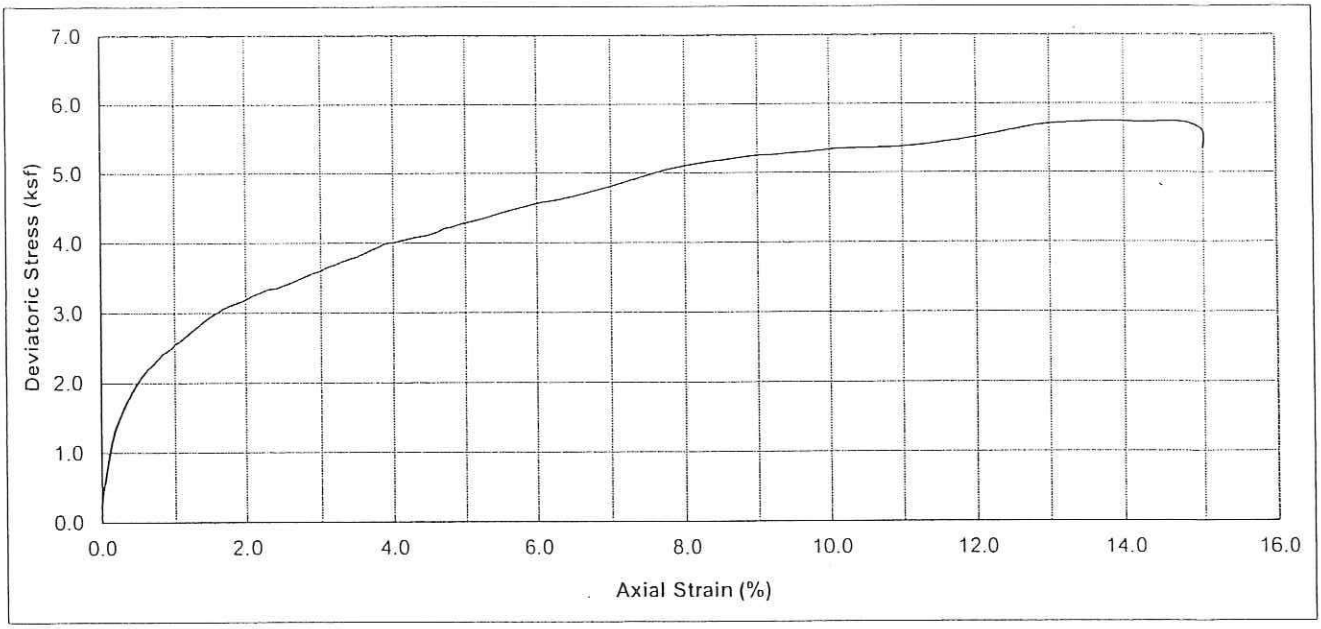
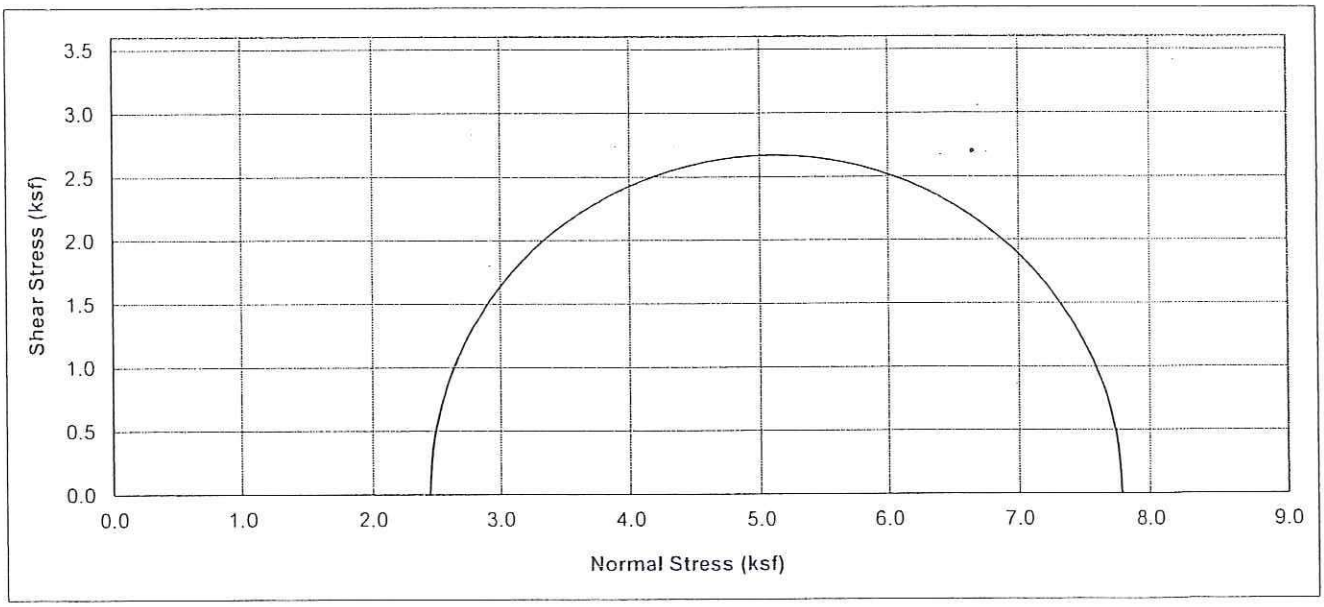
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 / Date : 06/07/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-008	D-6	30	Olive Brown , LEAN CLAY (CL)	111.3	17.79	2.44	5.34	93.6

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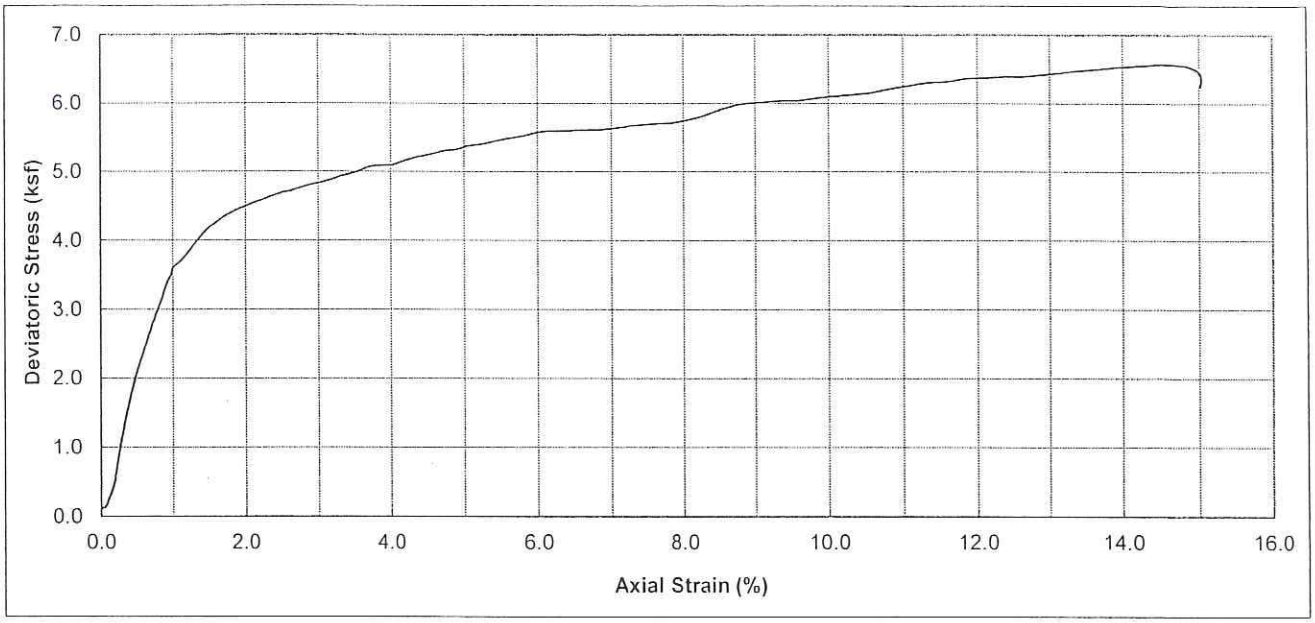
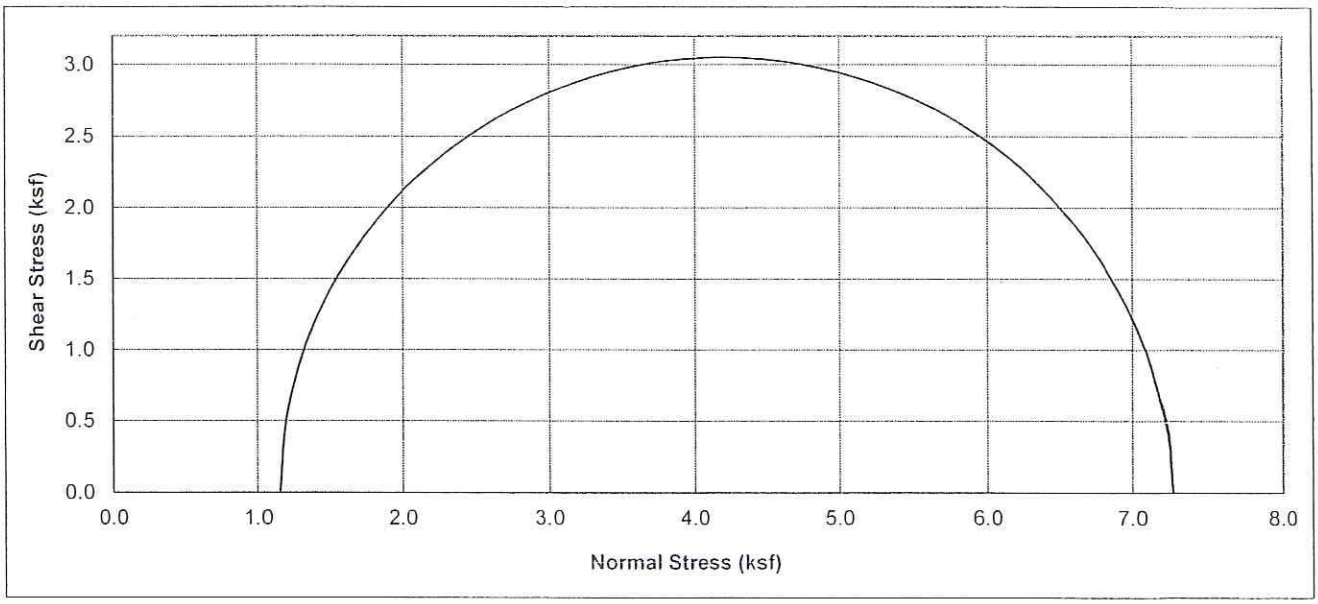
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 / Date : 06/08/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-010	D-4	15	Olive Brown , LEAN CLAY (CL)	103.6	21.96	1.15	6.11	94.8

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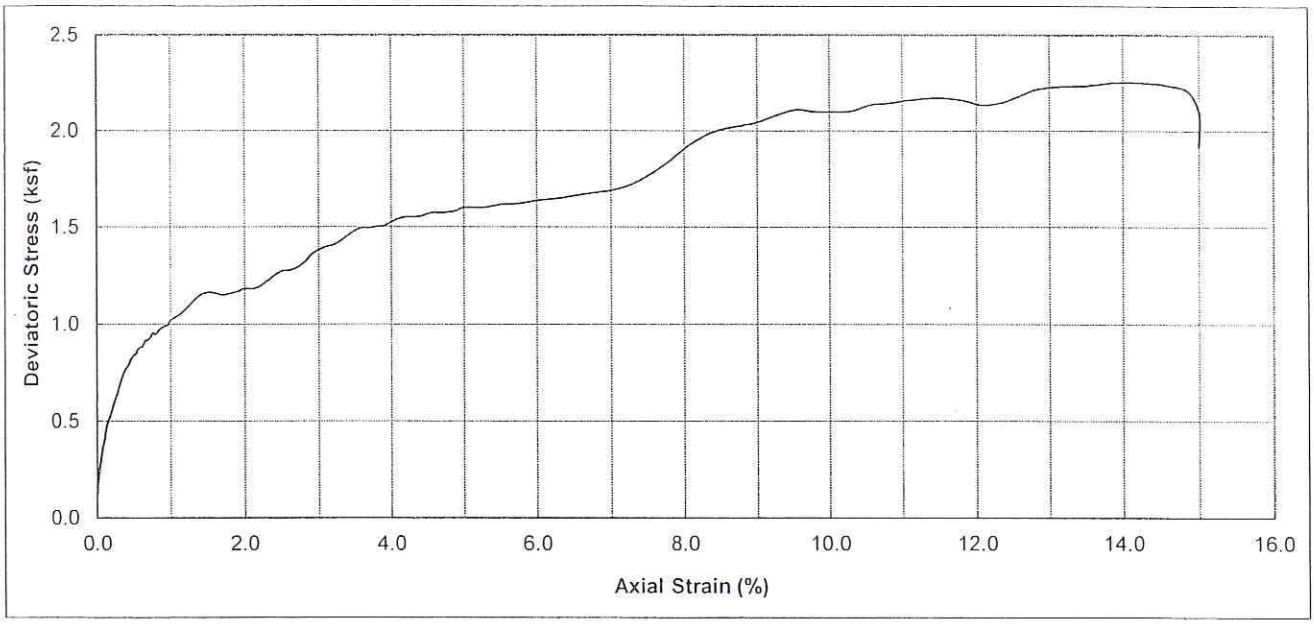
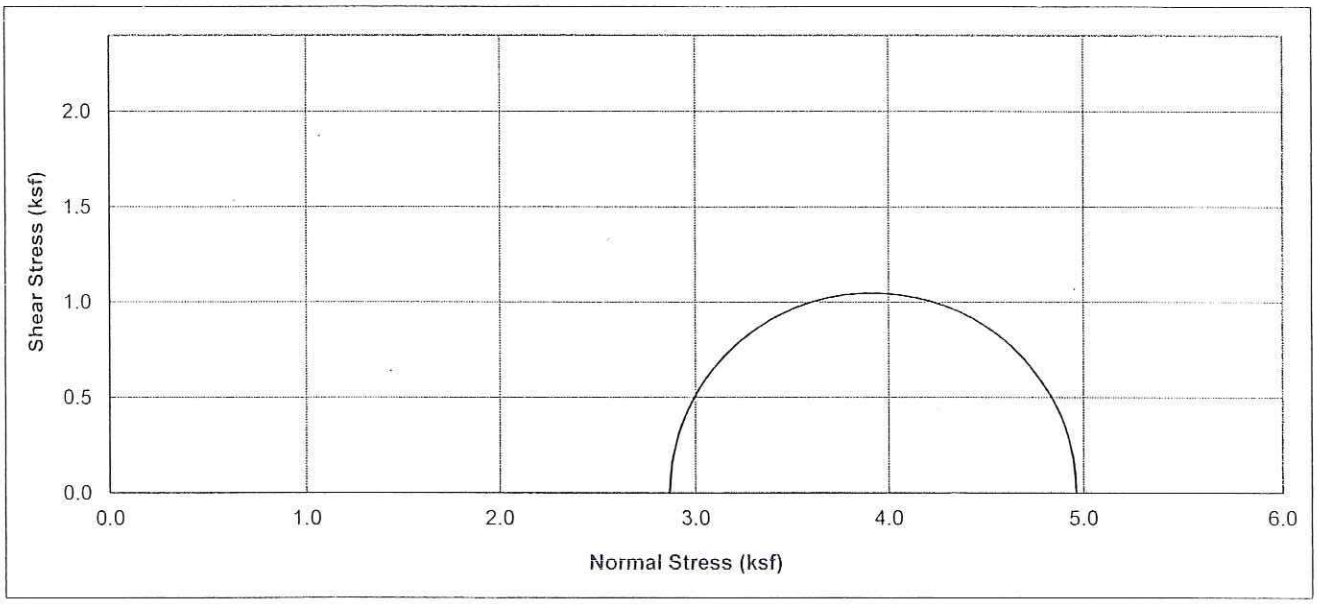
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 Date : 06/08/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-010	D-8	35	Olive Brown , LEAN CLAY (CL)	99.5	24.20	2.87	2.10	94.2

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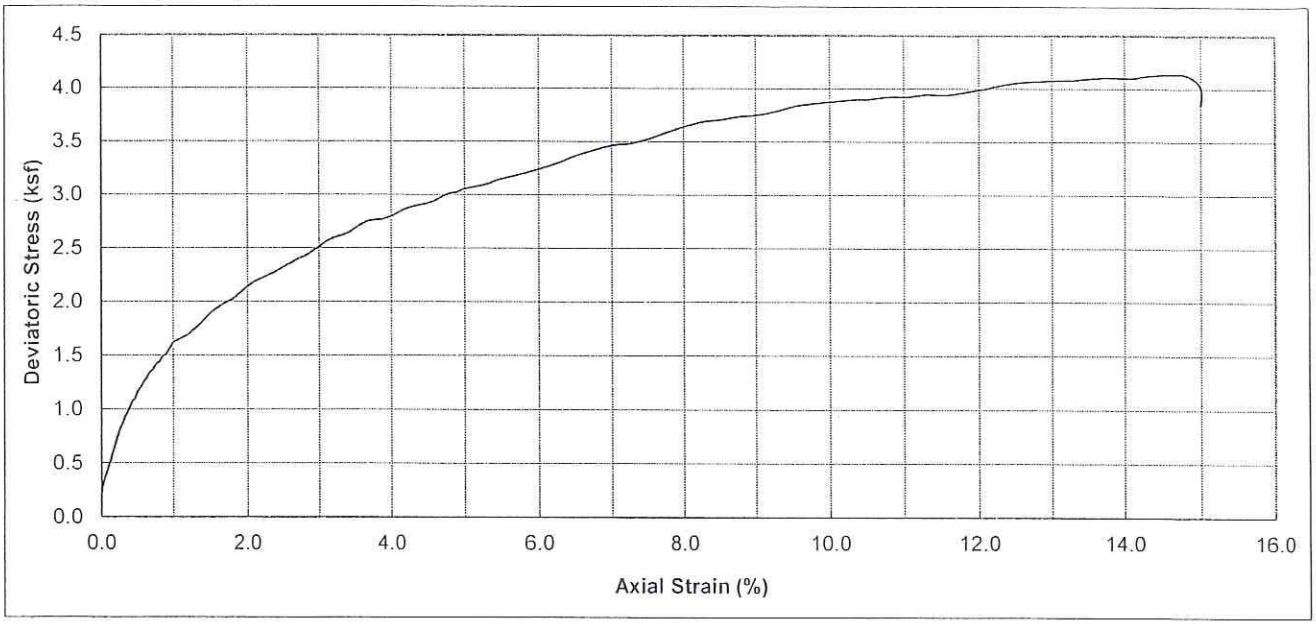
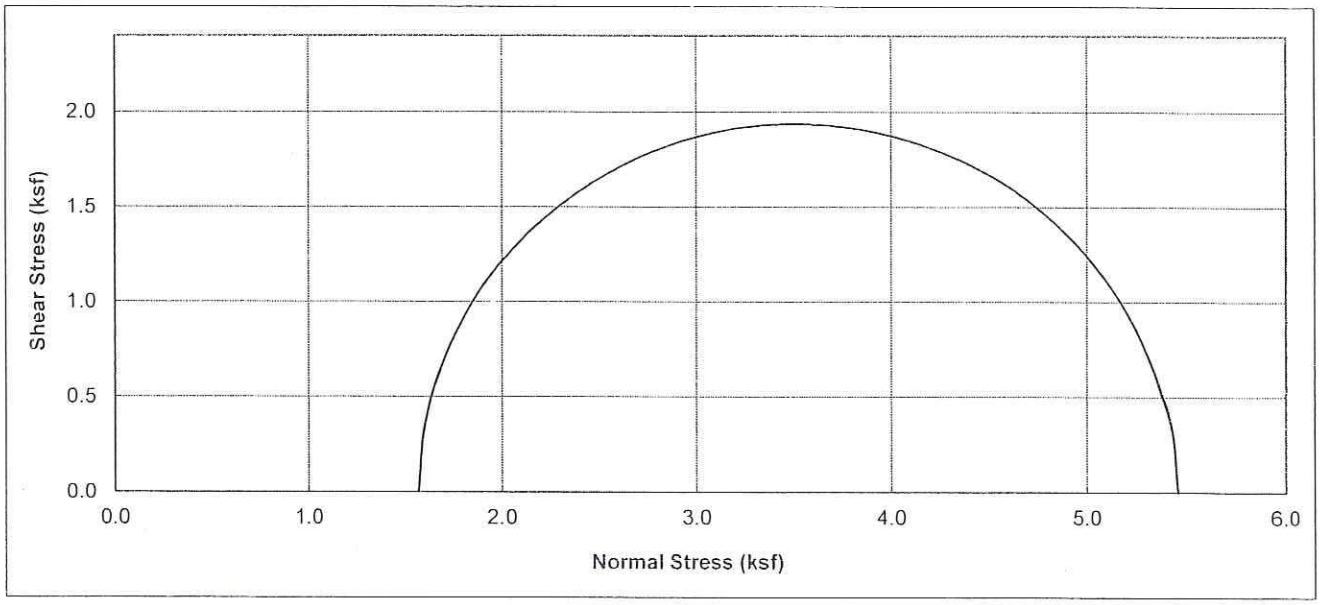
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 Date : 06/08/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-014	D-4	20	Olive Brown , LEAN CLAY (CL)	115.9	14.26	1.57	3.88	84.8

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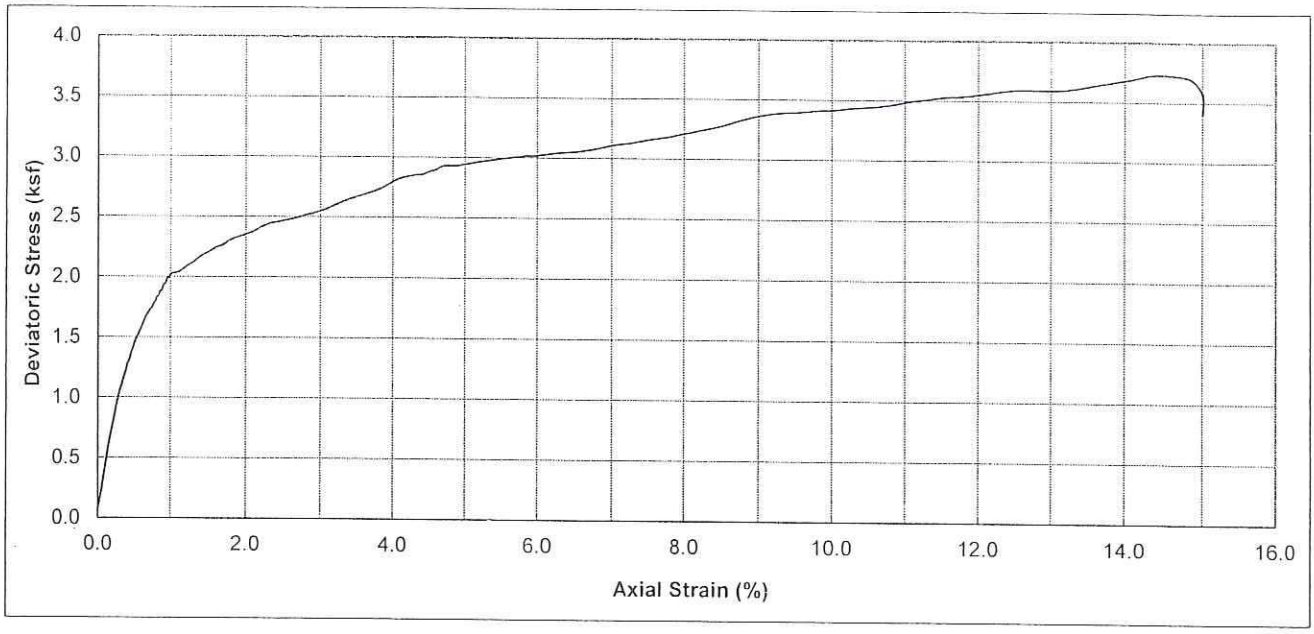
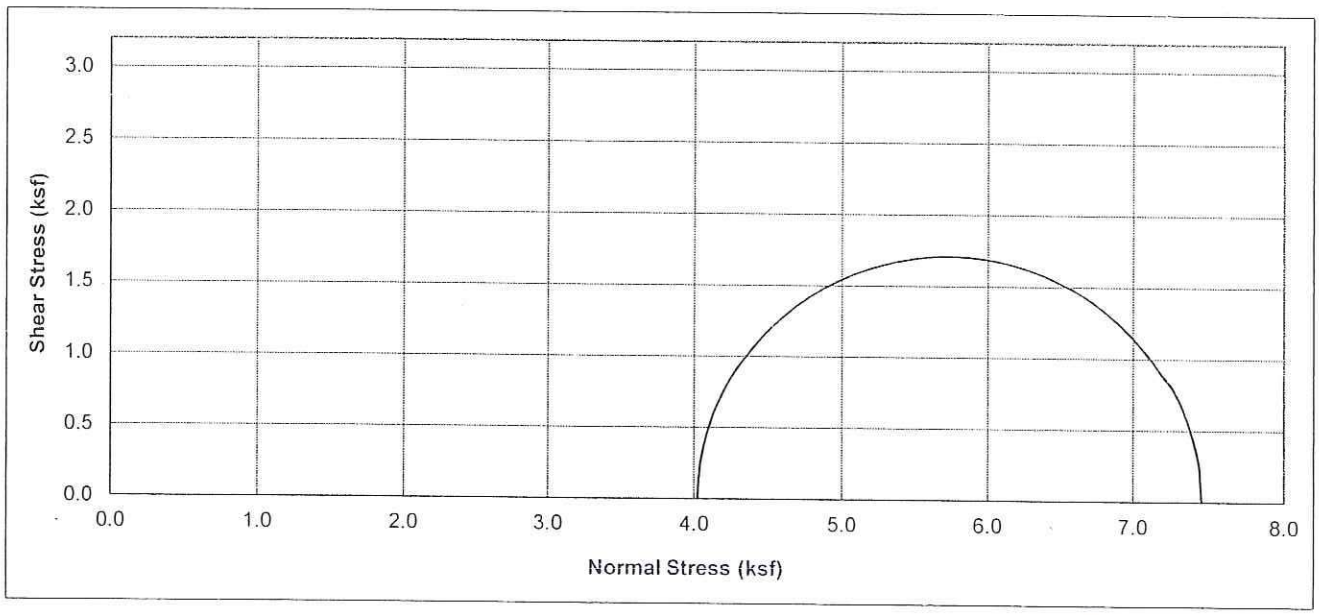
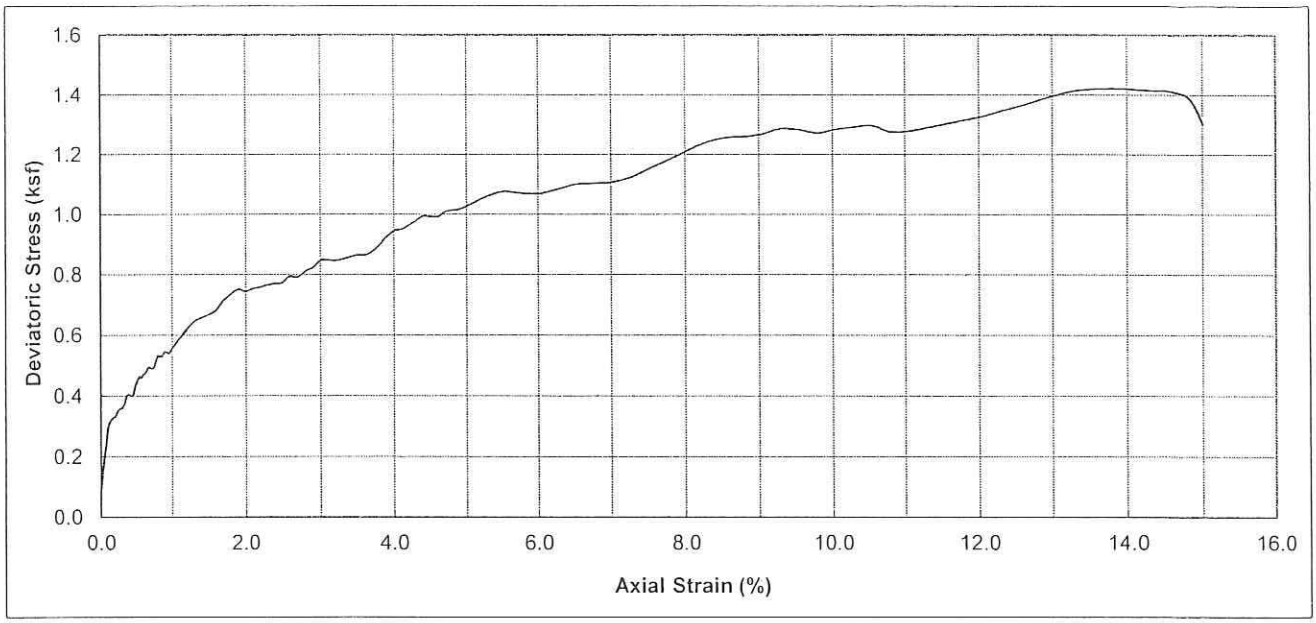
		UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133	Date : 06/08/11	(ASTM D2850) Figure No. :

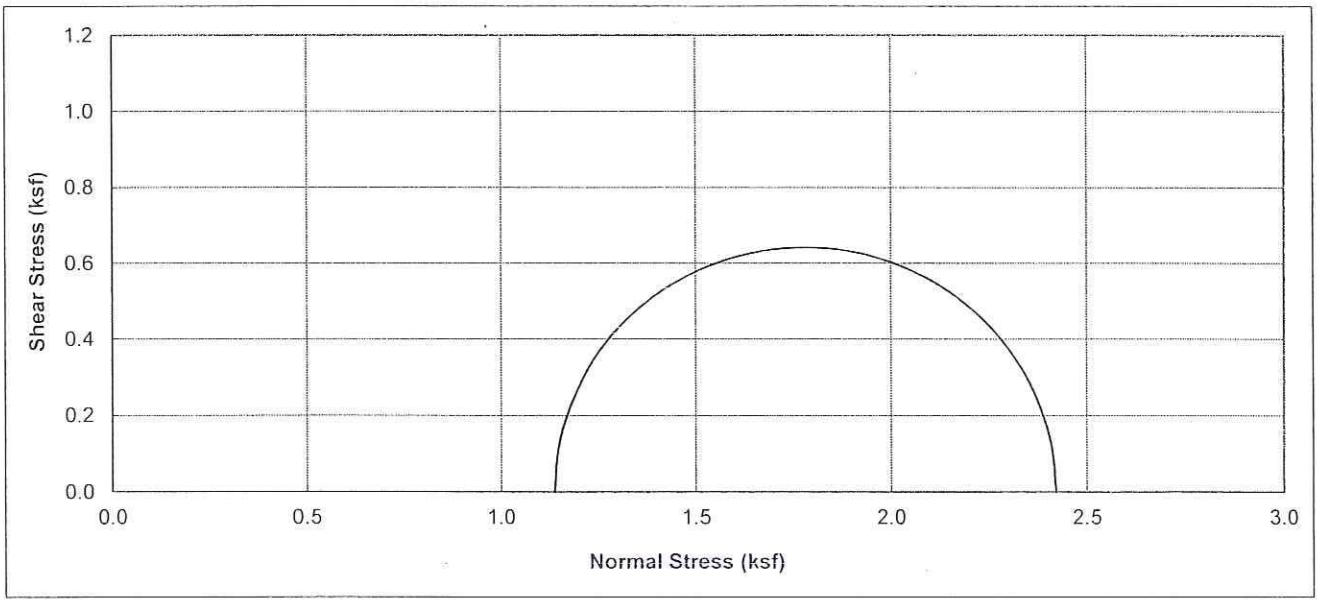




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-014	D-10	50	Olive Brown , FAT CLAY (CH)	95.2	27.47	4.02	3.42	96.4

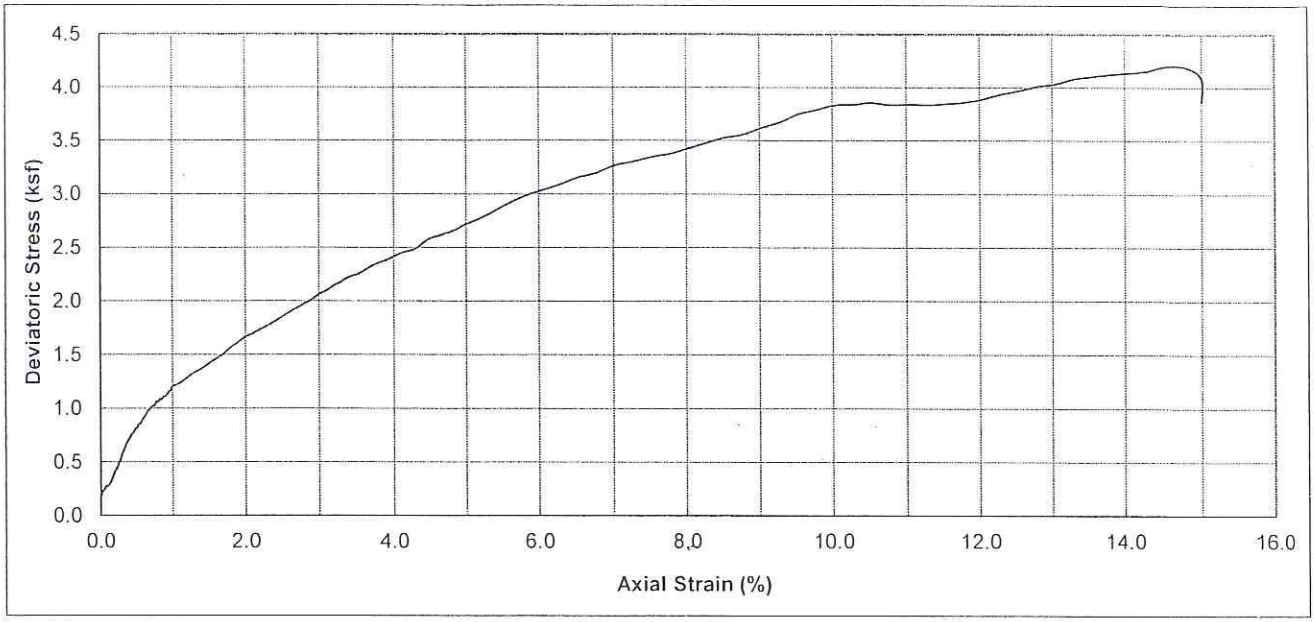
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
Project No. : 10-133 / Date : 06/08/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :

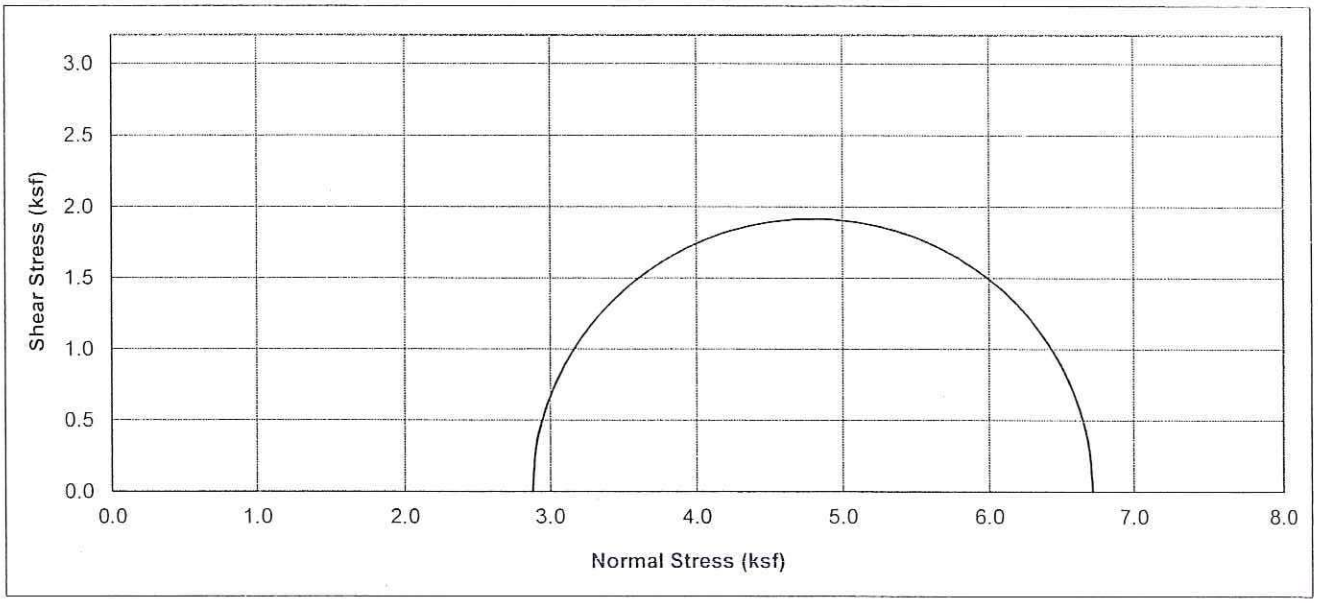




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-021	D-3	15	Olive Brown , SANDY CLAY (CL)	105.9	21.67	1.14	1.28	99.0

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 / Date : 06/08/11	(ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-021	D-7	35	Olive Brown , SANDY CLAY (CL)	126.4	7.70	2.88	3.83	62.5

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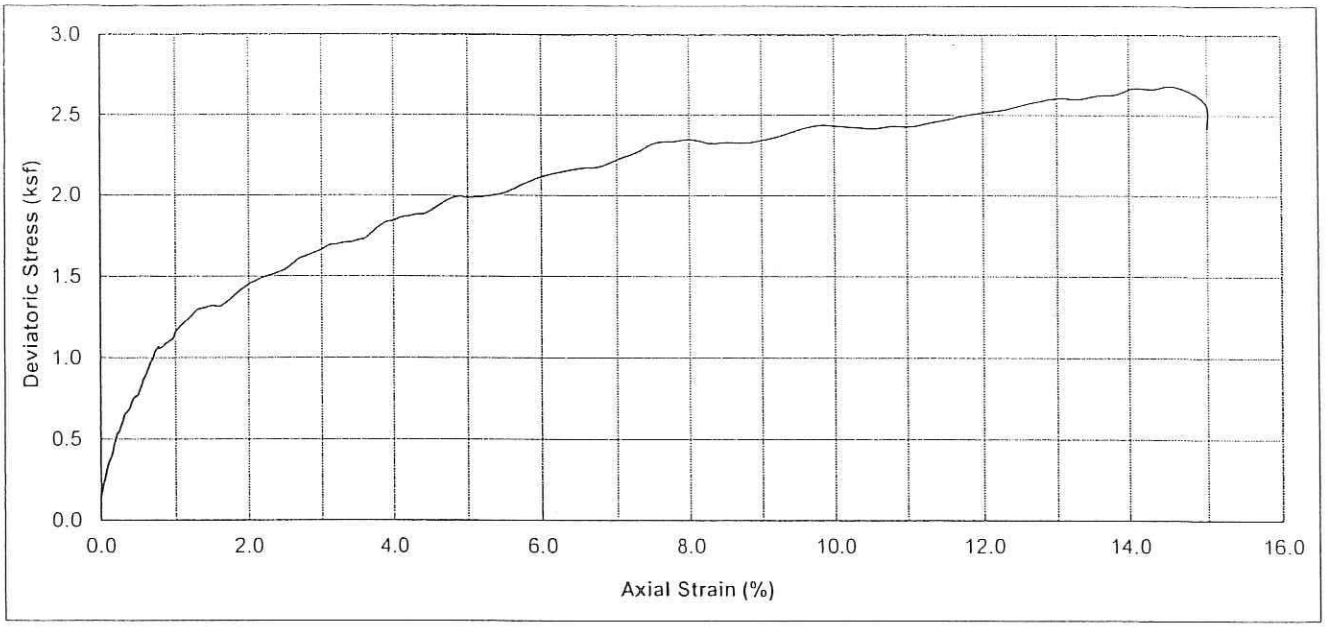
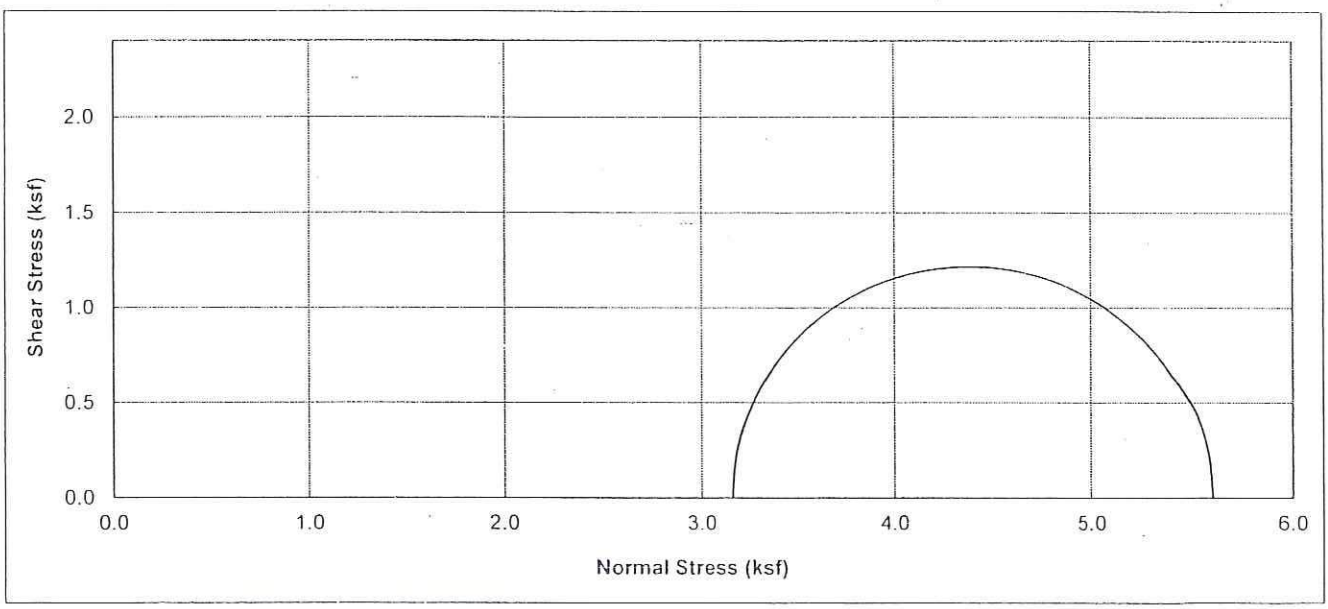
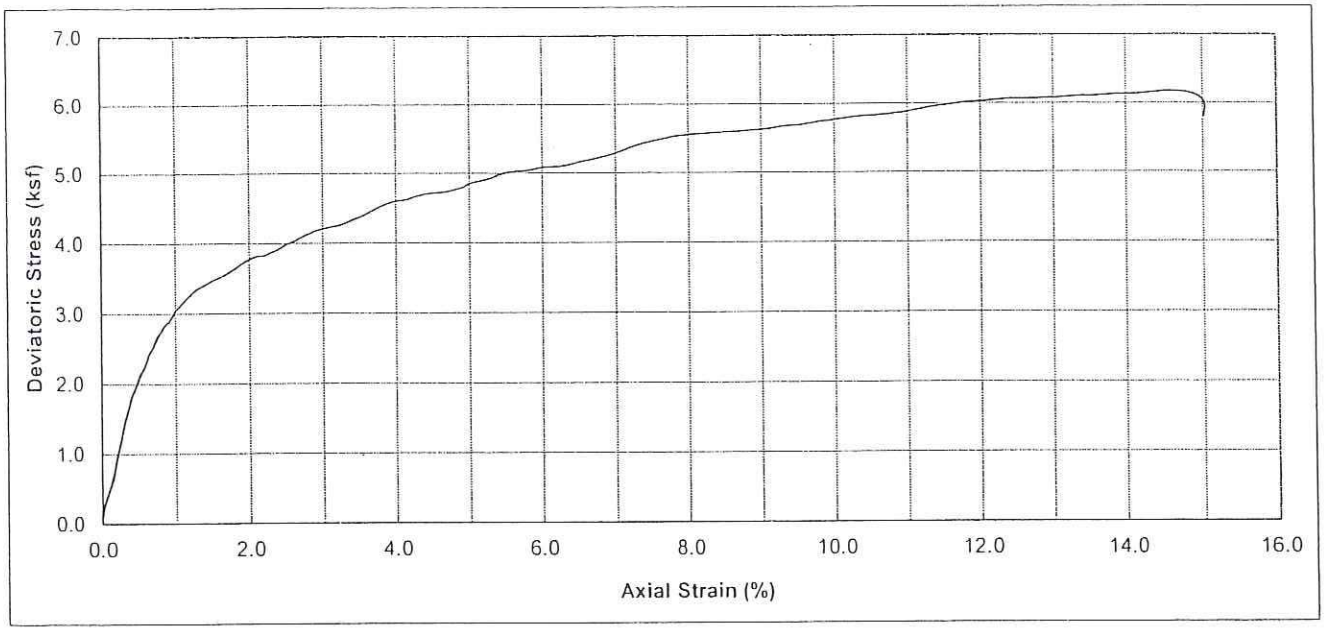
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 / Date : 06/08/11	(ASTM D2850) Figure No. :

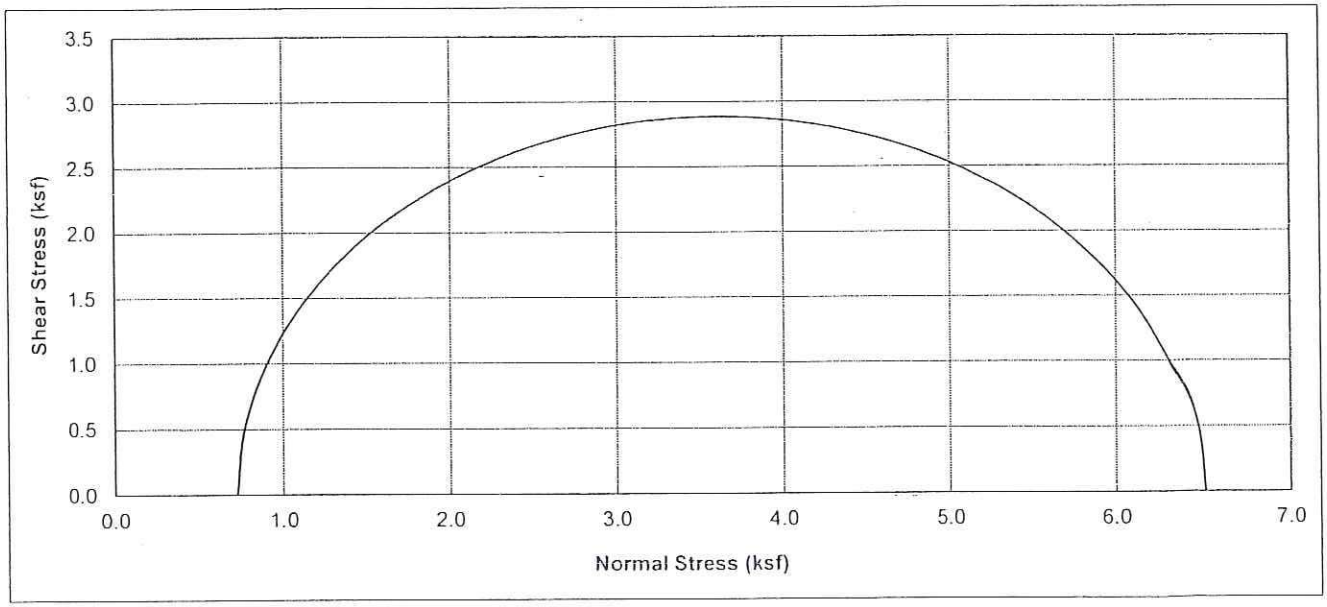




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-030	D-8	40	Olive Brown , LEAN CLAY (CL)	91.0	30.16	3.16	2.43	95.6

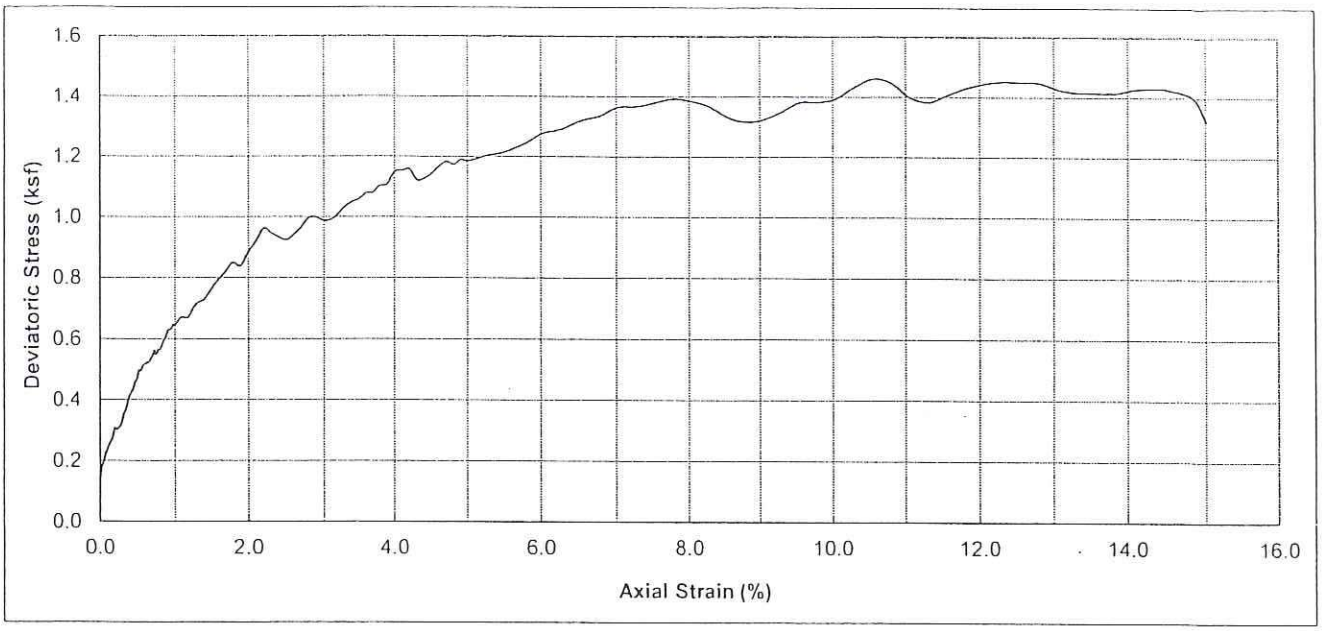
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 Date : 06/08/11	(ASTM D2850) Figure No. :

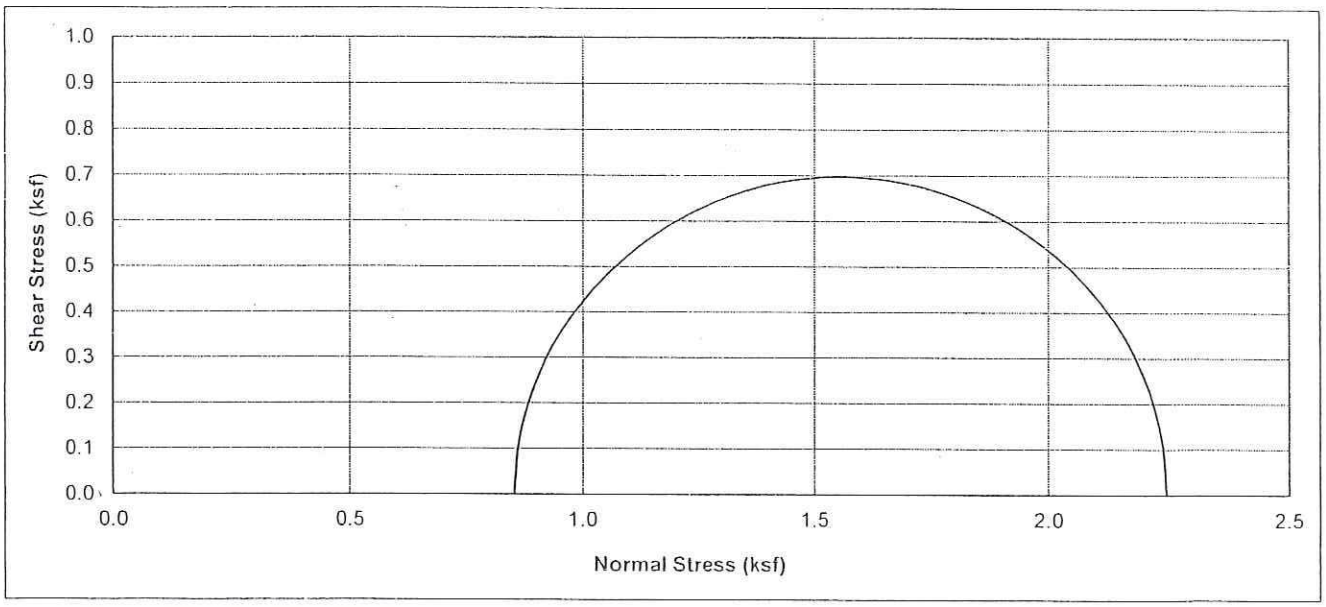




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-031	D-1	5	Olive Brown , FAT CLAY (CH)	101.9	20.71	0.72	5.77	85.5

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
Project No. : 10-133 / Date : 06/09/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-034	D-2	10	Olive Brown , FAT CLAY (CH)	91.3	29.17	0.86	1.39	93.3

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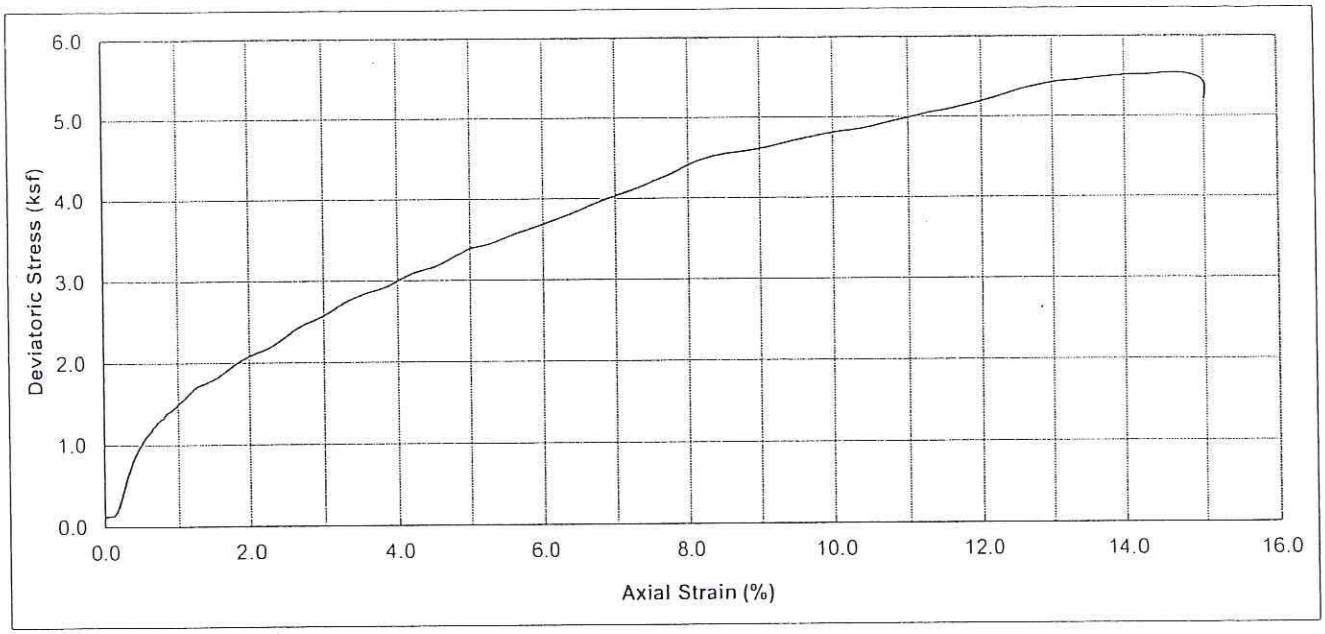
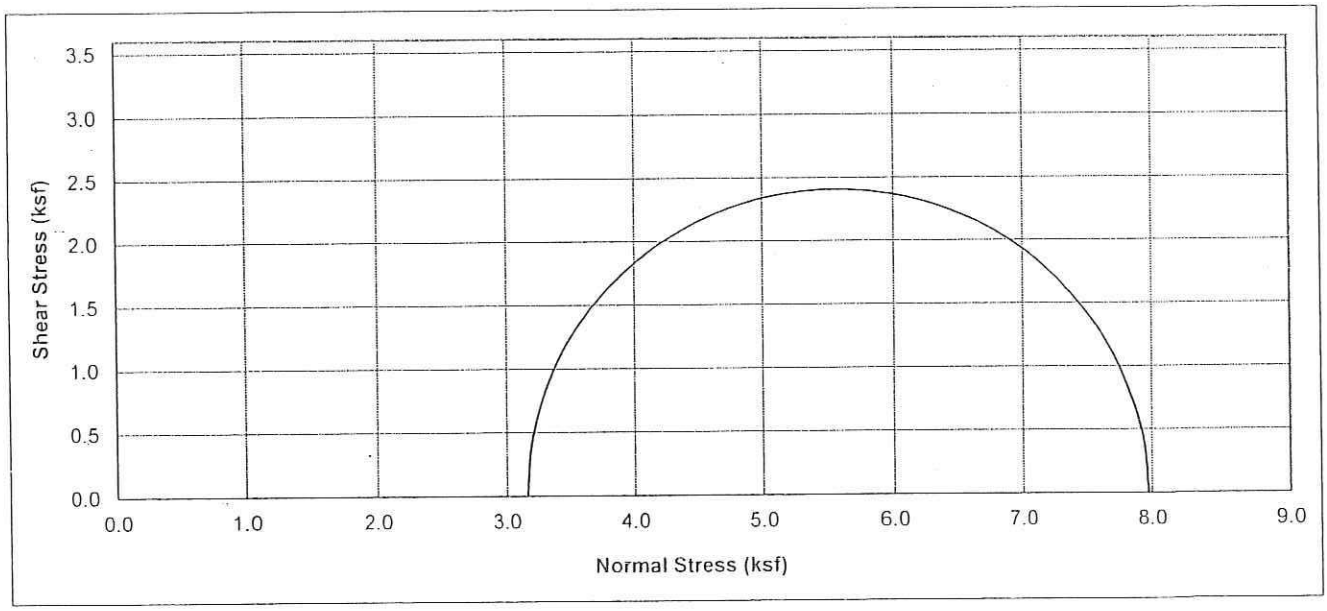
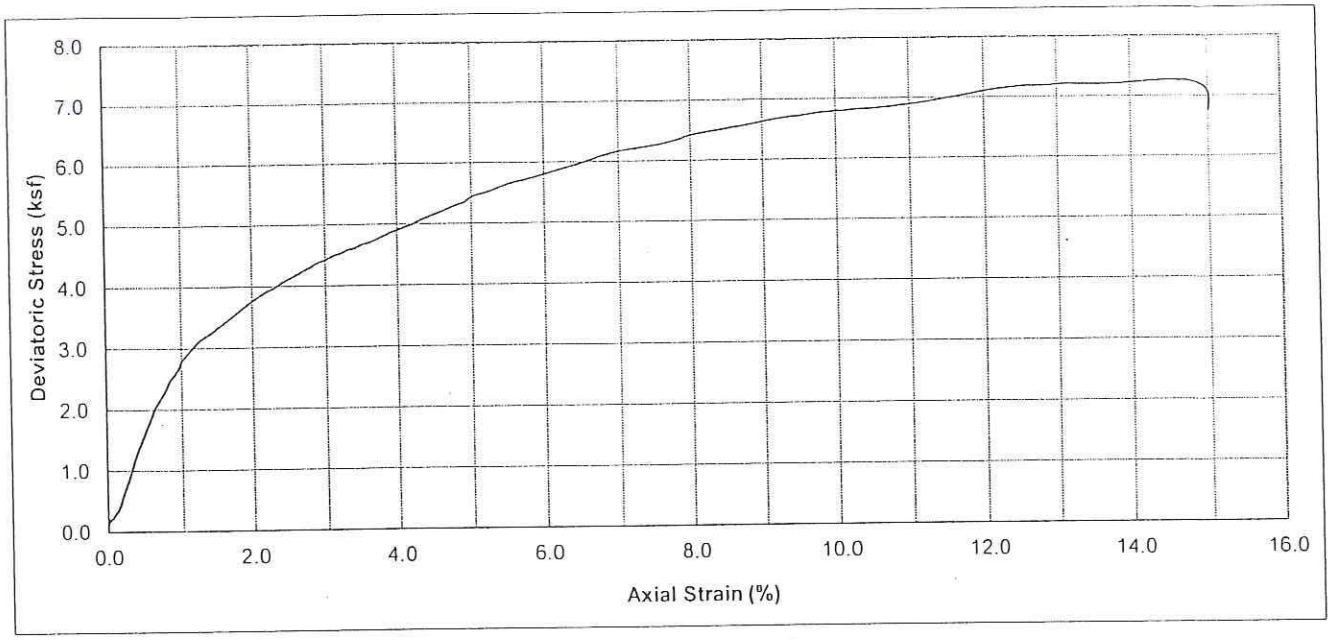
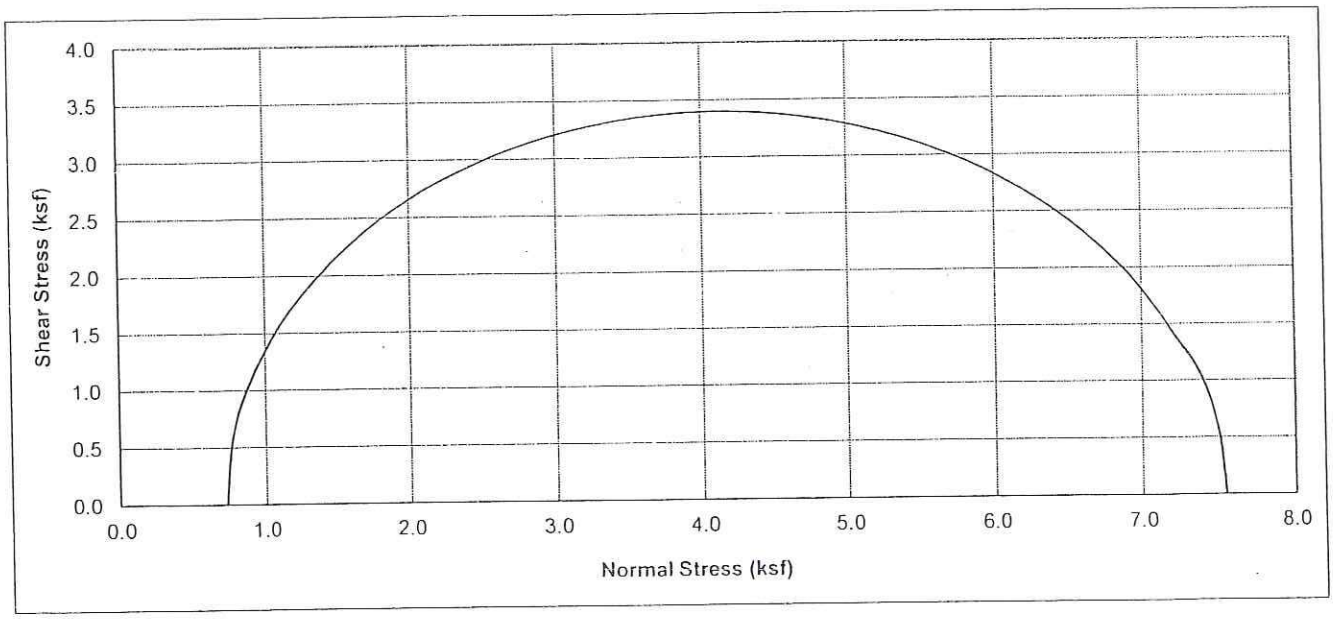




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-034	D-8	40	Olive , LEAN CLAY , (CL)	107.8	19.13	3.16	4.82	91.7

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
Project No. : 10-133 Date : 06/09/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-035	D-1	5	Olive, LEAN CLAY(CL)	109.7	17.74	0.72	6.80	89.5

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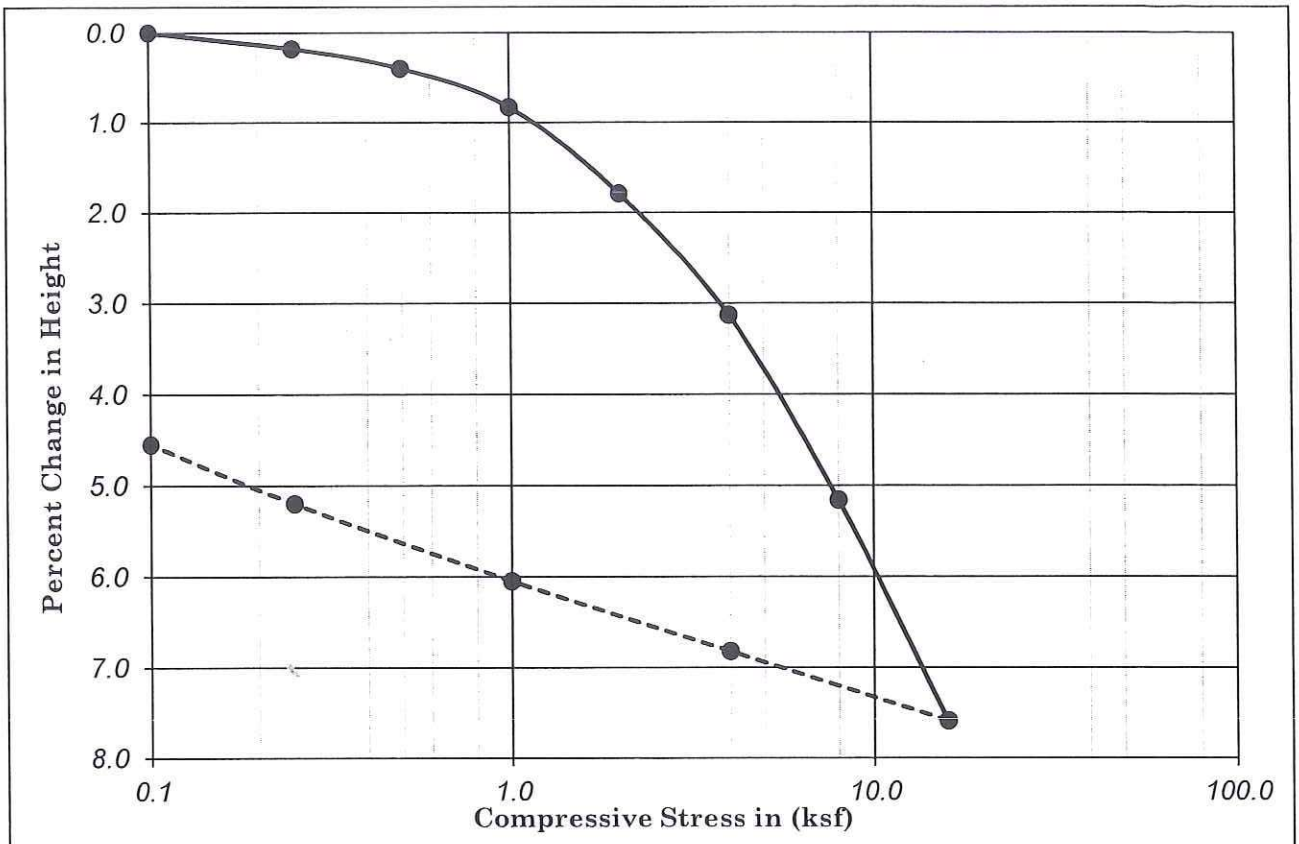
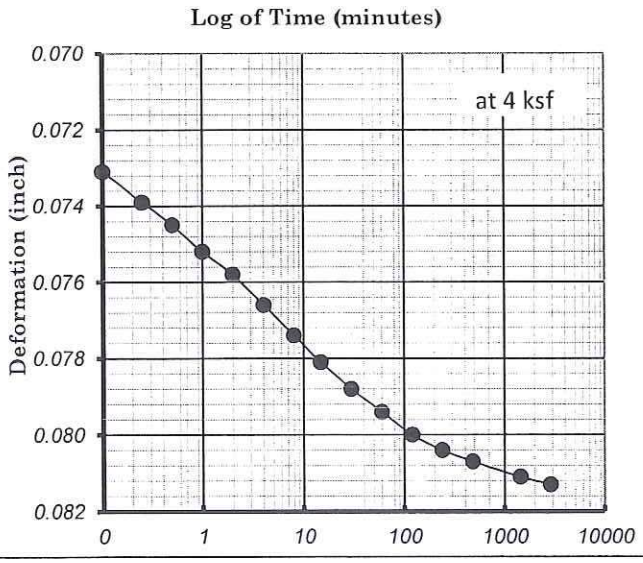
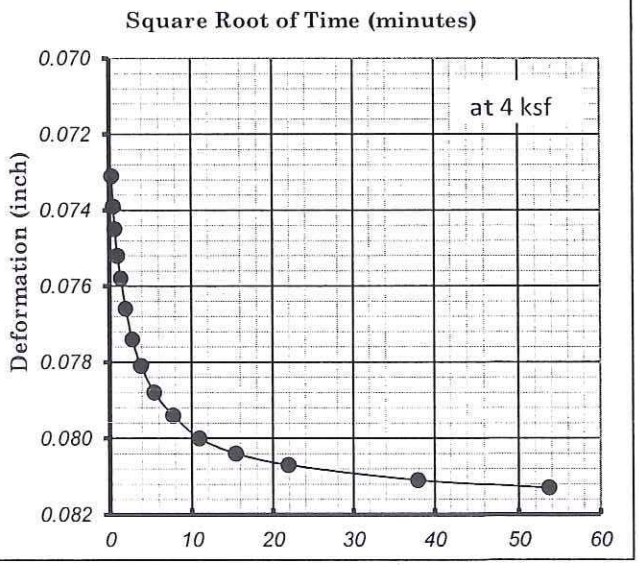
Project No.: 10-133 Date: 06/09/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No.:







Boring No.	: R-11-002		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 25.0	26.5	Plasticity Index :	-	Initial	23.86	102.16	16.08	99.12	0.65
Depth (m)	: 7.63	8.08	Specific Gravity :	2.70	Final	21.56	107.04	16.85	101.27	0.57
Description : Olive-brown, Lean CLAY with SAND (CL)										

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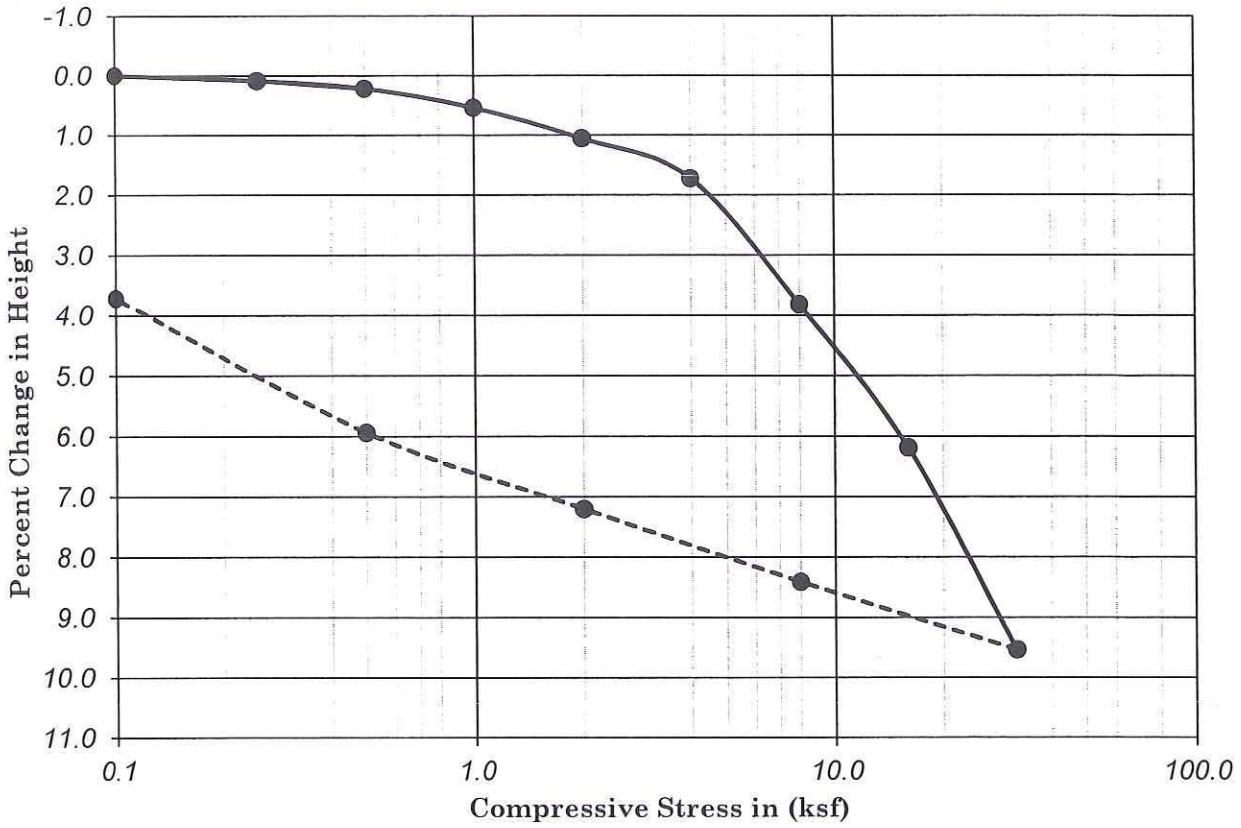

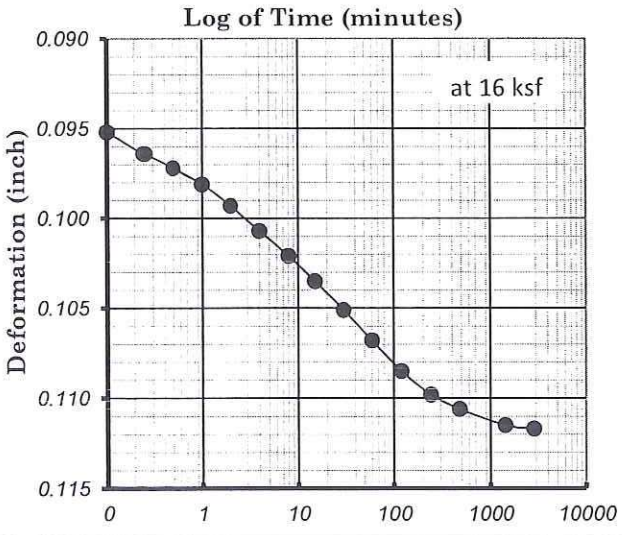

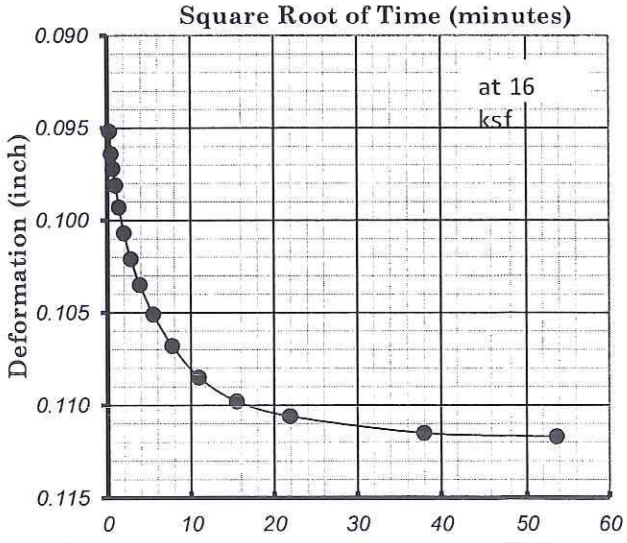

Boring No.	: R-11-006		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-7		Plastic Limit :	-						
Depth (ft)	: 35.0	36.5	Plasticity Index :	-	Initial	23.88	99.29	15.63	92.42	0.70
Depth (m)	: 10.68	11.13	Specific Gravity :	2.70	Final	24.03	103.15	16.24	102.32	0.63

Description : Olive-brown, Fat CLAY (CH)

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CONSOLIDATION TEST
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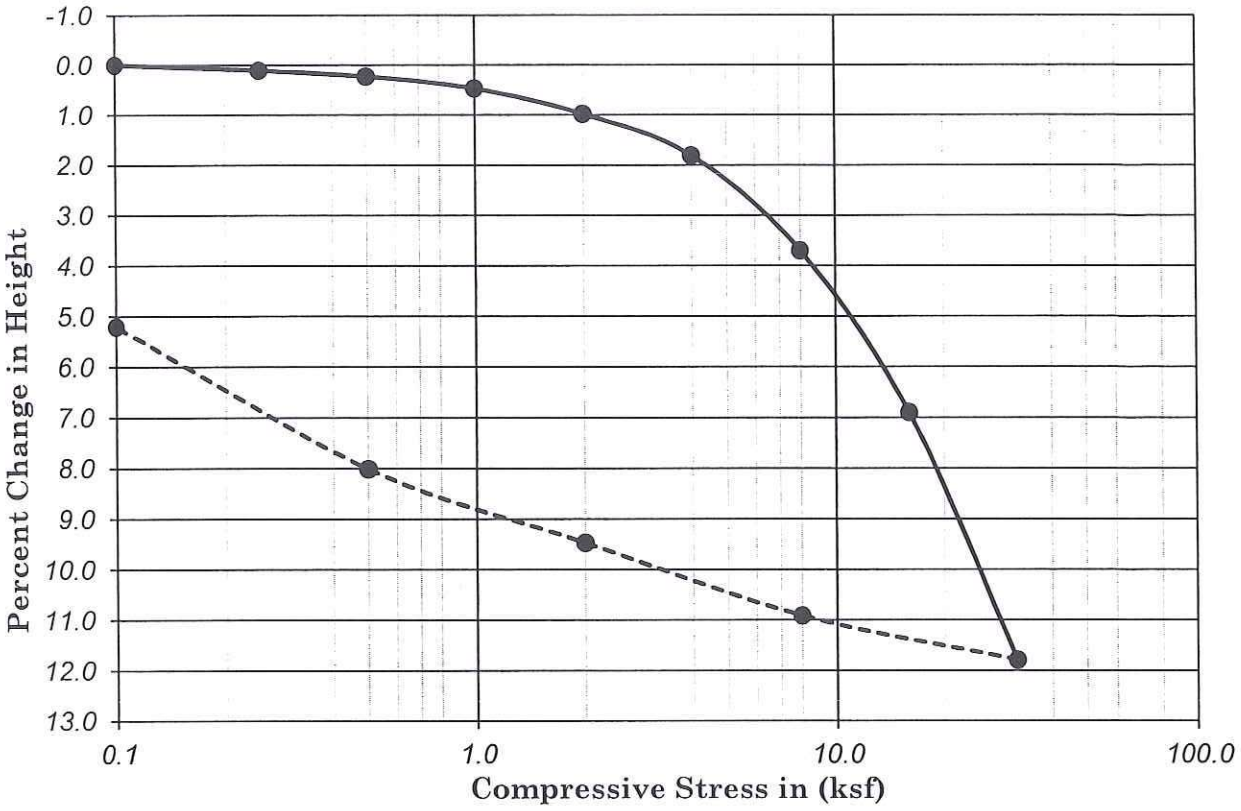

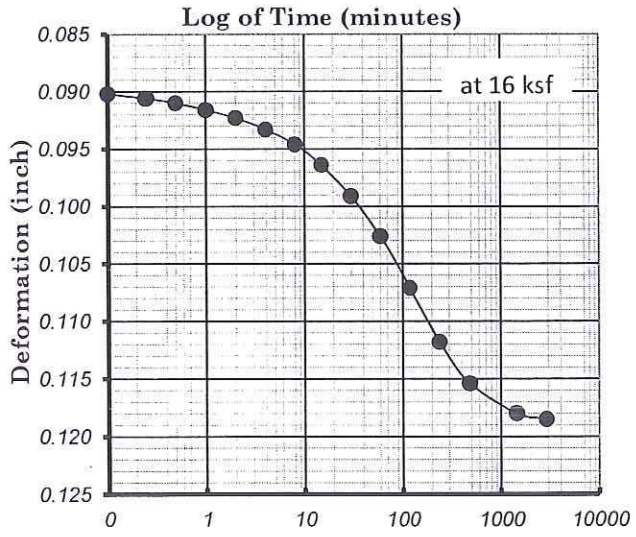

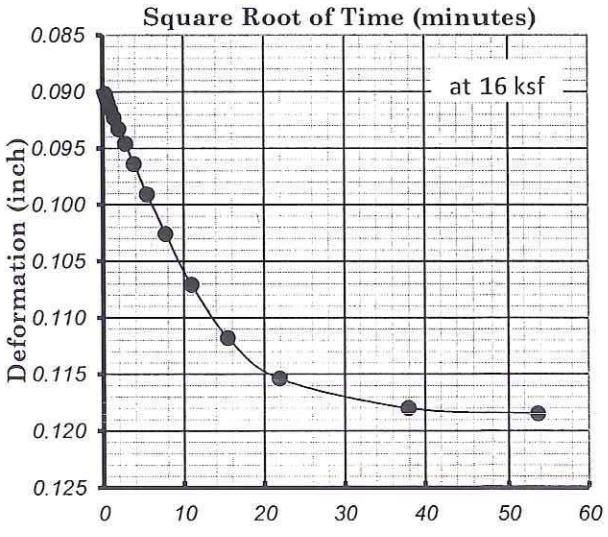

Boring No.	: R-11-008		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-8		Plastic Limit :	-						
Depth (ft)	: 40.0	41.5	Plasticity Index :	-	Initial	29.68	91.70	14.43	95.61	0.84
Depth (m)	: 12.20	12.66	Specific Gravity :	2.70	Final	27.58	96.76	15.23	100.37	0.74

Description : Olive- brown, Fat CLAY (CH)

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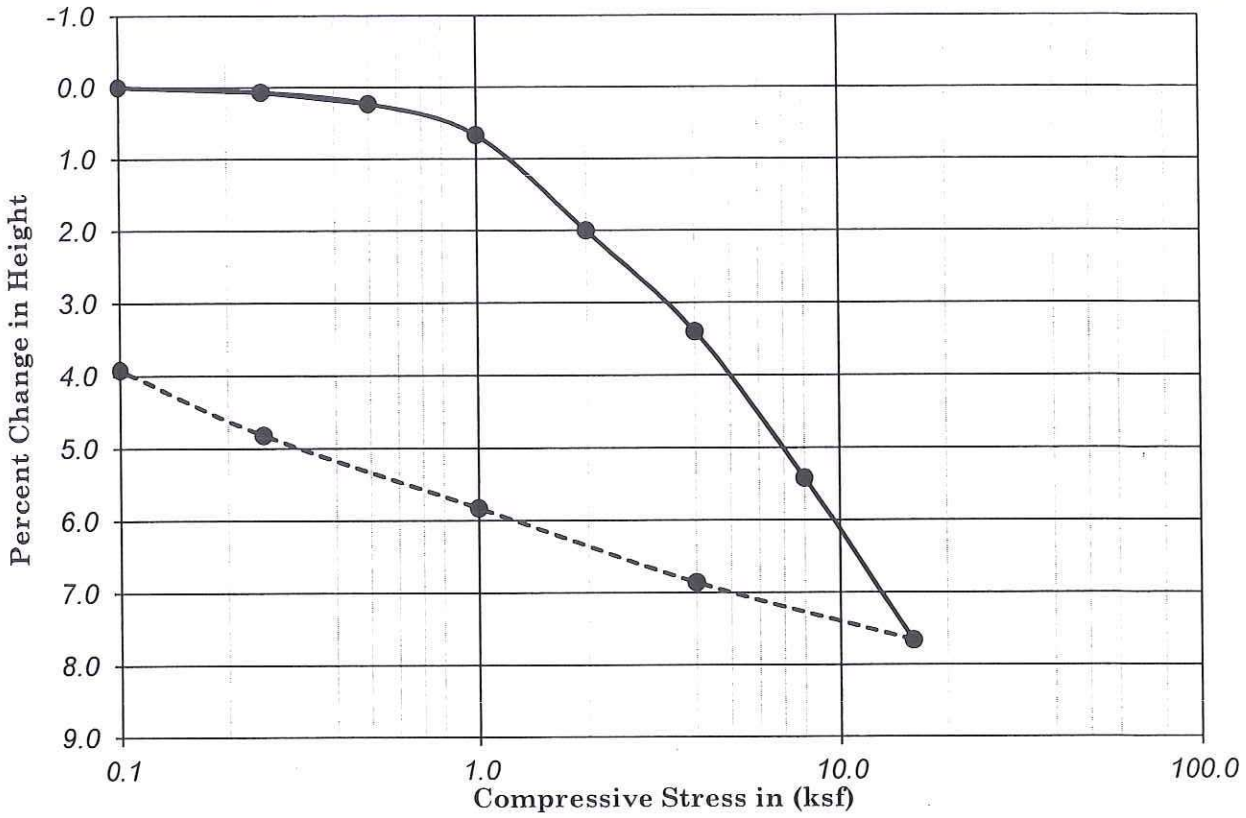

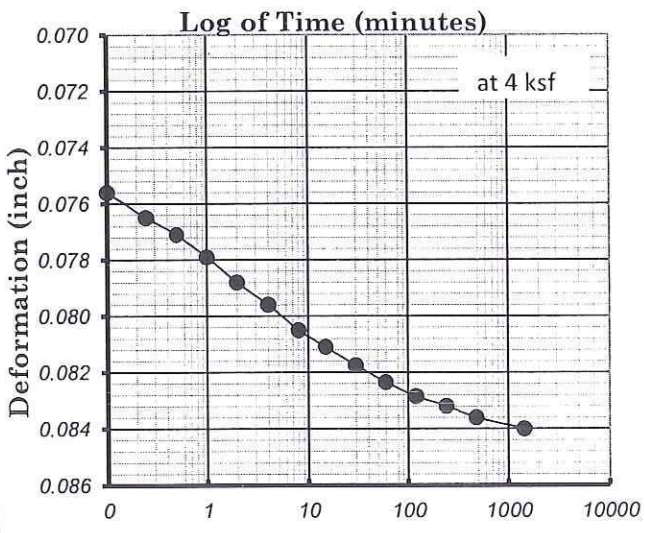

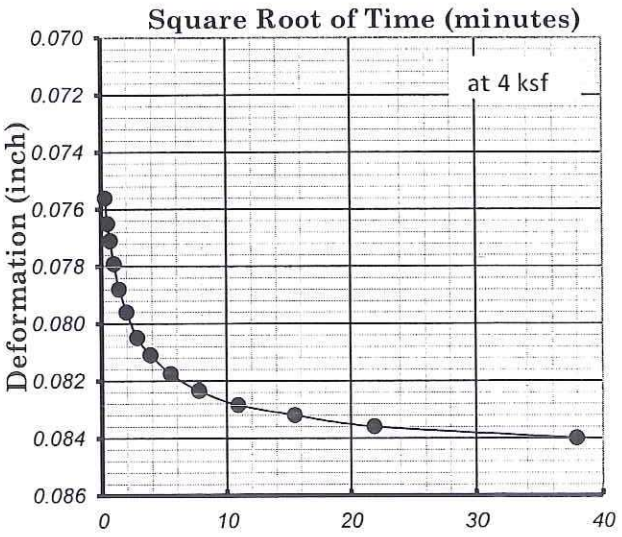

Boring No.	: R-11-010		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-2		Plastic Limit :	-						
Depth (ft)	: 5.0	6.5	Plasticity Index :	-	Initial	22.14	103.95	16.36	96.18	0.62
Depth (m)	: 1.53	1.98	Specific Gravity :	2.70	Final	21.18	108.21	17.03	102.53	0.56

Description : *Mottled olive-brown, yellowish brown and white, SANDY lean CLAY (CL)*

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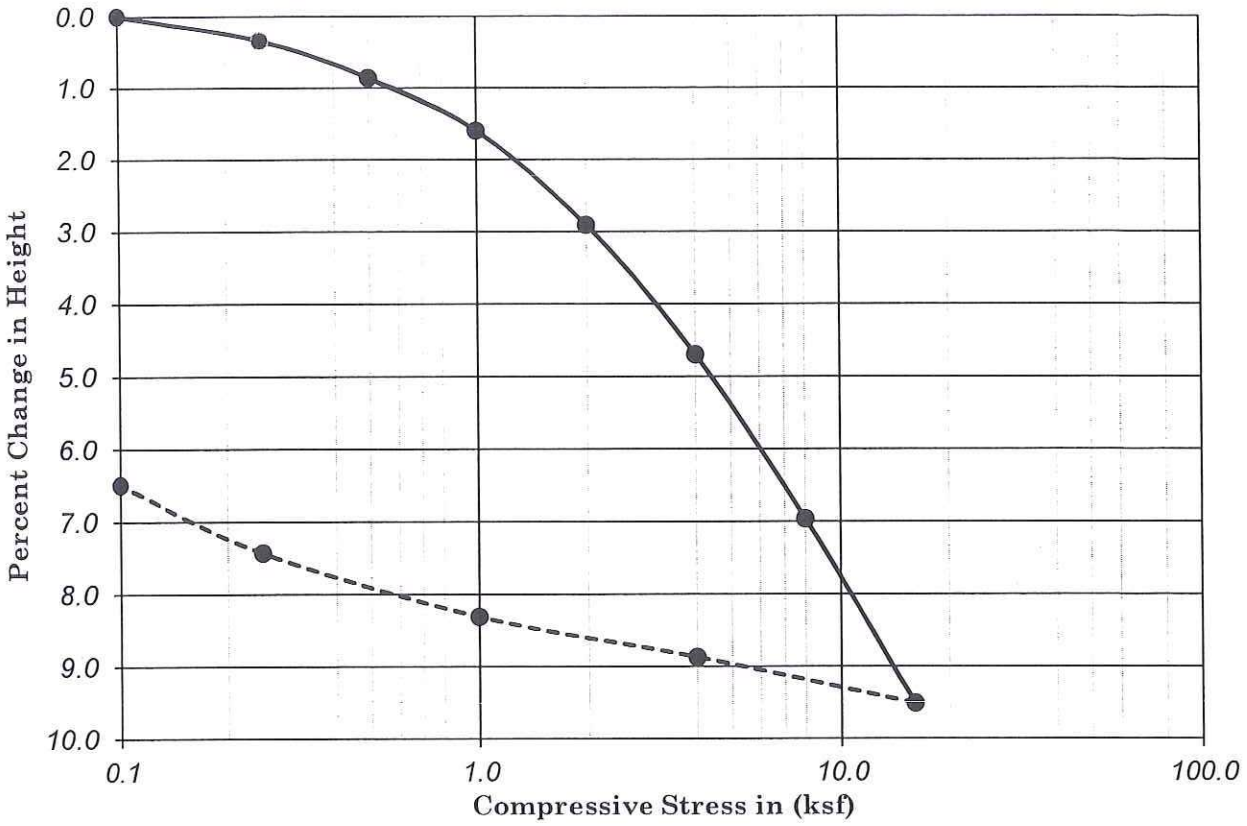

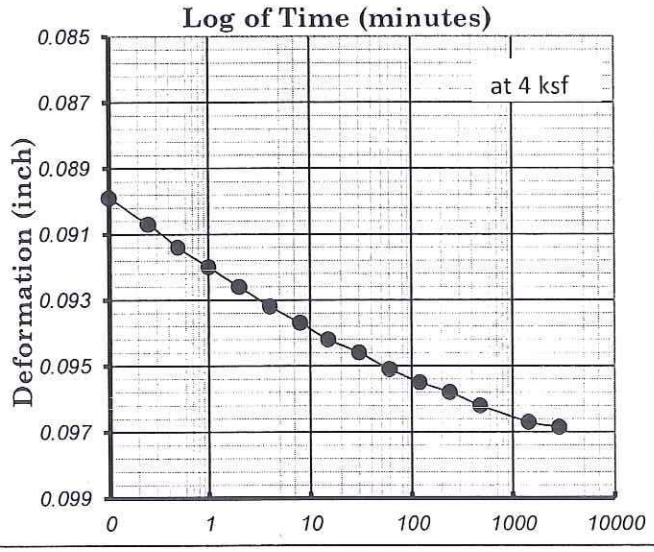

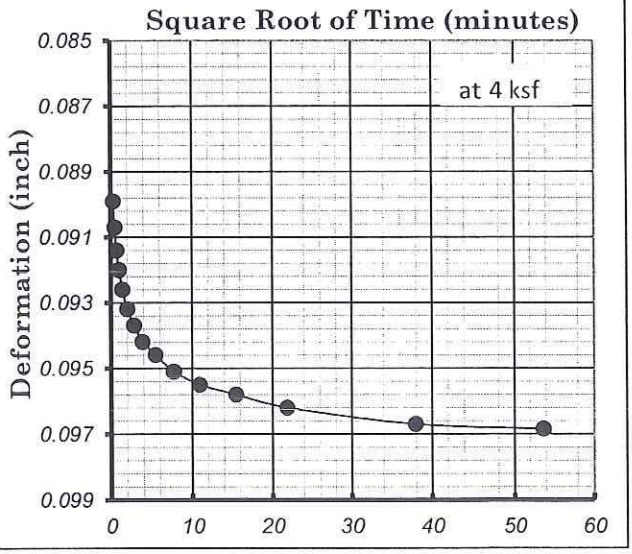

Boring No.	: R-11-014		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-8		Plastic Limit :	-						
Depth (ft)	: 40.0	41.5	Plasticity Index :	-	Initial	23.92	100.90	15.88	96.31	0.67
Depth (m)	: 12.20	12.66	Specific Gravity :	2.70	Final	21.74	107.92	16.99	104.47	0.56

Description : Olive-brown, SANDY lean CLAY (CL)

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CONSOLIDATION TEST
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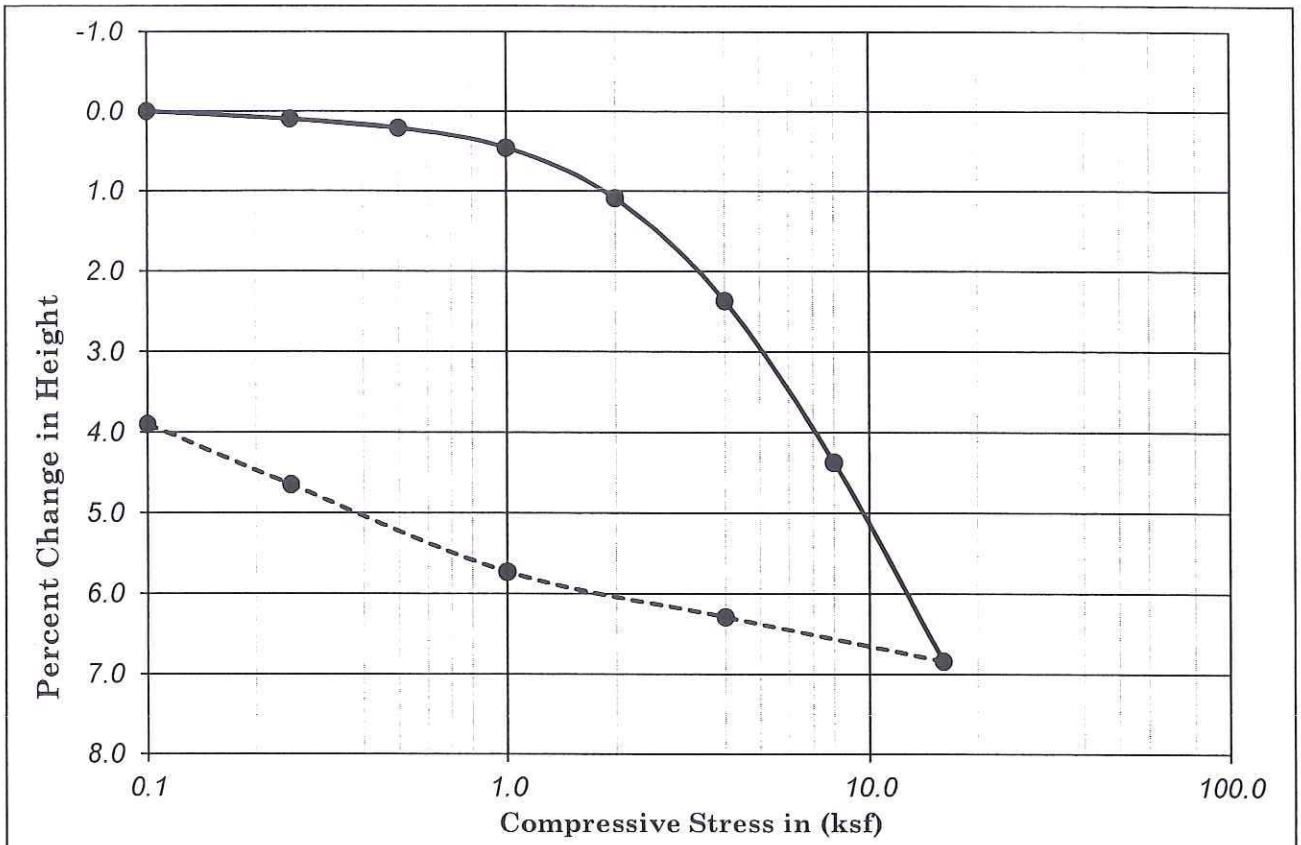

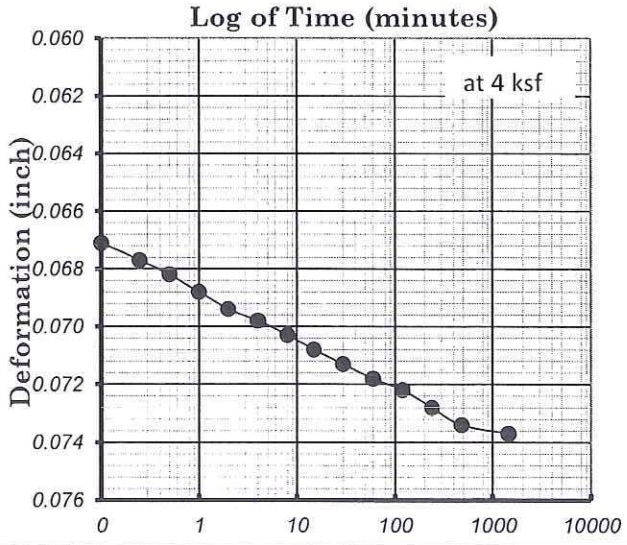

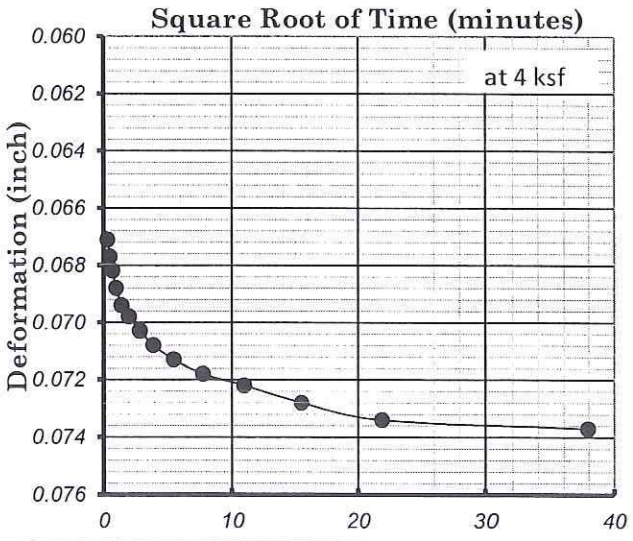

Boring No.	: R-11-021		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-1		Plastic Limit :	-						
Depth (ft)	: 5.0	6.5	Plasticity Index :	-	Initial	19.57	106.04	16.69	89.63	0.59
Depth (m)	: 1.53	1.98	Specific Gravity :	2.70	Final	19.54	110.35	17.37	100.03	0.53

Description : *Very dark brown to black, Lean CLAY with SAND (CL)*

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CONSOLIDATION TEST
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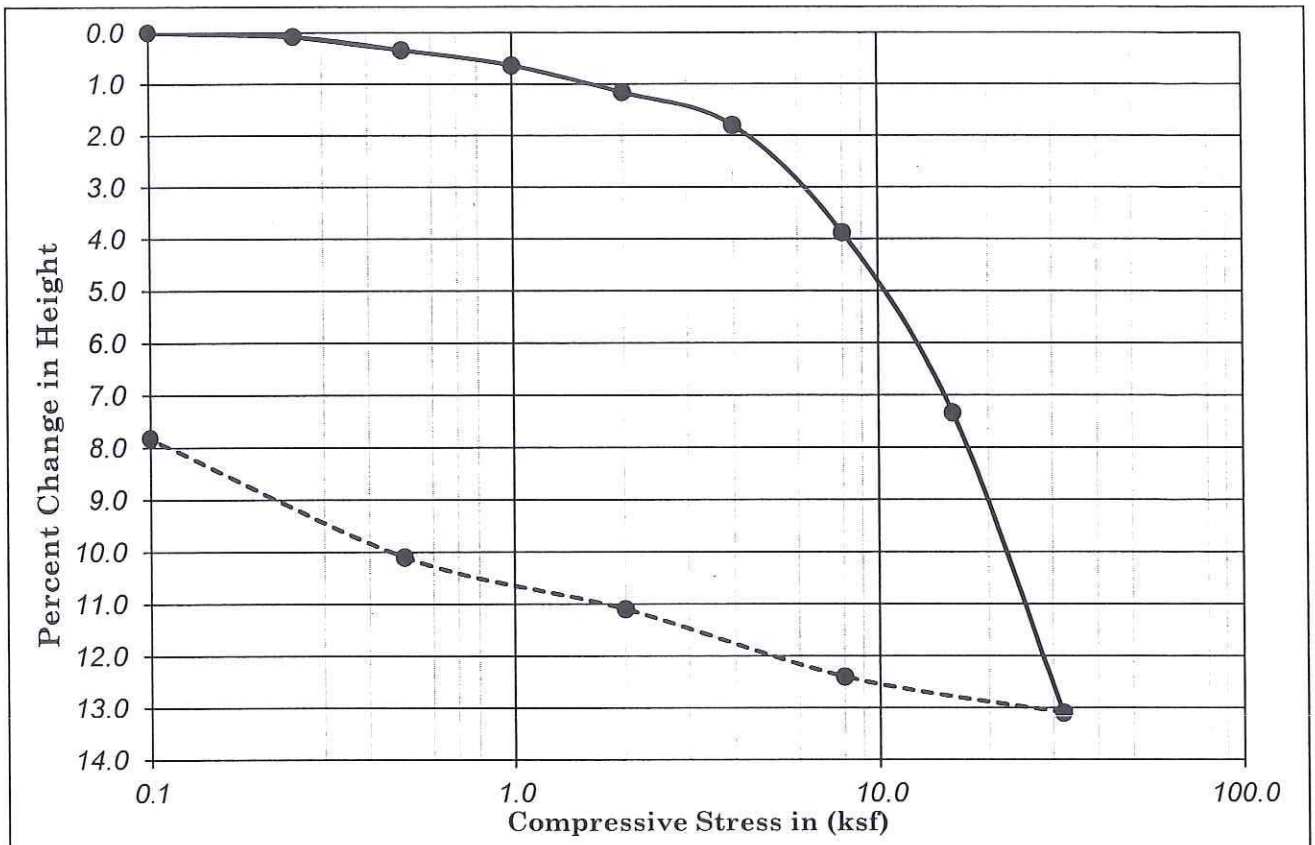

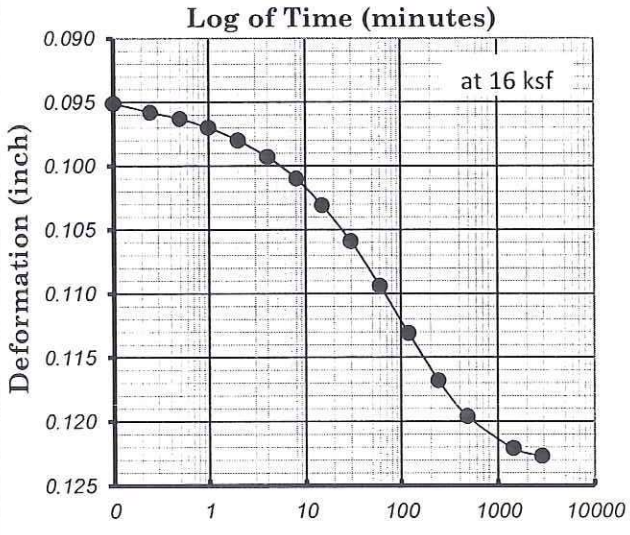

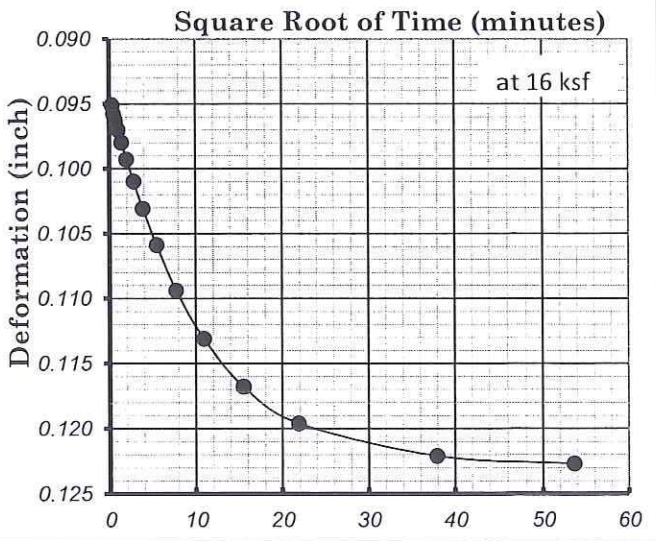

Boring No.	: R-11-030		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 30.0	31.5	Plasticity Index :	-	Initial	34.76	83.58	13.15	92.31	1.02
Depth (m)	: 9.15	9.61	Specific Gravity :	2.70	Final	32.68	90.71	14.28	102.81	0.86

Description : Olive-gray, Fat CLAY (CH)

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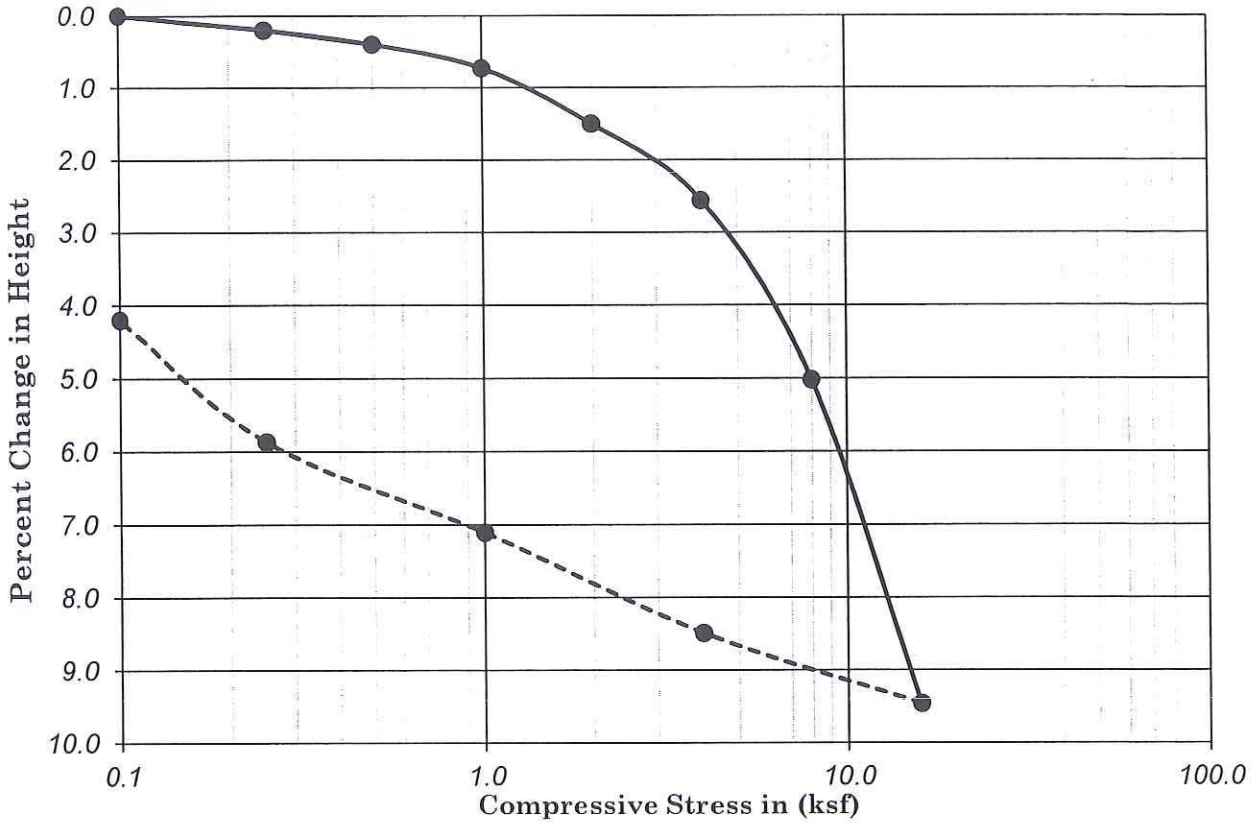
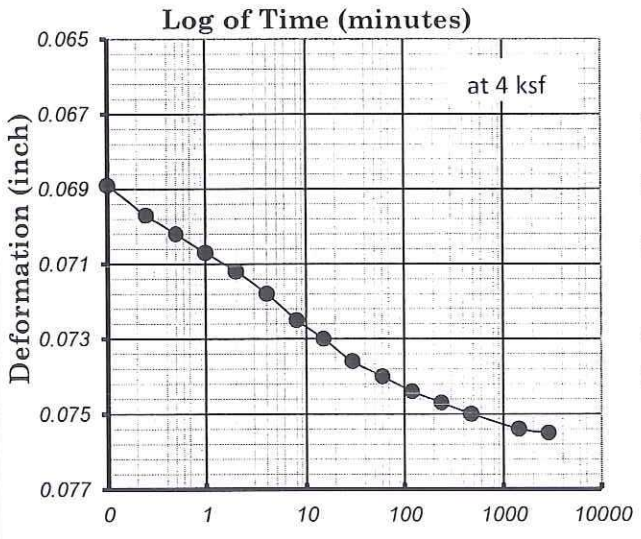
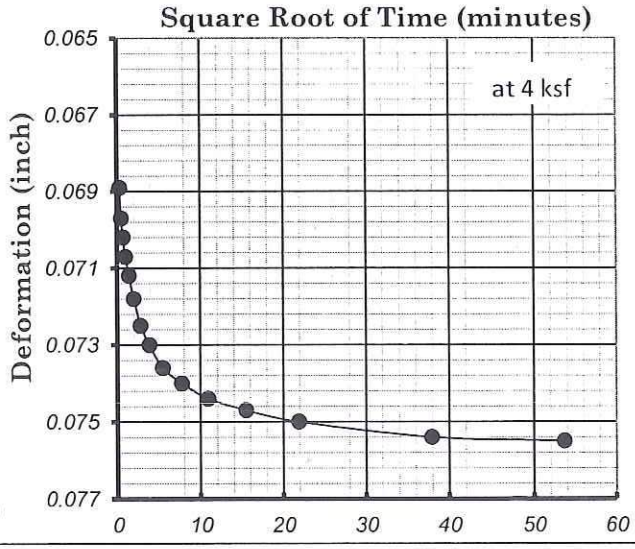
(ASTM D-2435 / CT-219)







Boring No.	: R-11-031		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-7		Plastic Limit :	-						
Depth (ft)	: 35.0	36.5	Plasticity Index :	-	Initial	33.54	87.94	13.84	98.77	0.92
Depth (m)	: 10.68	11.13	Specific Gravity :	2.70	Final	31.85	91.81	14.45	102.86	0.84

Description : Olive-brown, Fat CLAY (CH)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 North Safety and Operational Improvement

Project No. : 10-133

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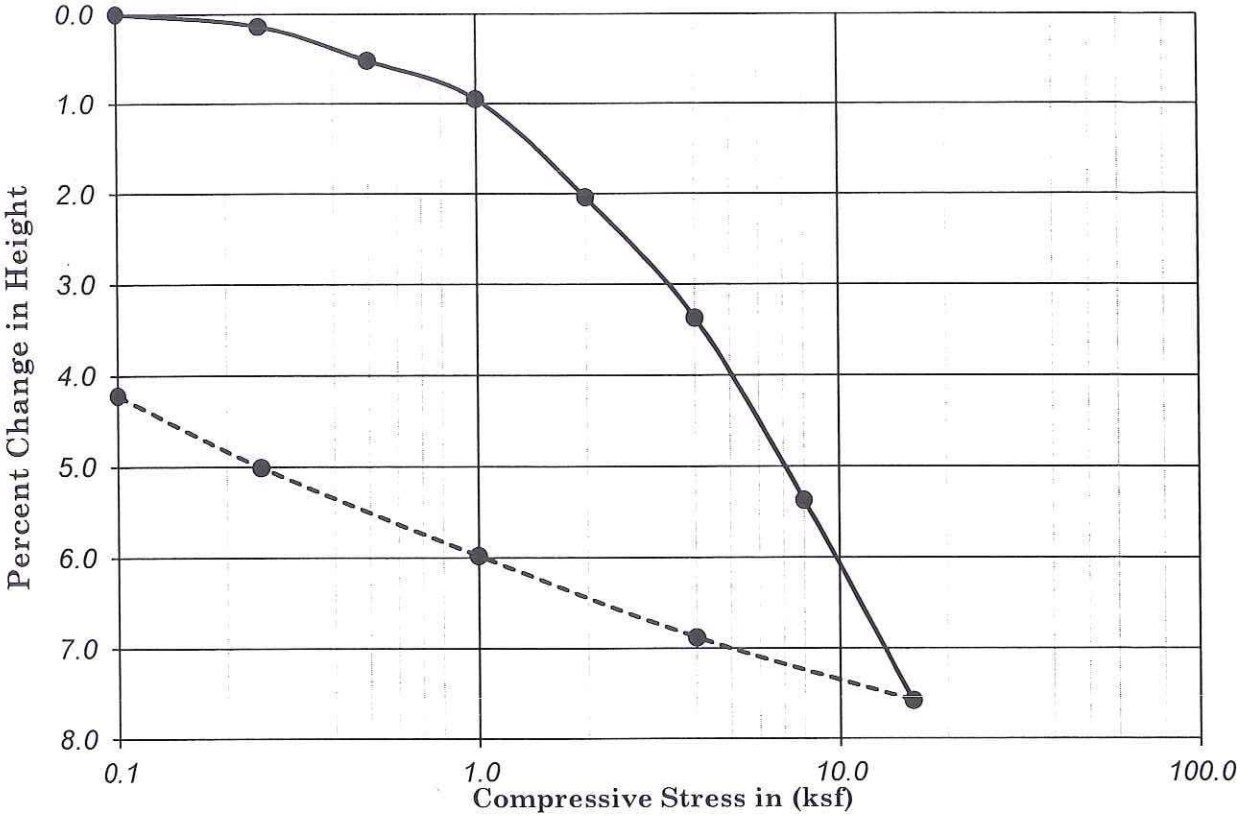
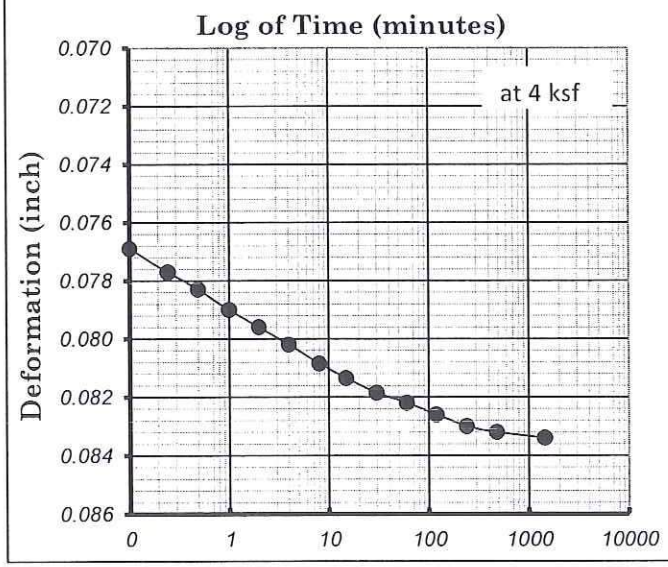
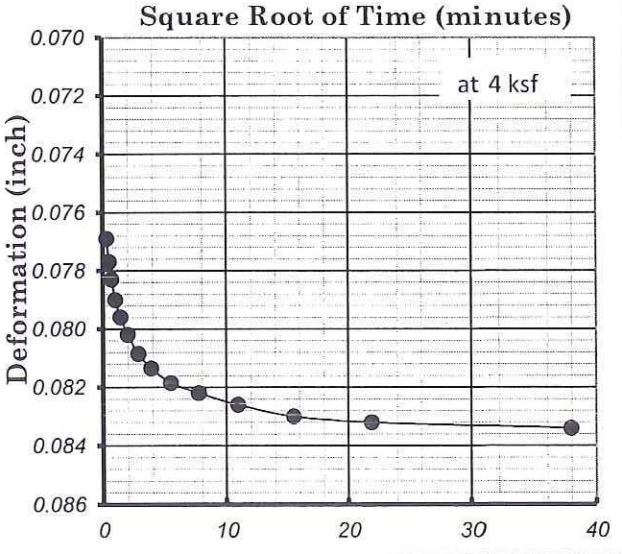
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)







Boring No.	: R-11-034		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 30.0	31.5	Plasticity Index :	-	Initial	26.33	96.43	15.18	95.05	0.75
Depth (m)	: 9.15	9.61	Specific Gravity :	2.70	Final	25.69	100.69	15.85	102.90	0.67

Description : *Yellowish brown with white, SANDY lean CLAY (CL)*

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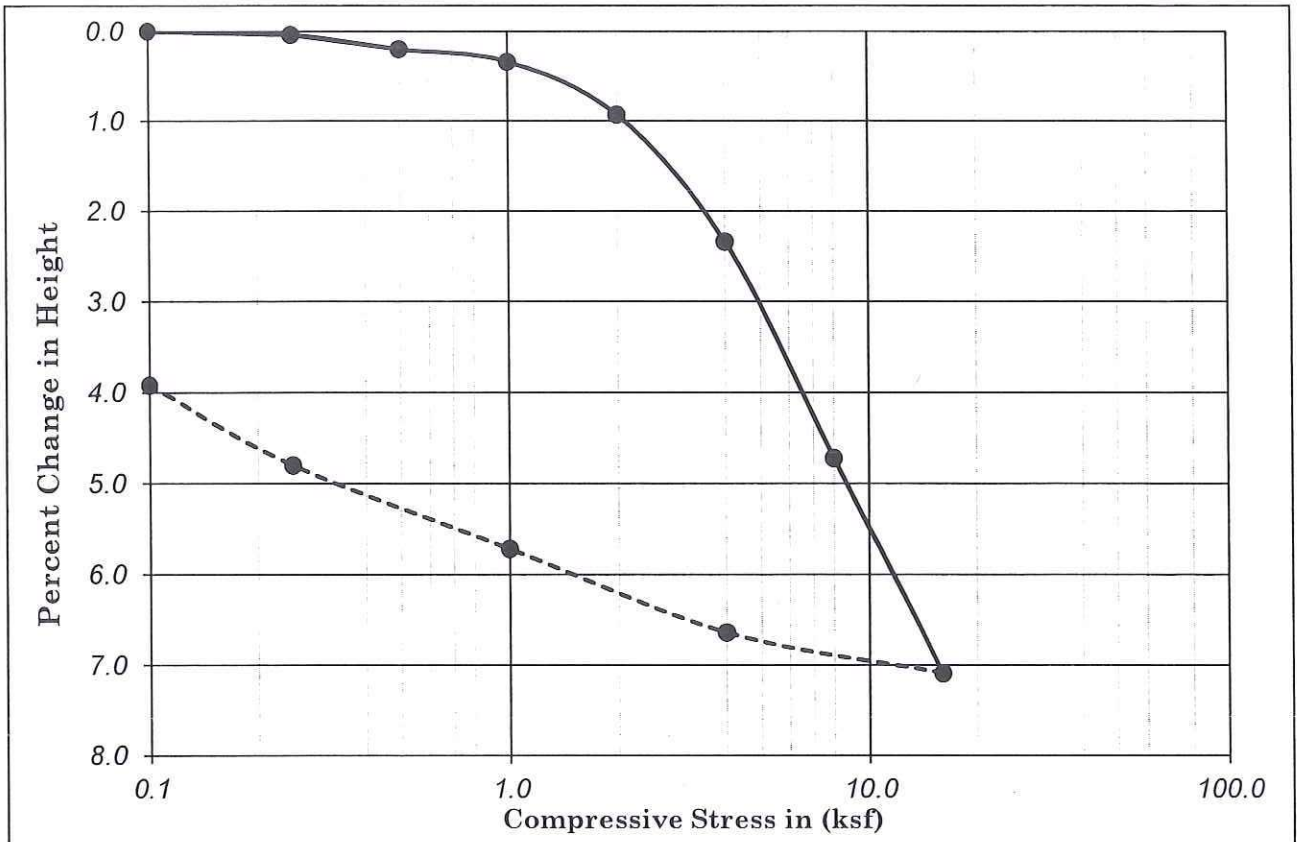
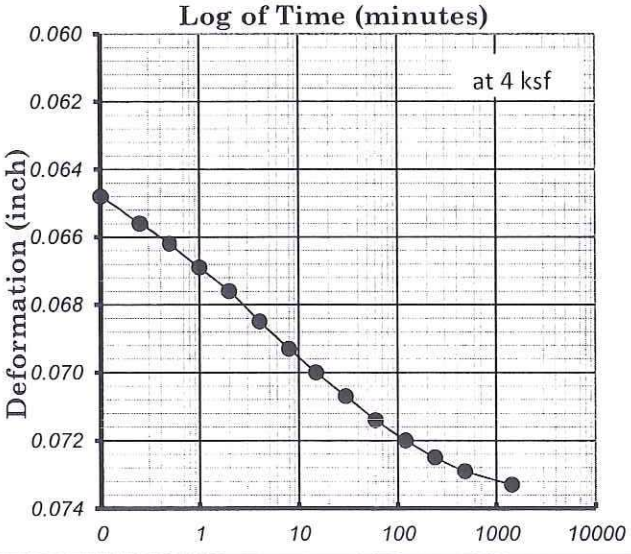
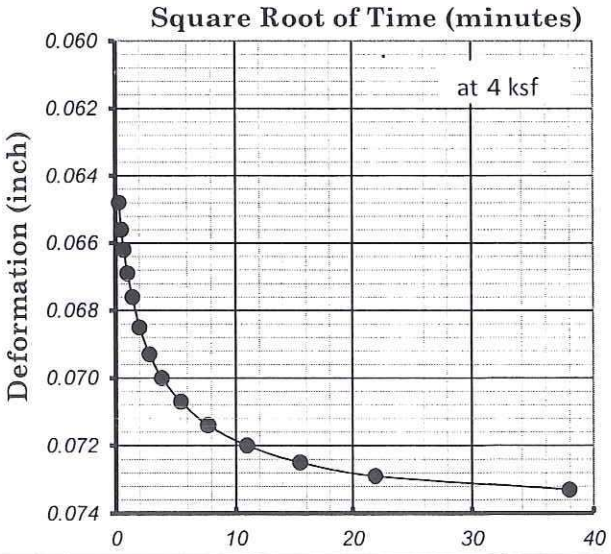
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)







Boring No.	: R-11-035		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-7		Plastic Limit :	-						
Depth (ft)	: 35.0	36.5	Plasticity Index :	-	Initial	19.87	109.21	17.19	98.72	0.54
Depth (m)	: 10.68	11.13	Specific Gravity :	2.70	Final	17.94	113.68	17.89	100.30	0.48

Description : *Mottled olive-brown, yellowish brown and white, Lean CLAY with SAND (CL)*

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 North Safety and Operational Improvement

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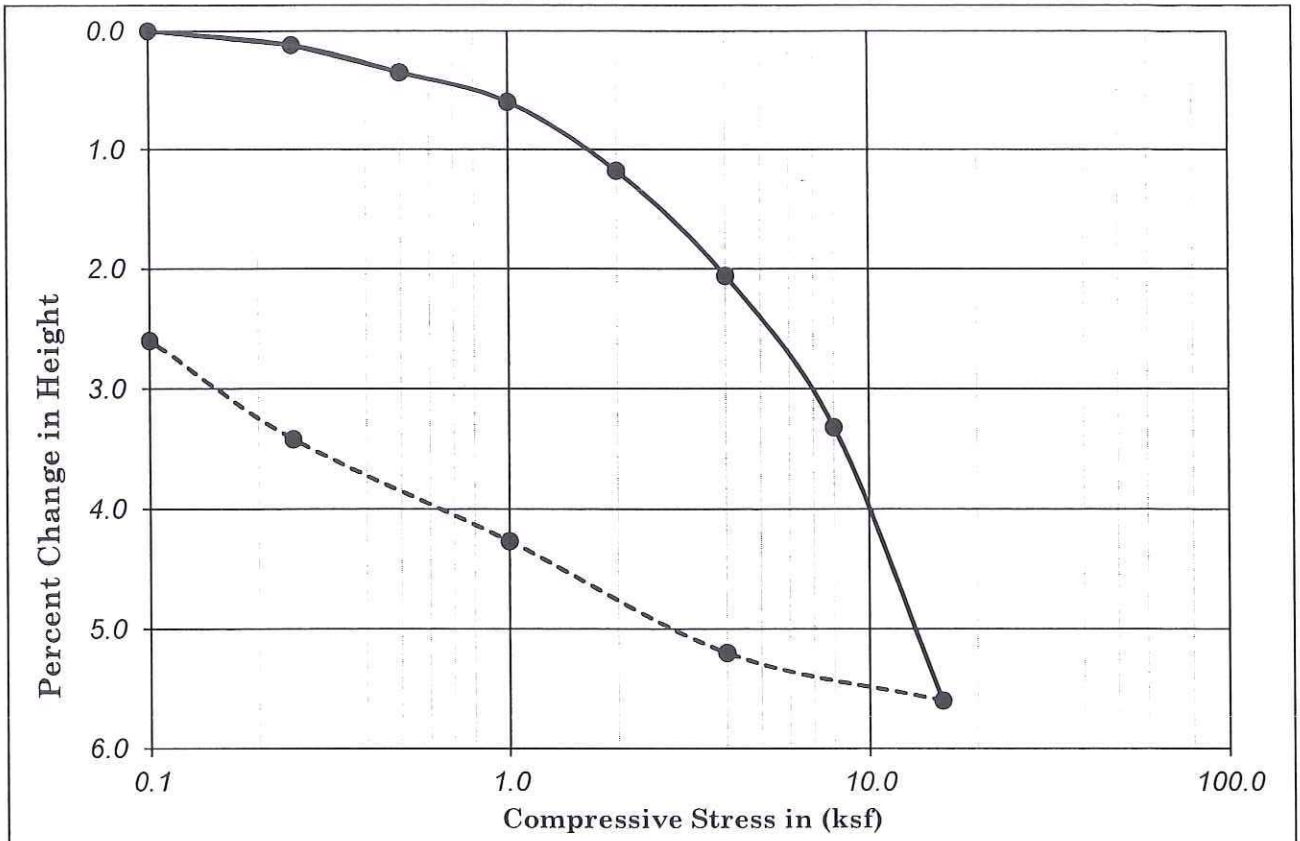
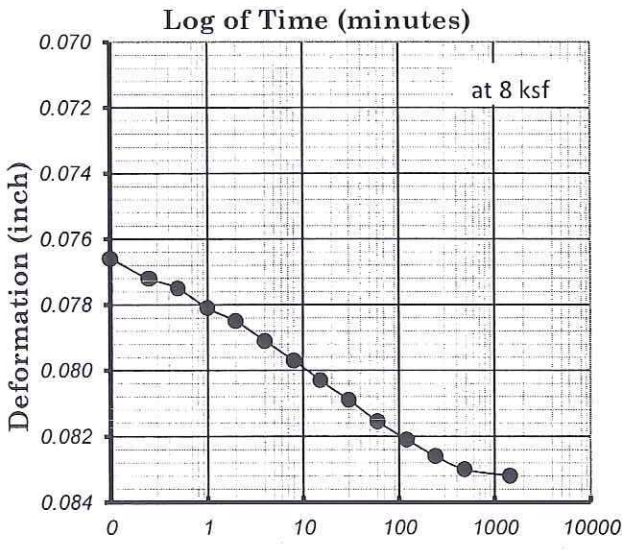
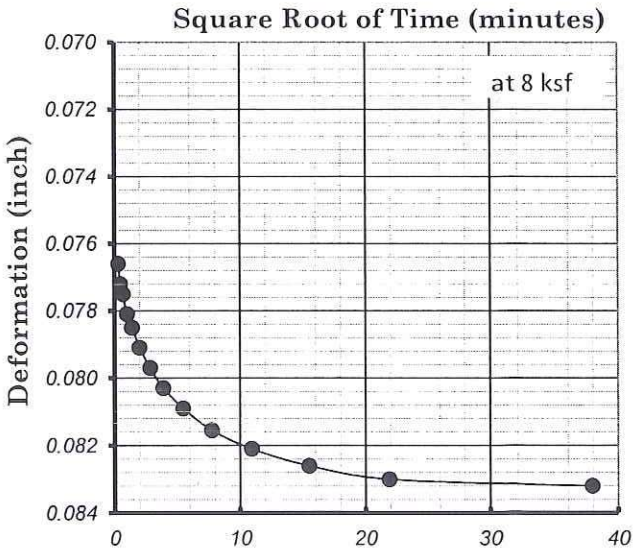
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)







Boring No.	: R-11-035		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-11		Plastic Limit :	-						
Depth (ft)	: 55.0	56.5	Plasticity Index :	-	Initial	21.29	104.11	16.39	92.84	0.62
Depth (m)	: 16.78	17.23	Specific Gravity :	2.70	Final	21.38	106.91	16.83	100.12	0.58

Description : Olive-brown, Lean CLAY (CL)

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Geotechnical and Earthquake Engineering

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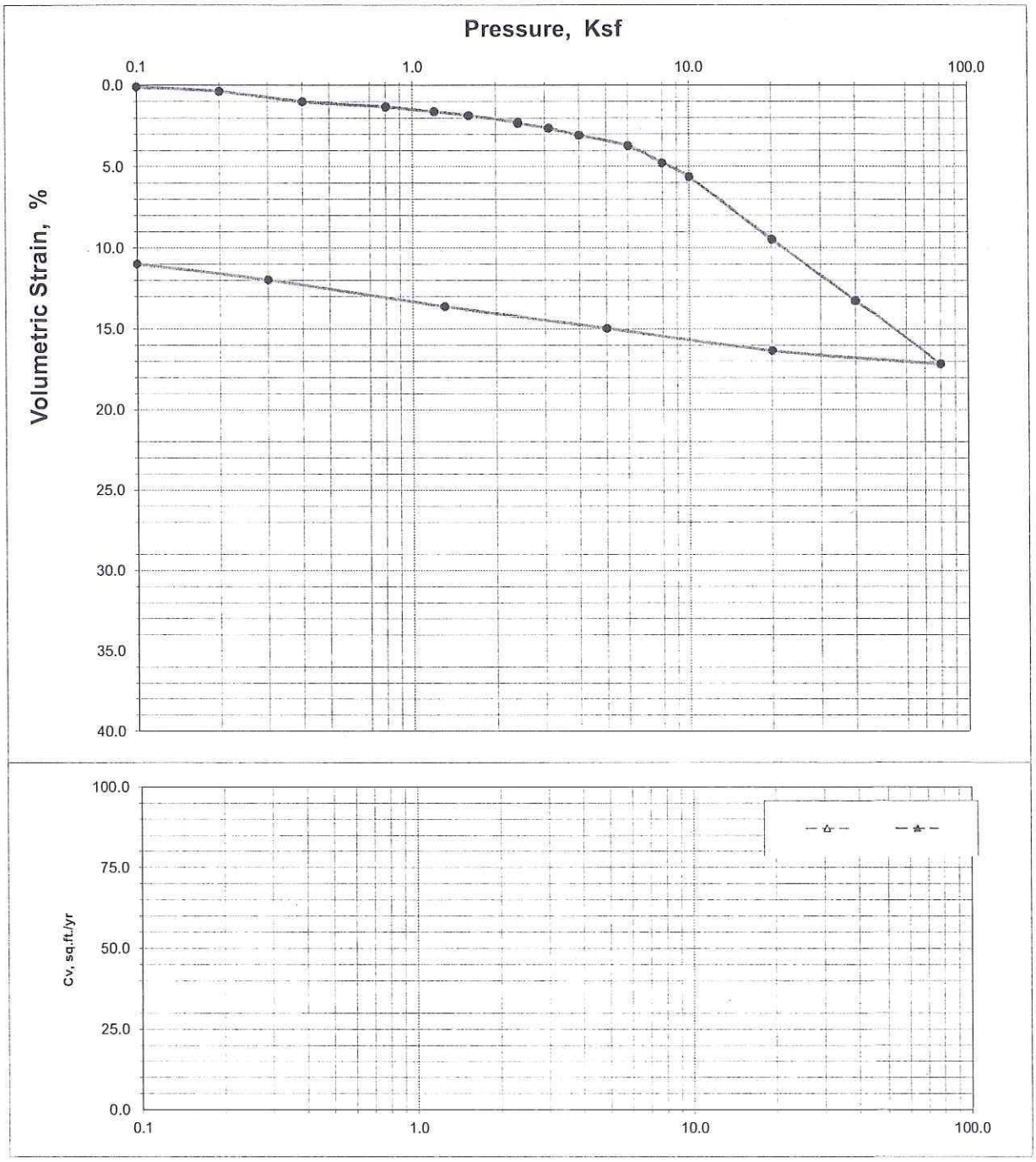
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)

CONSOLIDATION TEST

Boring Number	B-2	Sample Number	6	Depth (ft)	31.5-34	
Soil Description	Brown sandy lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	20.8	124.1	0.641	87.6	1.00	2.420	(assumed) 2.70		
Final	16.9	135.7	0.452	100.7	0.885				



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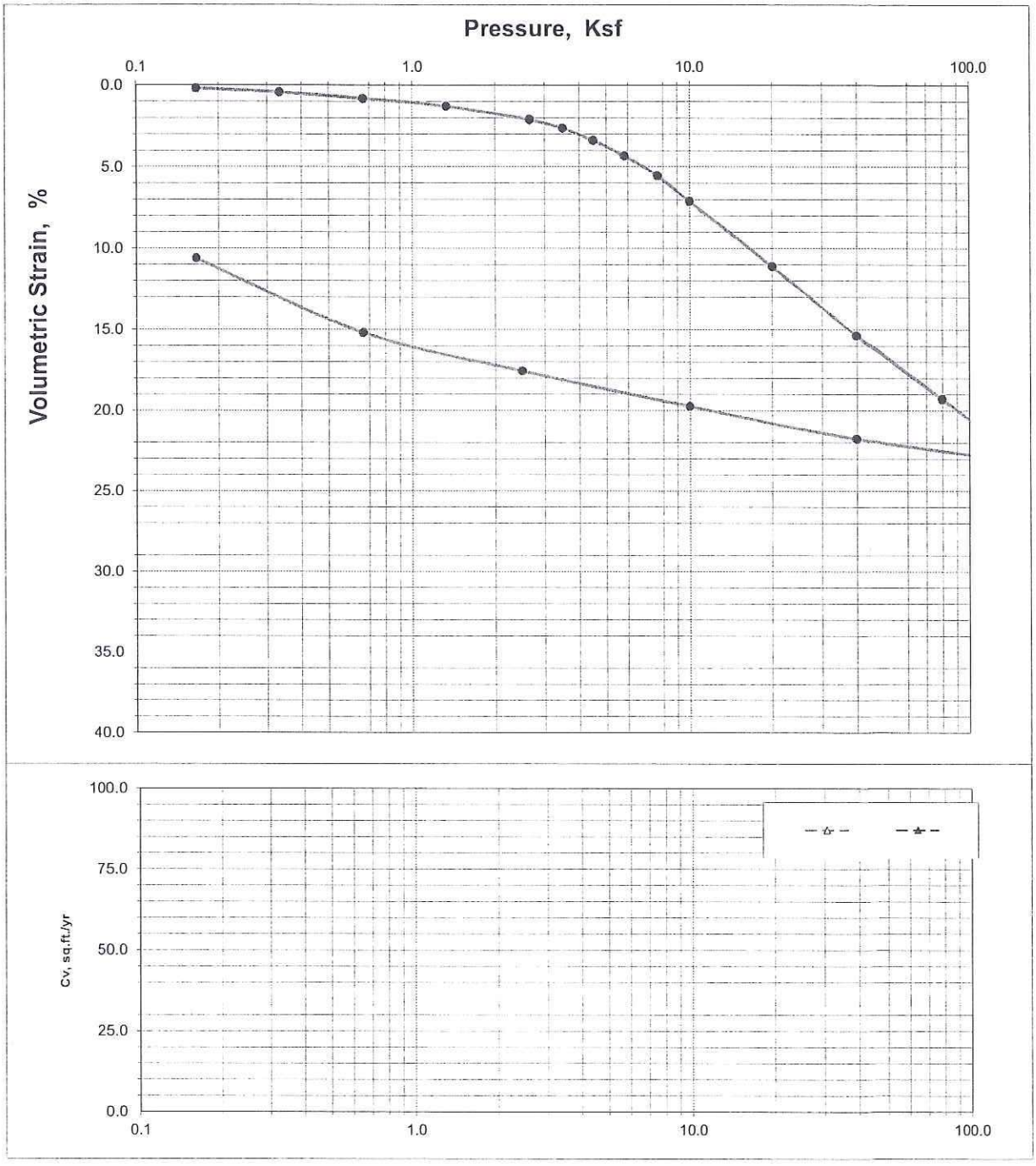
CONSOLIDATION TEST

Boring Number	B-4	Sample Number	5-3	Depth (ft)	21-21.5	
Soil Description	Olive brown sandy lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	24.6	126.9	0.656	101.1	0.69	1.880	(assumed) 2.70		
Final	18.2	135.5	0.470	104.4	0.613				



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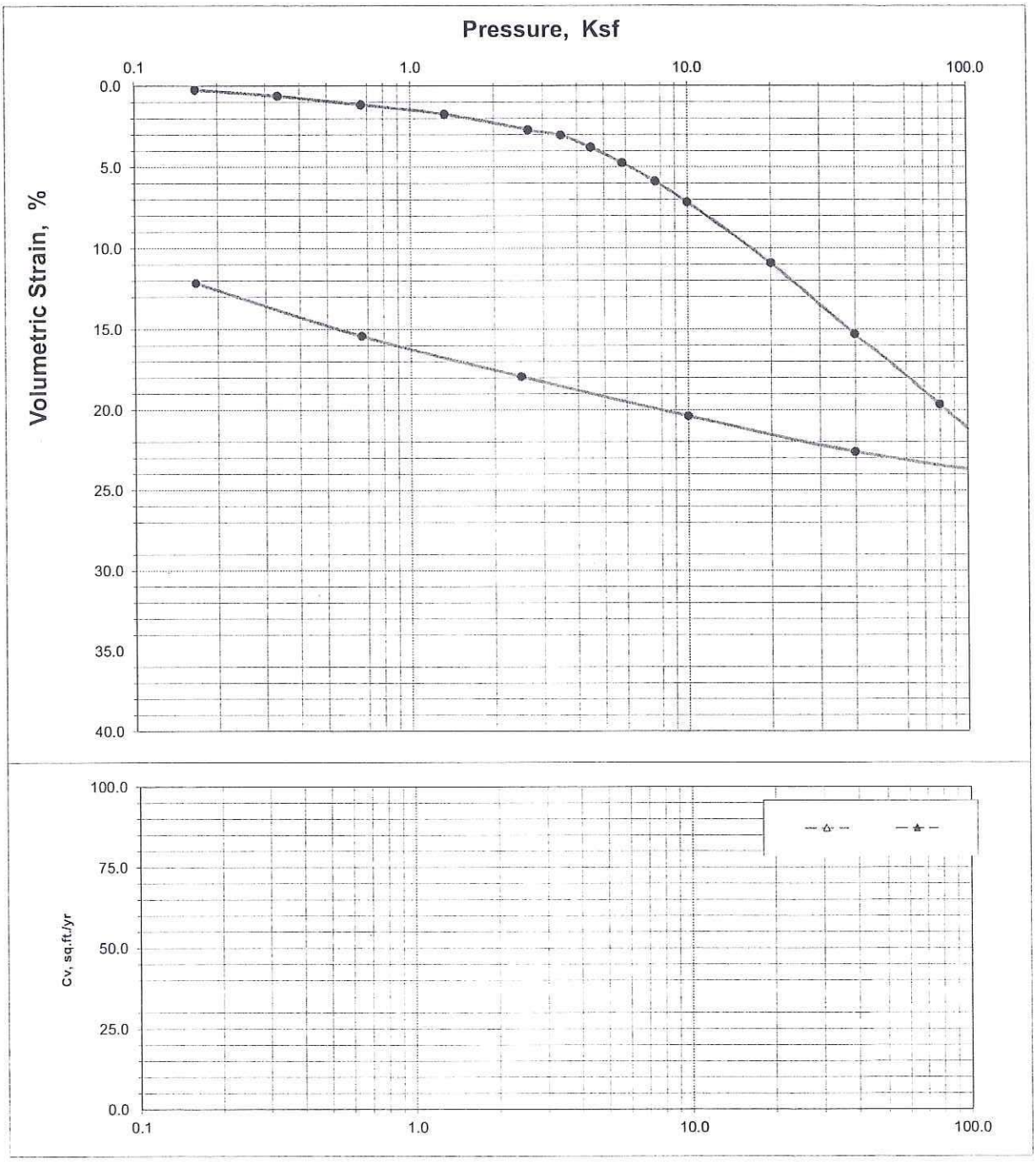
CONSOLIDATION TEST

Boring Number	B-5		Sample Number	11-2	Depth (ft)	50.5-51		
Soil Description	Dark grayish brown lean clay with sand							
	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	25.4	123.0	0.719	95.5	0.70	1.880	(assumed) 2.70		
Final	19.2	133.0	0.511	101.5	0.615				



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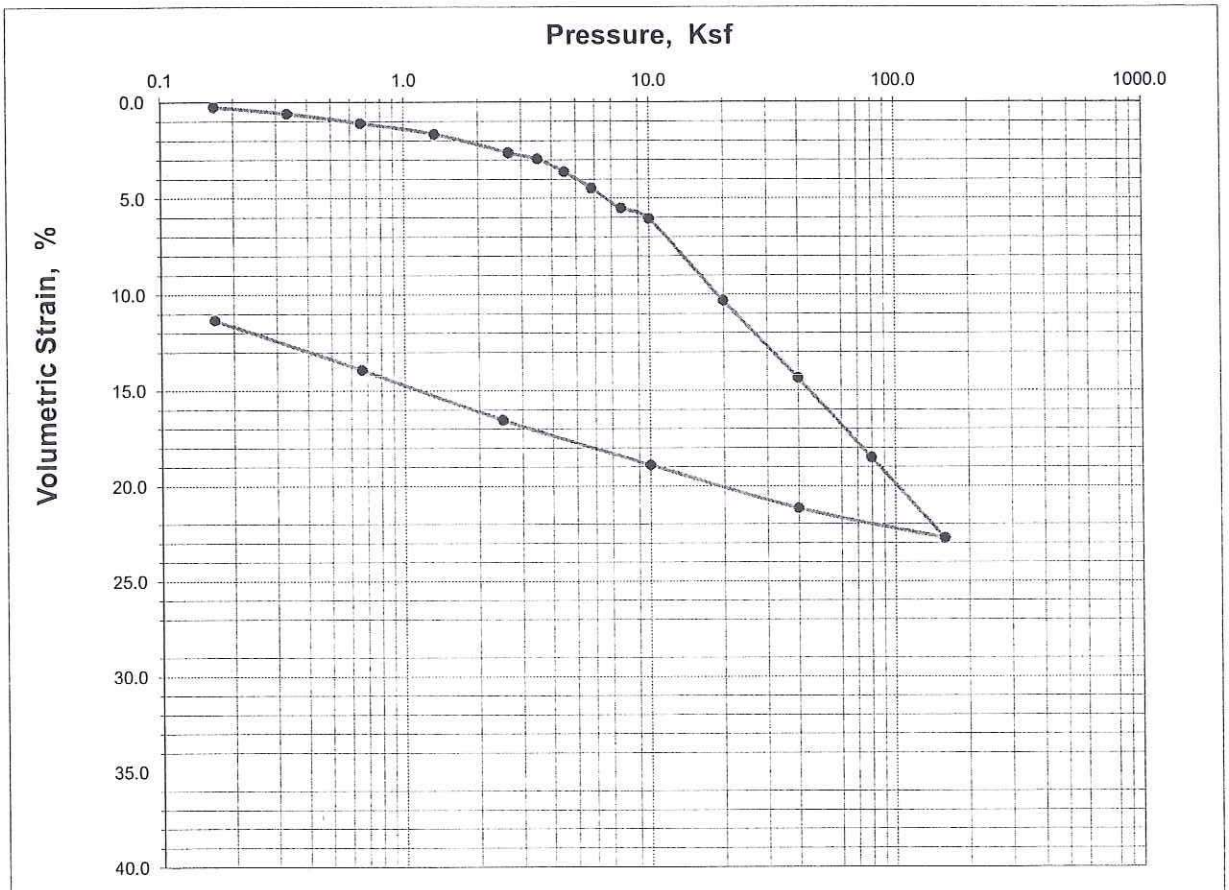
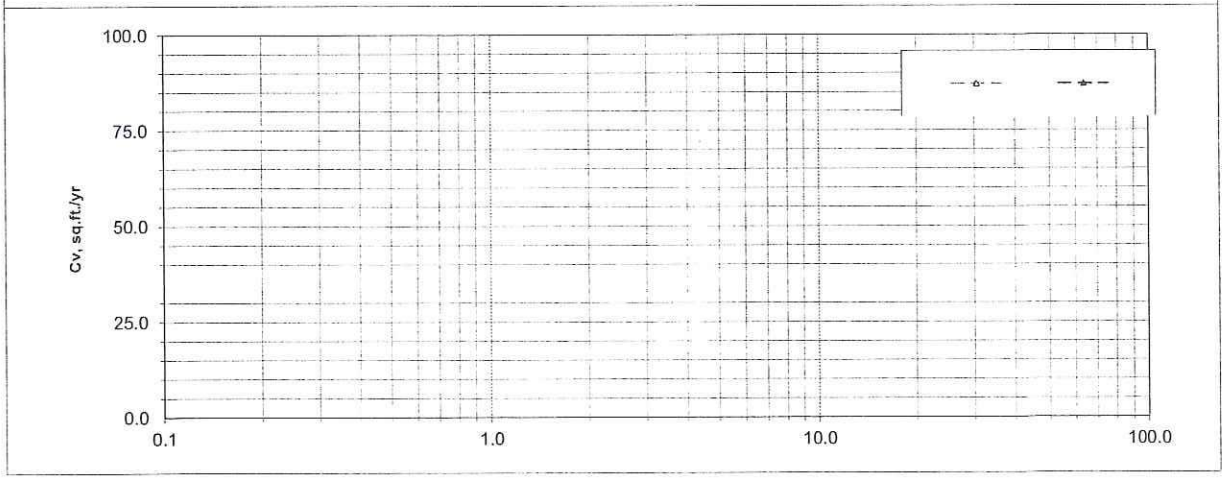
CONSOLIDATION TEST

Boring Number	B-8	Sample Number	3-2	Depth (ft)	10.5-11	
Soil Description	Dark brown lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	23.0	124.1	0.671	92.6	0.70	1.880	(assumed) 2.70		
Final	17.4	134.8	0.468	100.4	0.615				





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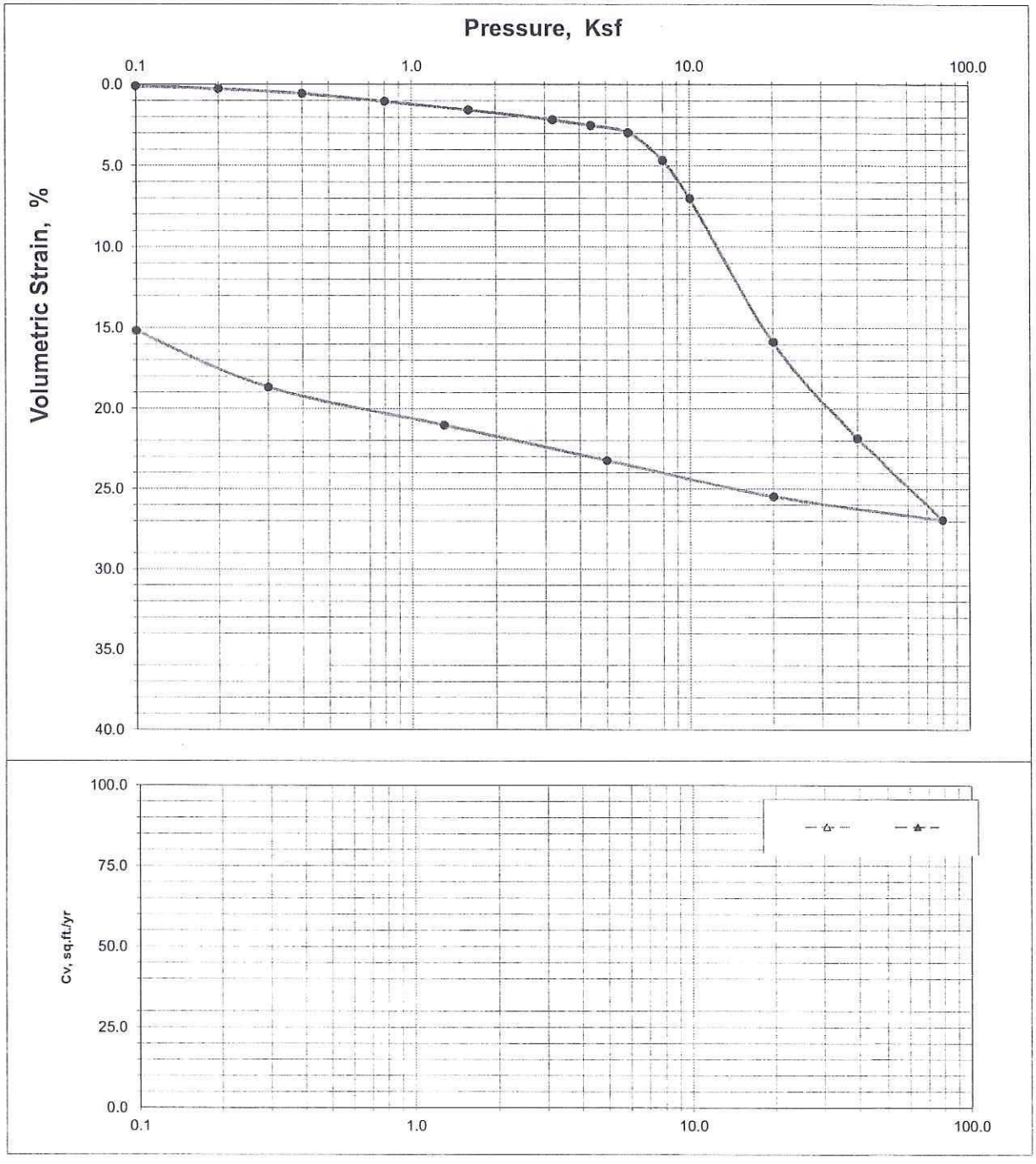
CONSOLIDATION TEST

Boring Number	B-11	Sample Number	7	Depth (ft)	26.5-29	
Soil Description	Light grayish brown fat clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	35.6	114.5	0.996	96.4	1.00	2.420	(assumed) 2.70		
Final	25.9	125.3	0.694	100.8	0.848				



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Laboratory Maximum Wet Density (CTM 216)

CTL Job No.:	641-013	**Boring:**	R-11-014	**Date:**	5/23/2011
Client:	Earth Mechanics	**Sample:**		**Tested :**	PJ
Project Name:	I-880 Improvements	**Depth (ft.):**	2.5-5	**Checked:**	DC
Project No:	10-133				

Visual Description: Very Dark Brown Sandy CLAY

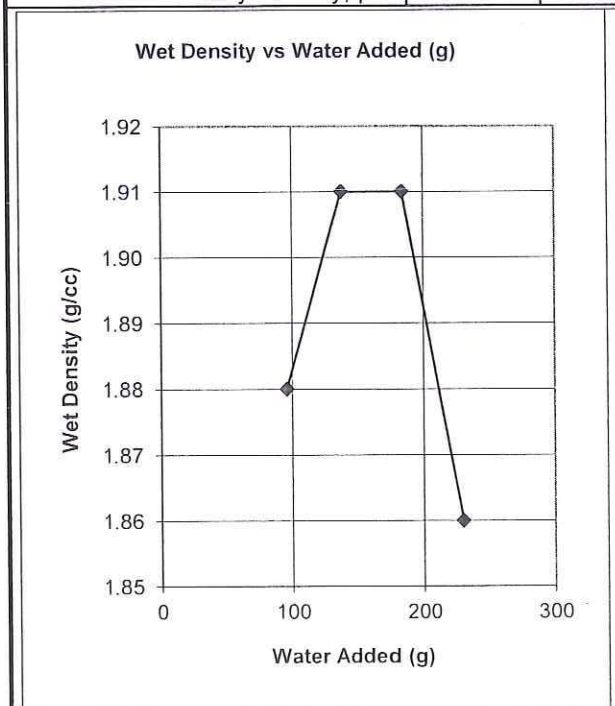
Test Results

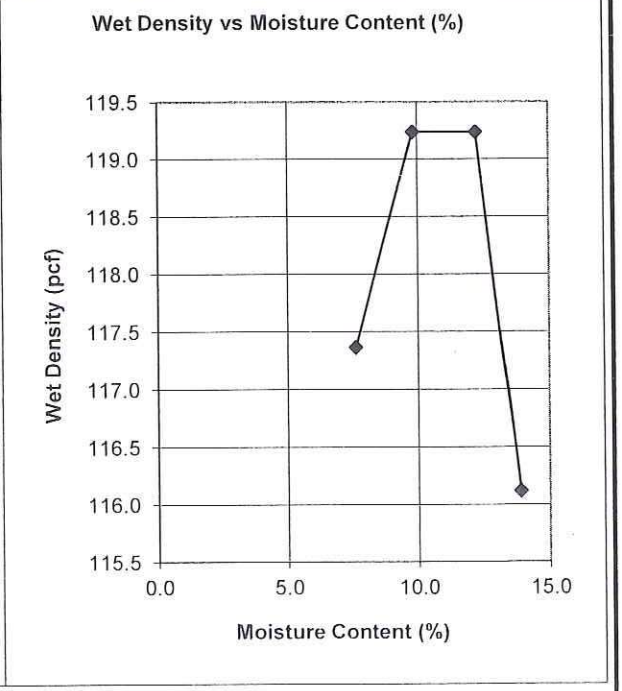
Maximum Wet Density (g/cc):	1.91
Maximum Dry Density (g/cc):	1.75
Maximum Wet Density (pcf):	119.2
Maximum Dry Density (pcf):	109.1

Remarks:

Test Data

Point Number:	1	2	3	4	5	6
Initial Wet Weight of Soil (g):	2300	2300	2300	2300		
Water Added (mL):	184	230	138	96		
Tamper Reading:	11.4	11.7	11.4	11.6		
Wet Density (g/cc):	1.91	1.86	1.91	1.88		
Dry Density (g/cc):	1.70	1.63	1.74	1.75		
Dish Number:						
Weight of Dish (g):	197.1	193.3	188.5	200.0		
Wet Weight of Soil and Dish (g):	887.7	653.3	931.2	876.0		
Dry Weight of Soil and Dish (g):	812.1	597.3	864.7	828.2		
Moisture Content, %:	12.3	13.9	9.8	7.6		
Wet Density, pcf:	119.2	116.1	119.2	117.4		
Dry Density, pcf:	106.2	102.0	108.6	109.1		





Laboratory Maximum Wet Density (CTM 216)

CTL Job No.:	641-013	**Boring:**	R-11-035	**Date:**	5/16/2011
Client:	Earth Mechanics	**Sample:**	Composite	**Tested :**	PJ
Project Name:	I-880 Improvements	**Depth (ft.):**	0-5	**Checked:**	DC
Project No:	10-133				

Visual Description: Dark Brown CLAY w/ Sand

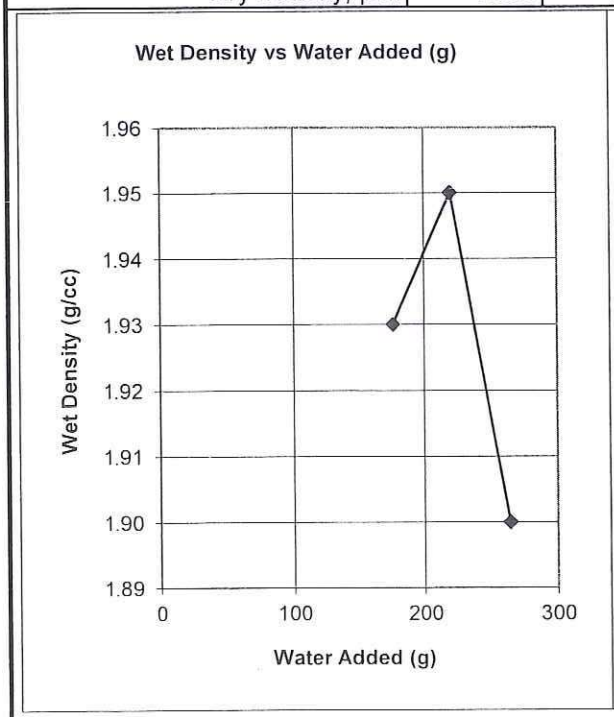
Test Results

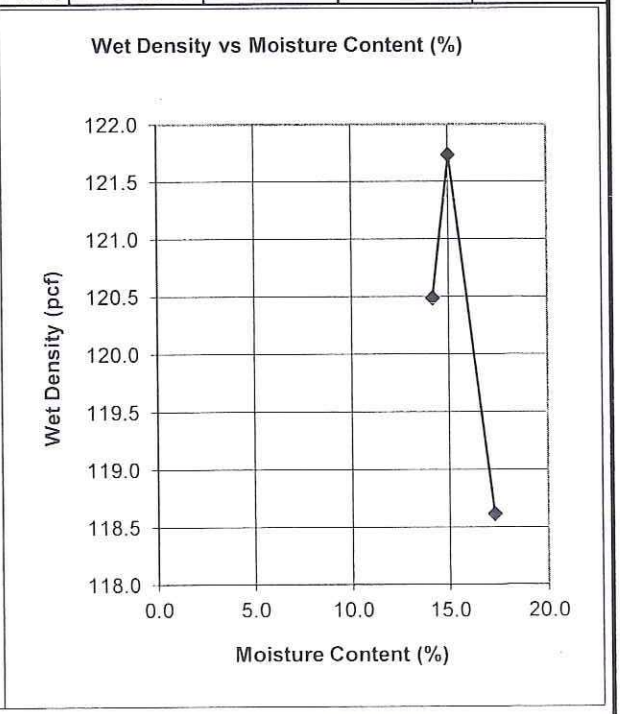
Maximum Wet Density (g/cc):	1.95
Maximum Dry Density (g/cc):	1.70
Maximum Wet Density (pcf):	121.7
Maximum Dry Density (pcf):	105.8

Remarks:

Test Data

Point Number:	1	2	3	4	5	6
Initial Wet Weight of Soil (g):	2200	2200	2200			
Water Added (mL):	176	220	264			
Tamper Reading:	10.8	10.7	11.0			
Wet Density (g/cc):	1.93	1.95	1.90			
Dry Density (g/cc):	1.69	1.70	1.62			
Dish Number:						
Weight of Dish (g):	196.3	194.9	197.0			
Wet Weight of Soil and Dish (g):	808.9	764.3	881.2			
Dry Weight of Soil and Dish (g):	732.8	689.9	780.1			
Moisture Content, %:	14.2	15.0	17.3			
Wet Density, pcf:	120.5	121.7	118.6			
Dry Density, pcf:	105.5	105.8	101.1			





Appendix C

DESIGN CALCULATIONS

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/16/11 Checked By Lino Date 8/17/11 Sheet 1 of 1

Retaining Walls and Soundwall - Liquefaction Potential

* Analysis was performed using two site-specific soil borings R-11-002 and R-11-021, which contain a considerable thickness of coarse-grained soil layer.
* Remaining soil borings contain predominately fine-grained soils; therefore analysis was not performed.
* Historical high ground water depth of 5 feet was used.

∴ Liquefaction potential at the site is low. //

I-880 Operational and Safety Improvements Project

EMI Project No. 10-133

Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
$^{1}C_N$ = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
$CRR\ r = CRR_{7.5} \times Cm \times K\ sigma$

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines (Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

$F_L = CRR\ r / CSR\ i$

R-11-002

Emean (%)	75			Present Ground El.	26.6	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.2	=Field Water Table Depth	Acc. max :	0.710	g					Earthq. M=	7.3	
C_E	1.25			Future Ground El.	26.6	C_B	1.00	120	21.6	=Design Water El.	13.4	=Field Water El.								Cm=	1.07	

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
5	21.6	21	CL	90.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	24	34	1.00	High N	0.00	LARGE	high N
10	16.6	17	CL	85.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	29	39	1.00	High N	0.00	LARGE	high N
15	11.6	9	CL	88.0	0.90	0.84	1.11	0.85	1.00	0.67	2	2	0.97	0.59	0.68	7	14	1.00	0.15	0.16	0.23	Fines
20	6.6	18	CL	75.0	1.20	0.99	1.03	0.95	1.20	1.00	1	1	0.95	0.73	0.72	26	37	1.00	High N	0.00	LARGE	high N
25	1.6	31	CL	95.0	1.50	1.13	0.96	0.95	1.00	0.67	2	2	0.94	0.88	0.74	24	33	1.00	High N	0.00	LARGE	high N
30	-3.4	34	CL	88.0	1.80	1.28	0.90	1.00	1.20	1.00	1	1	0.93	1.02	0.76	46	60	1.00	High N	0.00	LARGE	high N
35	-8.4	32	CL	95.0	2.10	1.42	0.86	1.00	1.00	0.67	2	2	0.89	1.16	0.74	23	32	0.98	High N	0.00	LARGE	high N
40	-13	35	SC	20.0	2.40	1.56	0.82	1.00	1.20	1.00	1	1	0.85	1.31	0.72	43	50	0.96	High N	0.00	LARGE	high N
45	-18	26	CL	55.0	2.70	1.71	0.78	1.00	1.00	0.67	2	2	0.81	1.45	0.69	17	25	0.94	0.30	0.30	0.43	Fines
50	-23	21	CL	87.0	3.00	1.85	0.75	1.00	1.20	1.00	1	1	0.77	1.60	0.67	24	33	0.92	High N	0.00	LARGE	high N
55	-28	44	GC	40.0	3.30	2.00	0.72	1.00	1.00	0.67	2	2	0.73	1.74	0.64	26	37	0.90	High N	0.00	LARGE	high N
60	-33	44	CL	95.0	3.60	2.14	0.70	1.00	1.20	1.00	1	1	0.69	1.88	0.60	46	60	0.88	High N	0.00	LARGE	high N
65	-38	42	CL	85.0	3.90	2.28	0.68	1.00	1.00	0.67	2	2	0.64	2.03	0.57	24	33	0.88	High N	0.00	LARGE	high N
70	-43	46	CL	90.0	4.20	2.43	0.66	1.00	1.20	1.00	1	1	0.60	2.17	0.54	45	59	0.87	High N	0.00	LARGE	high N

I-880 Operational and Safety Improvements Project

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Version - 12/05

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K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

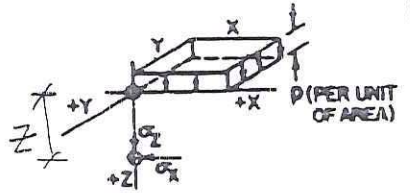
$F_L = CRR\ r / CSR\ i$

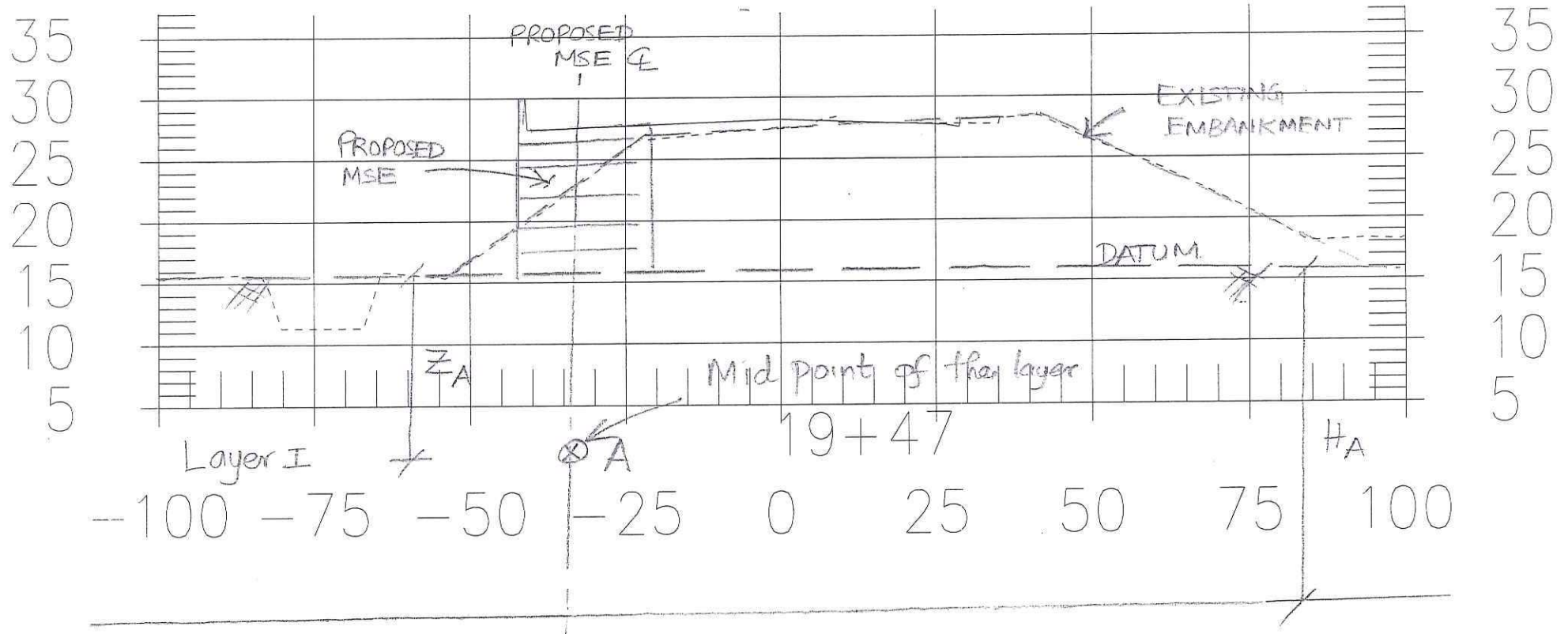
R-11-021

Emean (%)	75			Present Ground El.	24.2	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.2	=Field Water Table Depth	Acc. max =	0.710	g							Earthq. M=	7.3
C_E	1.25			Future Ground El.	24.2	C_B	1.00	120	19.2	=Design Water El.	11	=Field Water El.										Cm=	1.07

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-		-	-	-	-				-		-	-	-	-	-	-	-	-	-	-
5	19.2	27	CL	85.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	31	42	1.00	High N	0.00	LARGE	high N
10	14.2	13	CL	90.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	22	31	1.00	High N	0.00	LARGE	high N
11.5	12.7	11	CL	85.0	0.69	0.69	1.23	0.85	1.20	1.00	1	1	0.97	0.49	0.64	17	26	1.00	0.31	0.33	0.52	Fines
15	9.2	4	CL	85.0	0.90	0.84	1.11	0.85	1.00	0.67	2	2	0.97	0.59	0.68	3	9	1.00	0.10	0.11	0.16	Fines
20	4.2	7	CH	81.0	1.20	0.99	1.03	0.95	1.20	1.00	1	1	0.95	0.73	0.72	10	17	1.00	0.18	0.20	0.27	Fines
25	-0.8	46	GP-GM	5.0	1.50	1.13	0.96	0.95	1.00	0.67	2	2	0.94	0.88	0.74	35	35	1.00	High N	0.00	LARGE	high N
30	-5.8	21	SC-SM	30.0	1.80	1.28	0.90	1.00	1.20	1.00	1	1	0.93	1.02	0.76	28	38	1.00	High N	0.00	LARGE	high N
35	-11	24	CL	65.0	2.10	1.42	0.86	1.00	1.00	0.67	2	2	0.89	1.16	0.74	17	26	0.98	0.30	0.32	0.43	Fines
40	-16	5	CH	95.0	2.40	1.56	0.82	1.00	1.20	1.00	1	1	0.85	1.31	0.72	6	12	0.96	0.13	0.14	0.19	Fines
45	-21	22	SC/CL	45.0	2.70	1.71	0.78	1.00	1.00	0.67	2	2	0.81	1.45	0.69	14	22	0.94	0.24	0.25	0.35	Fines
50	-26	18	CL	80.0	3.00	1.85	0.75	1.00	1.20	1.00	1	1	0.77	1.60	0.67	20	29	0.92	0.43	0.42	0.63	Fines

A SCHEMATIC DIAGRAM SHOWING STRESS INCREASES

UNIFORMLY LOADED RECTANGULAR AREA (From NAVFAC DM 7.01)		VERTICAL (BENEATH CORNER OF RECTANGLE)	$\sigma_z = \frac{p}{4\pi}\left[\frac{2XYZ(X^2+Y^2+Z^2)^{1/2}}{Z^2(X^2+Y^2+Z^2)+X^2Y^2}\cdot\frac{X^2+Y^2+2Z^2}{X^2+Y^2+Z^2} + \tan^{-1}\frac{2XYZ(X^2+Y^2+Z^2)^{1/2}}{Z^2(X^2+Y^2+Z^2)-X^2Y^2}\right]$



@ Point 'A',

Vertical overburden stress $\sigma_o' = Z_A \times \gamma$

$\Delta\sigma_1$ = Stress increase due to existing embankment

$\Delta\sigma_2$ = Stress increase due to proposed MSE

$\Delta\sigma_1 - \Delta\sigma_2$ = Net stress increase

RETAINING WALL 17

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

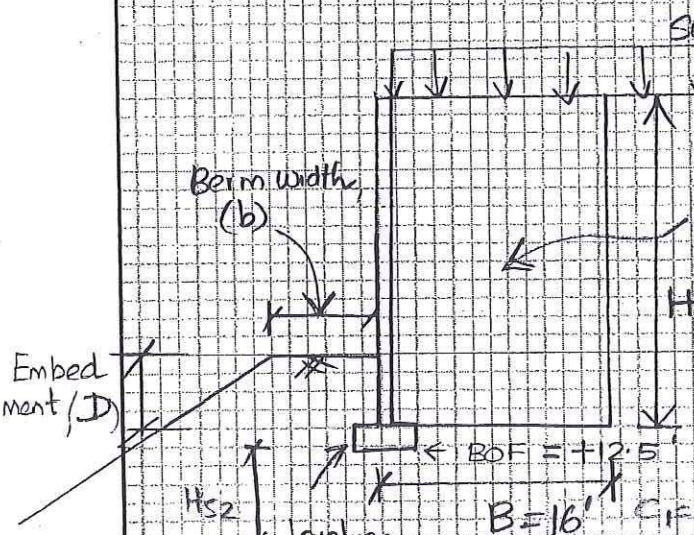
By Ranjan Date 7/5/11 Checked By Lino Date 8/15/1 Sheet 1 of 3

Bearing Capacity Calculations - RW 17

For H_{max} = 20', B = 16' ; BOF = +12.5'

Maximum Bearing Stresses

Strength Limit State = 5500 psf
Extreme Limit State = 6000 psf
Service Limit State = 4100 psf



Per Caltrans BDS,

Minimum b = 4 ft or 0.1H (whichever greater)

Minimum D = 2 ft or 0.1H (whichever greater)

∴ D = 2.25' + 0.5'
= 2.75'

b/B = 0.25

D/B = 0.17

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 2 of 3

Bearing Capacity Equation

$$q_u = c N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \quad \rightarrow (1)$$

$N_{cm} = N_c S_c i_c$; $N_{qm} = N_q S_q i_q d_q$; $N_{\gamma m} = N_\gamma S_\gamma i_\gamma$

load inclination factors $i_c = i_q = i_\gamma = 1$

shape factors $S_c = S_q = S_\gamma = 1$

depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

For stronger soil overlies a weaker soil,

$$N_{cm} = \left(\frac{1}{\beta_m} + K N_c\right) \leq N_c \quad (\because S_c = 1)$$

$$\beta_m = \frac{BL}{2(B+L)H_{s2}} = \frac{15 \times 100}{2(15+100)7.5} = 0.9 \quad (\because L = 100')$$

$$K = c_2/c_1 = 1.5/2 = 0.75$$

$\therefore N_{cm} = 5.1$ ≤ 5.14

$$\Rightarrow q_{u1} = (2 \times 5.1) + (0.12 \times 2.75)$$

$$= 10.7 \text{ ksf}$$

Consider 3' deep overex below MSE base & Assume 4 ksf for backfill

Using AASHTO Eq^n C10.6.3.1.2f-1,

$$q_n = q_2 e^{0.67\left[1 + B/L\right]\frac{H_{s2}}{B}}$$

$$= 10.7 \times 1.18$$

$$= 12.6 \text{ ksf}$$

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 3 of 3

Service Limit State

$$q_{vall} = \frac{q_{vu}}{3} = \frac{12.6}{3} = 4.2 \text{ ksf} > 4.1 \text{ ksf}$$

Strength Limit State

$$q_{vall} = 0.45 \times q_{vu} = 5.67 \text{ ksf} > 5.5 \text{ ksf}$$

Extreme Limit State

$$q_{vall} = 1 \times q_{vu} = 12.6 \text{ ksf} > 6.0 \text{ ksf}$$

CHECK SATISFIED //

⇒ Required minimum overex = 3' //

I-880 Operational & Safety Improvement Project

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 17 (H = 10 ft)

Consolidation Settlement

Ground Surface El. = 17.5 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Initail stress (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.420	**0.481**	0.901	**1.851**	2.753	1.09
CL 2	7.5	10	5	1.044	**0.501**	1.545	**1.175**	2.720	0.37
CL 3A	0	17.5	10	1.476	**0.534**	2.010	**0.899**	2.909	0.48
CL 3B	-10	27.5	10	2.052	**0.567**	2.619	**0.622**	3.241	0.28
CL 4	-22.5	40	15	2.772	**0.601**	3.373	**0.346**	3.720	0.19
CL 5	-45	62.5	30	4.068	**0.605**	4.673	**0.218**	4.891	0.18
								Total Settlement (in):	**2.59**

2.6"

After 3' overex ⇒ $\delta = 2.2"$

I-880 Operational & Safety Improvement Project

RW 17 (H = 12.5 and 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Initail stress (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.420	**0.481**	0.901	**2.213**	3.115	1.21
CL 2	7.5	10	5	1.044	**0.501**	1.545	**1.373**	2.919	0.41
CL 3A	0	17.5	10	1.476	**0.534**	2.010	**1.044**	3.054	0.55
CL 3B	-10	27.5	10	2.052	**0.567**	2.619	**0.716**	3.335	0.31
CL 4	-22.5	40	15	2.772	**0.601**	3.373	**0.387**	3.760	0.21
CL 5	-45	62.5	30	4.068	**0.605**	4.673	**0.238**	4.910	0.19
							Total Settlement (in):		**2.89**

2.9"

After 3' overex $\Rightarrow$ $\delta = 2.5$"

RW17 - Sta. 19+60

C-10

I-880 Operational & Safety Improvement Project

RW 17 (H = 17.5 and 20 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 13 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	13	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Initail stress (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11.5	1.5	3	0.180	**0.424**	0.604	**3.393**	3.997	0.74
CL 2	7.5	5.5	5	0.504	**0.464**	0.968	**2.699**	3.667	0.87
CL 3A	0	13	10	0.936	**0.516**	1.452	**1.871**	3.323	1.08
CL 3B	-10	23	10	1.512	**0.572**	2.084	**1.089**	3.173	0.55
CL 4	-22.5	35.5	15	2.232	**0.595**	2.827	**0.436**	3.262	0.28
CL 5	-45	58	30	3.528	**0.595**	4.123	**0.233**	4.356	0.21
								Total Settlement (in):	**3.73**

3.8"

After 3' overex ⇒ $\delta = 3"$

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/25/11 Checked By Lino Date ____ Sheet 1 of 1

Consolidation Time Calculations - RW 17

Per URS B-10,
Consider the clay layer between El. 0' and El. -21',

$$H_{dr} = \frac{20'}{2} = 10 \text{ ft} \quad (\because \text{Double-drainage})$$

Based on laboratory test results,

Avg $C_v = 0.85 \text{ ft}^2/\text{day}$

Time Factor

Total settlement estimated = 3.0"

Allowable settlement for MSE = 0.5"

$$\text{Required \% consolidation } (U) = \frac{3" - 0.5"}{3"} \times 100$$

$$= 83\ \%$$

$\therefore$ Corresponding Time factor $(T) = 1.781 - 0.933 \times \log(100 - U)$ $(\because U > 60\%)$

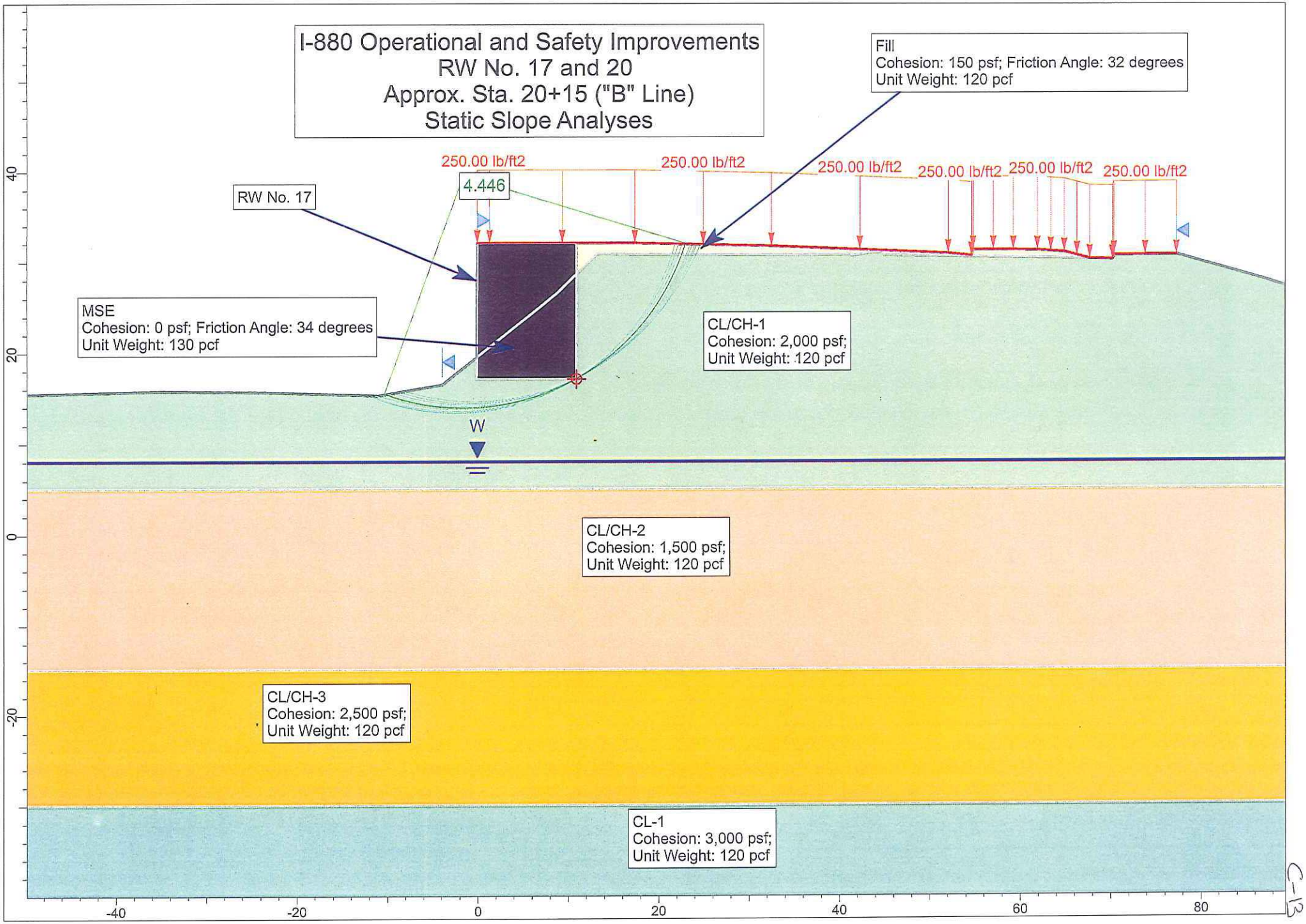
For $U < 60\%$, $T = \frac{\pi}{4}\left(\frac{U}{100}\right)^2$

$$T = 0.633$$

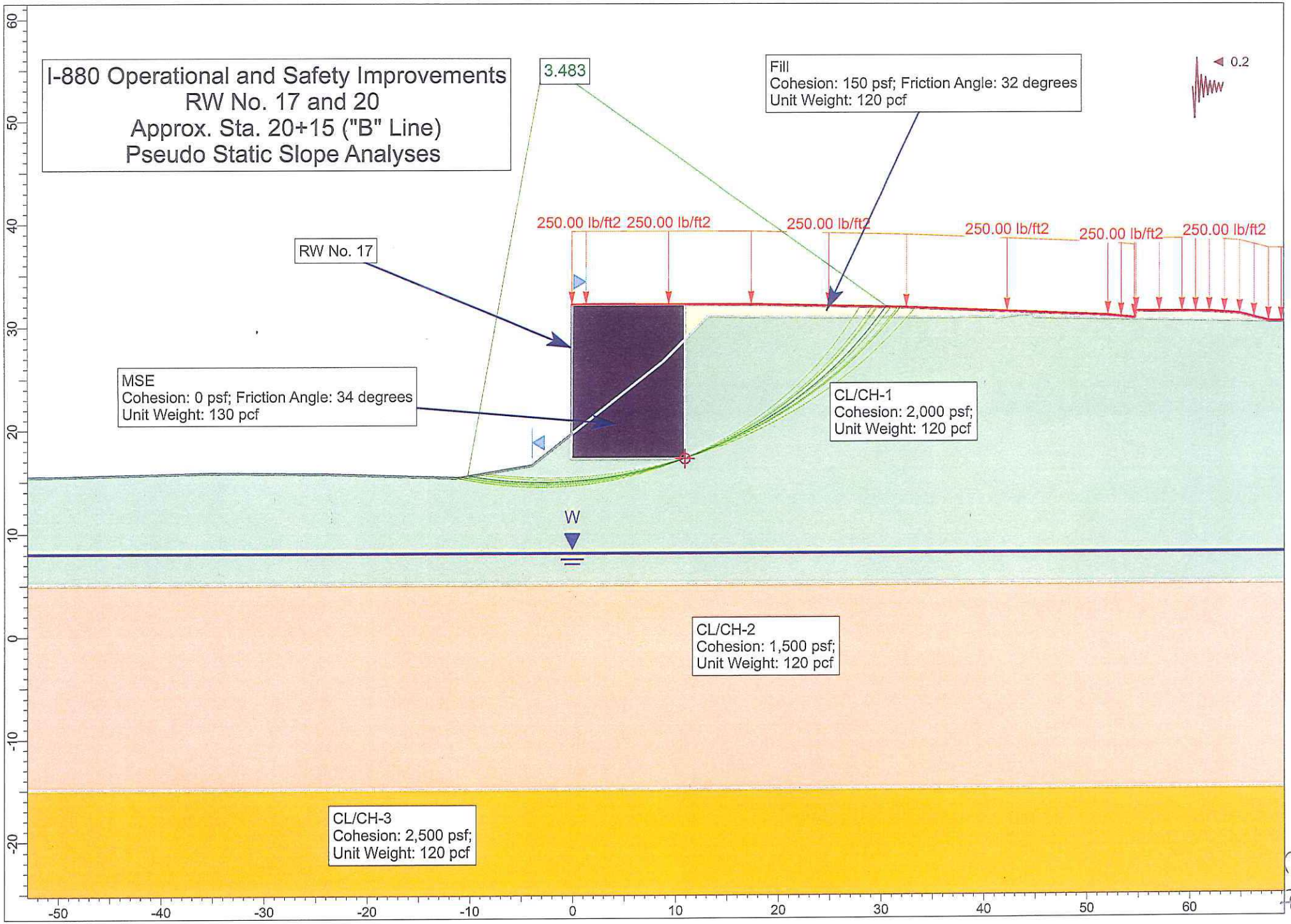
$\Rightarrow$ Required time (without any surcharge),

$$t = \frac{T H_{dr}^2}{C_v} = 180 \text{ days}$$

SAY 6 MONTHS


I-880 Operational and Safety Improvements
RW No. 17 and 20
Approx. Sta. 20+15 ("B" Line)
Static Slope Analyses
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
4.446
RW No. 17
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-2
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL/CH-3
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
40
20
0
-20
-40
-20
0
20
40
60
80

C-13


I-880 Operational and Safety Improvements
RW No. 17 and 20
Approx. Sta. 20+15 ("B" Line)
Pseudo Static Slope Analyses
3.483
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
0.2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 17
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-2
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL/CH-3
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
60
50
40
30
20
10
0
-10
-20
-50
-40
-30
-20
-10
0
10
20
30
40
50
60

RETAINING WALLS 18 & 19

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/15/11 Checked By Lino Date 8/15/11 Sheet 1 of 3

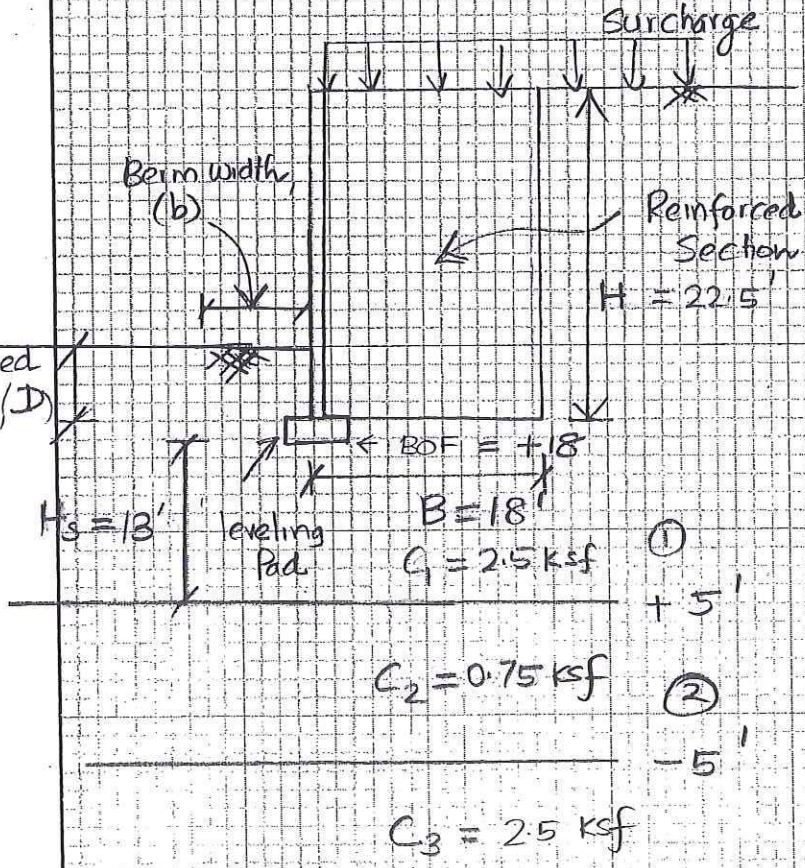
Bearing Capacity Calculations - RW 18 & 19

For $H_{max} = 22.5'$,

$B = 18'$; BOF = $+18'$

Maximum Bearing Stresses

Strength Limit State = 6200 psf
Extreme Limit State = 7000 psf
Service Limit State = 4600 psf



Per Caltrans BDS,
Minimum D = 2 ft
or 0.1H (whichever greater)

$D = 2.25 + 0.5'$
$= 2.75'$

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 2 of 3

Bearing Capacity Equation (10.6.3.1.2a-1)

$$q_{ru} = c N_{cm} + \sigma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \quad (\because \phi = 0)$$

$N_{cm} = N_c s_c i_c$; $N_{qm} = N_q s_q i_q d_q$; $N_{\gamma m} = N_\gamma s_\gamma i_\gamma$

load inclination factors $i_c = i_q = i_\gamma = 1$

shape factors $s_c = s_q = s_\gamma = 1$ ($\phi = 0$, $L \gg B$)

depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

$\therefore q_{ru} = c N_{cm} + \sigma D$

$= (2 \times 5.14) + (2.5 \times 0.12) = 10.6$ ksf

Strength Limit State

$q_{all} = 0.45 \times 10.6 = 4.8$ ksf < 5.2 ksf

CHECK NOT SATISFIED //

Consider 3' of removal & compaction below footing

Assume compacted material strength is 4 ksf

For layered soil where stronger soil overlies a weaker soil;

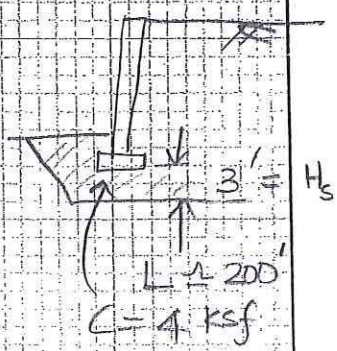
$$N_{cm} = \left(\frac{1}{\beta_m} + K N_c\right) \le N_c = 5.14 \quad (\because s_c = 1)$$

$$\beta_m = \frac{BL}{2(B+L)H_s} = 2.2 \quad ; \quad K = \frac{c_2}{c_1} = \frac{2}{4} = 0.5$$

$N_{cm} = 3.02$

$\therefore q_{ru} = (4 \times 3.02) + (0.12 \times 2.5)$

$= 12.4$ ksf



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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/15/11 Checked By Lino Date 8/15/11 Sheet 2 of 3

Bearing Capacity

$$q_u = c N_{cm} + \gamma D N_{qm} + \tfrac{1}{2}\gamma B N_{\gamma m} \quad (\phi = 0)$$

$N_{qm} = 1.0$; $N_{\gamma m} = 0$

For weaker soil overlying stronger soil,

$$\frac{c_2}{c_1} = \frac{2.5}{0.75} = 3.3$$

$$\frac{B}{H_s} = \frac{18}{13} = 1.4$$

$\Rightarrow N_{cm} = 5.14$ from AASHTO fig 10.6.3.1.2e-2

$$\Rightarrow q_{u1} = (2.5 \times 5.14) + (2.5 \times 0.12 \times 1)$$
$$= 13.2 \text{ ksf}$$

Strength Limit State

$$q_{ud} = 0.45 \times 13.2 = 5.9 < 6.2 \text{ ksf}$$ bearing pressure

CHECK NOT SATISFIED //

Consider 3' of removal & compaction below footing.
Assume the compacted material strength is 4 ksf.

For layered soil where stronger soil overlies a weaker soil:

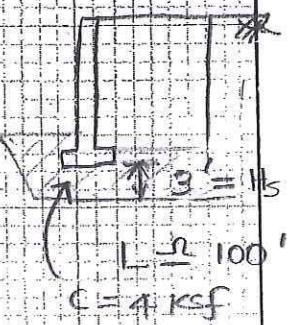
$$N_{cm} = \left(\frac{1}{\beta_m} + K N_c\right) \le N_c \quad (\because S_c \simeq 1)$$

$N_c = 5.14$

$\beta_m = \frac{BL}{2(B+L)H_s} = 2.5$; $K = \frac{c_2}{c_1} = \frac{2.5}{4} = 0.625$

$N_{cm} = 3.6$

$\therefore q_u = (4 \times 3.6) + (0.12 \times 2.75) = 14.7 \text{ ksf}$



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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/15/11 Checked By Lino Date 8/15/11 Sheet 3 of 3

Strength Limit State

$$q_{all} = 0.45 \times 14.7 = 6.6 \text{ ksf} > 6.2 \text{ ksf}$$

Extreme Limit State

$$q_{all} = 1 \times 14.7 = 14.7 \text{ ksf} > 7.0 \text{ ksf}$$

Service Limit State

$$q_{all} = \frac{14.7}{3} = 4.9 \text{ ksf} > 4.6 \text{ ksf}$$

CHECK SATISFIED //

⇒ Consider 3 ft of overex //

⇒ For Wall 19 with wall height of 5'; use 2' of overex due to the presence of groundwater.

I-880 Operational & Safety Improvement Project

RW 18 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 14 ft

Groundwater El. = 12 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	14	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12	2	4	0.240	**0.570**	**1.708**	**1.14**	0.810	1.948	0.46
CL 2	6	8	7.5	0.586	**0.552**	**1.537**	**0.98**	1.138	2.122	0.61
CL 3A	-2.5	16.5	10	1.075	**0.463**	**1.274**	**0.81**	1.538	2.349	0.55
CL 3B	-13	27	12.5	1.680	**0.382**	**0.874**	**0.49**	2.062	2.554	0.35
CL 4	-36	50	32.5	3.005	**0.307**	**0.542**	**0.23**	3.312	3.546	0.29
									Total Settlement (in):	**2.26**

2.3"

After 3' overex $\Rightarrow \delta = 2"$

I-880 Operational & Safety Improvement Project

RW 19 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 14 ft

Groundwater El. = 12 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	14	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12	2	4	0.240	**0.570**	**1.708**	**1.14**	0.810	1.948	0.46
CL 2	6	8	7.5	0.586	**0.552**	**1.537**	**0.98**	1.138	2.122	0.61
CL 3A	-2.5	16.5	10	1.075	**0.463**	**1.278**	**0.82**	1.538	2.353	0.55
CL 3B	-13	27	12.5	1.680	**0.382**	**0.885**	**0.50**	2.062	2.565	0.36
CL 4	-36	50	32.5	3.005	**0.307**	**0.542**	**0.23**	3.312	3.546	0.29
							Total Settlement (in):			**2.27**

2.3"

After 3' overex $\Rightarrow \delta = 2"$

I-880 Operational & Safety Improvement Project

RW 18 (H = 10 and 12.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 15 ft

Groundwater El. = 12.5 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.837**	**2.294**	**1.46**	1.137	2.594	0.54
CL 2	6	9	7.5	0.674	**0.781**	**2.126**	**1.34**	1.456	2.800	0.64
CL 3A	-2.5	17.5	10	1.164	**0.653**	**1.726**	**1.07**	1.817	2.890	0.60
CL 3B	-13	28	12.5	1.769	**0.536**	**1.206**	**0.67**	2.305	2.975	0.42
CL 4	-36	51	32.5	3.094	**0.413**	**0.746**	**0.33**	3.507	3.840	0.38
									Total Settlement (in):	**2.58**

2.6"

After 3' overex $\Rightarrow$ $\delta = 2.3$"

C.22

I-880 Operational & Safety Improvement Project

RW 19 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	10.5	0.358	**0.837**	**2.285**	**1.45**	1.195	2.643	1.09
CL 2	6	11.5	7.5	0.818	**0.781**	**2.007**	**1.23**	1.599	2.826	0.56
CL 3A	-2.5	20	10	1.308	**0.647**	**1.671**	**1.02**	1.955	2.979	0.55
CL 3B	-13	30.5	12.5	1.913	**0.527**	**1.140**	**0.61**	2.440	3.053	0.37
CL 4	-36	53.5	32.5	3.238	**0.401**	**0.711**	**0.31**	3.638	3.948	0.35
							Total Settlement (in):			**2.90**

2.9"

After 3' overex ⇒ $\delta = 2.6"$

I-880 Operational & Safety Improvement Project

RW 18 (H = 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.837**	**2.782**	**1.95**	1.195	3.140	0.94
CL 2	6	11.5	7.5	0.818	**0.781**	**2.443**	**1.66**	1.599	3.262	0.70
CL 3A	-2.5	20	10	1.308	**0.654**	**1.856**	**1.20**	1.962	3.164	0.62
CL 3B	-13	30.5	12.5	1.913	**0.527**	**1.230**	**0.70**	2.440	3.143	0.41
CL 4	-36	53.5	32.5	3.238	**0.401**	**0.897**	**0.50**	3.638	4.135	0.54
									Total Settlement (in):	**3.22**

3.3"

After 3' overex $\Rightarrow$ $\delta = 3"$

I-880 Operational & Safety Improvement Project

RW 19 (H = 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 20.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	20.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	15	5.5	10.5	0.660	**0.830**	**2.738**	**1.91**	1.490	3.398	1.13
CL 2	6	14.5	7.5	1.178	**0.744**	**2.255**	**1.51**	1.922	3.434	0.57
CL 3A	-2.5	23	10	1.668	**0.617**	**1.729**	**1.11**	2.285	3.397	0.52
CL 3B	-13	33.5	12.5	2.273	**0.487**	**1.319**	**0.83**	2.760	3.592	0.43
CL 4	-36	56.5	32.5	3.598	**0.359**	**0.851**	**0.49**	3.957	4.449	0.50
							Total Settlement (in):			**3.14**

3.2"

After 3' overex ⇒ $\delta = 2.9$"

I-880 Operational & Safety Improvement Project

RW 18 & 19 (H = 17.5 to 22.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.000**	**3.278**	**3.28**	0.358	3.636	2.27
CL 2	6	11.5	7.5	0.818	**0.005**	**2.861**	**2.86**	0.823	3.679	1.46
CL 3A	-2.5	20	10	1.308	**0.027**	**2.015**	**1.99**	1.335	3.323	1.19
CL 3B	-13	30.5	12.5	1.913	**0.040**	**1.357**	**1.32**	1.953	3.270	0.84
CL 4	-36	53.5	32.5	3.238	**0.087**	**0.876**	**0.79**	3.325	4.113	0.90
							Total Settlement (in):			**6.66**

6.7"

After 3' overex ⇒ $\delta = 5.8$"

After 5' overex ⇒ $\delta = 5.2$"

After 7' overex ⇒ $\delta = 4.6$"

RW 18 and 19 - Sta 22+00

⇒ SELECT 3' OVEREX DUE TO POTENTIAL OF GROUNDWATER //

I-880 Operational & Safety Improvement Project

RW 18 & 19 (H = 17.5 to 22.5 ft)

Consolidation Settlement

5-ft Surcharge

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.000**	**3.775**	**3.77**	0.358	4.133	2.52
CL 2	6	11.5	7.5	0.818	**0.005**	**3.294**	**3.29**	0.823	4.113	1.57
CL 3A	-2.5	20	10	1.308	**0.027**	**2.473**	**2.45**	1.335	3.781	1.36
CL 3B	-13	30.5	12.5	1.913	**0.040**	**1.773**	**1.73**	1.953	3.686	1.03
CL 4	-36	53.5	32.5	3.238	**0.087**	**1.012**	**0.92**	3.325	4.250	1.04
							Total Settlement (in):			**7.53**

7.5"

After 3' overex ⇒ δ = 6.5"

Earth Mechanics, Inc.
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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/25/11 Checked By Lino Date ____ Sheet 1 of 2

Consolidation Time Calculations - RW 18&19

Per CPT-111-032,
Consider the clay layer between El. 0' and El. -20',

$H_{dr} = \frac{20'}{2} = 10'$ (∵ Double-drainage)

Based on Laboratory test results,

Avg $C_v = 0.35$ ft²/day

Time Factor

Total settlement estimated = 5.8"

Allowable settlement for MSE = 0.5"

Required % consolidation (U) = $\frac{5.8" - 0.5"}{5.8"} \times 100$

$= 91$ %

∴ Corresponding Time factor (T) = $1.781 - 0.933 \times \log(100-U)$ (∵ $U > 60\%$)

$T = 0.89$

⇒ Required time (without any surcharge),

$t = \frac{T H_{dr}^2}{C_v} = 254$ days

SAY 8.5 MONTHS

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/16/11 Checked By Lino Date 8/17/11 Sheet 2 of 2

(A) If the remaining (long-term) settlement of 1-inch is allowed;

$$\text{Required \% of Consolidation (U)} = \frac{5.8'' - 1''}{5.8''} = 83\%$$

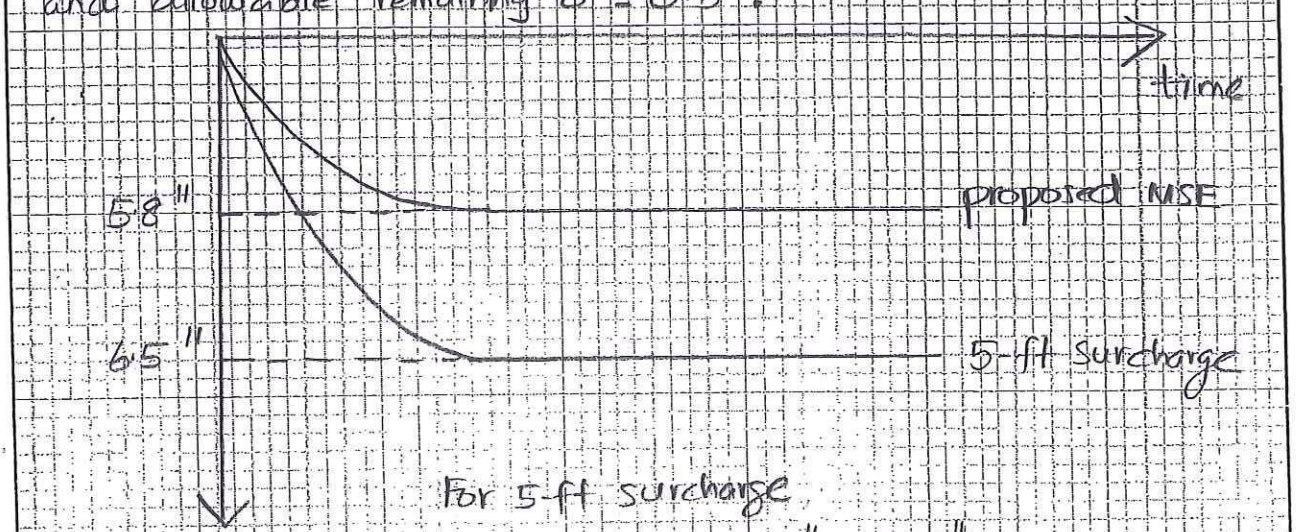
$\Rightarrow$ Corresponding $T = 0.633$

$$\text{Required time } (t) = \frac{T H_{dr}^2}{c_v} = \frac{0.633 \times 10^2}{0.35}$$

$$= 181 \text{ days}$$

SAY 26 weeks

(B) Consider 3-ft overexcavation below the leveling pad and allowable remaining $\delta = 0.5''$.



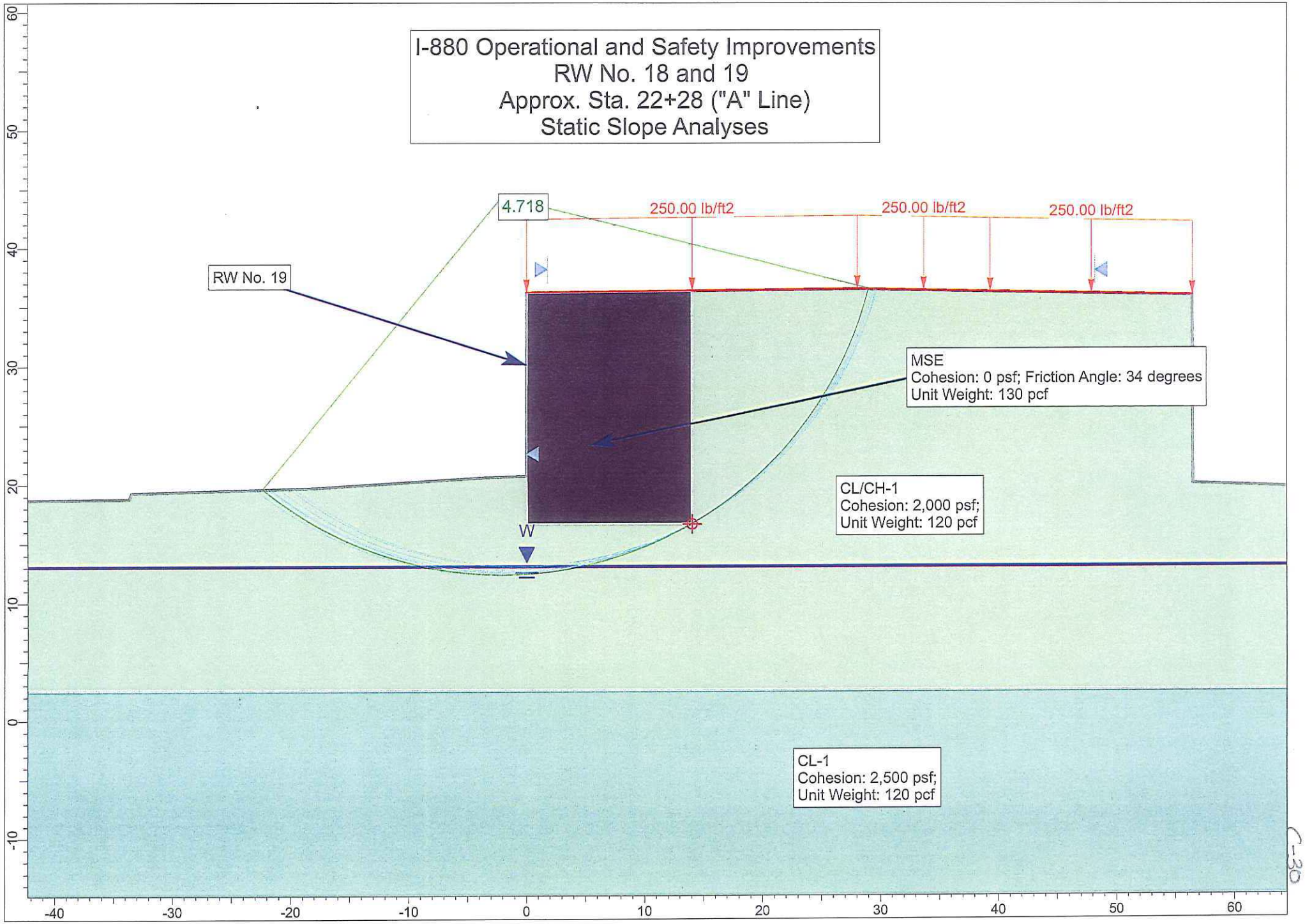
For 5-ft surcharge

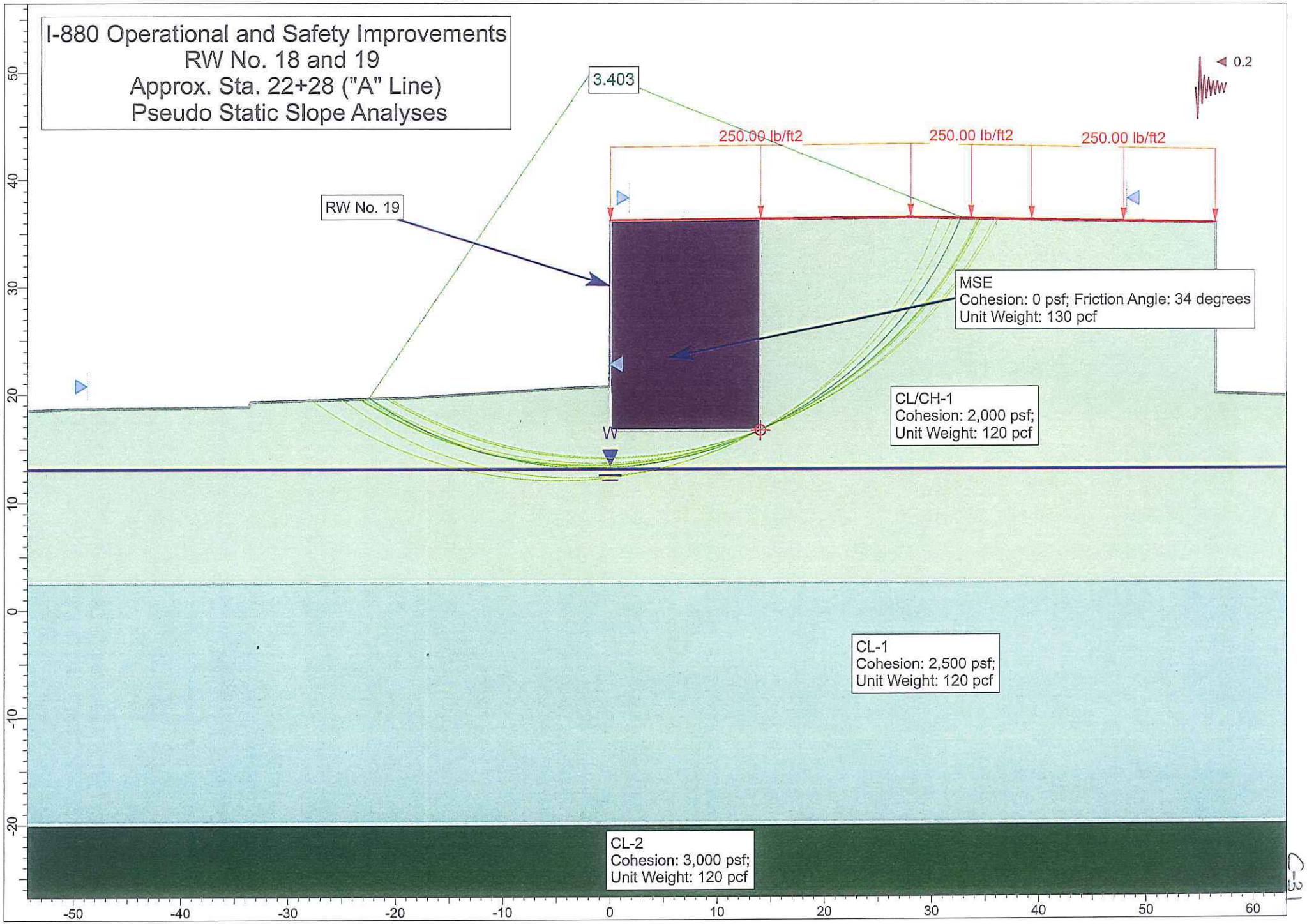
$$U = \frac{5.8'' - 0.5''}{6.5''} = 82\%$$

$\Rightarrow T = 0.61$

$$t = \frac{0.61 \times 10^2}{0.35} = 175 \text{ days}$$

SAY 6 months


I-880 Operational and Safety Improvements
RW No. 18 and 19
Approx. Sta. 22+28 ("A" Line)
Static Slope Analyses
4.718
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 19
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
60
50
40
30
20
10
0
-10
-40
-30
-20
-10
0
10
20
30
40
50
60


I-880 Operational and Safety Improvements
RW No. 18 and 19
Approx. Sta. 22+28 ("A" Line)
Pseudo Static Slope Analyses
3.403
0.2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 19
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
50
40
30
20
10
0
-10
-20
-50
-40
-30
-20
-10
0
10
20
30
40
50
60

C-31

RETAINING WALL 26

Earth Mechanics, Inc.
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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 1 of 3

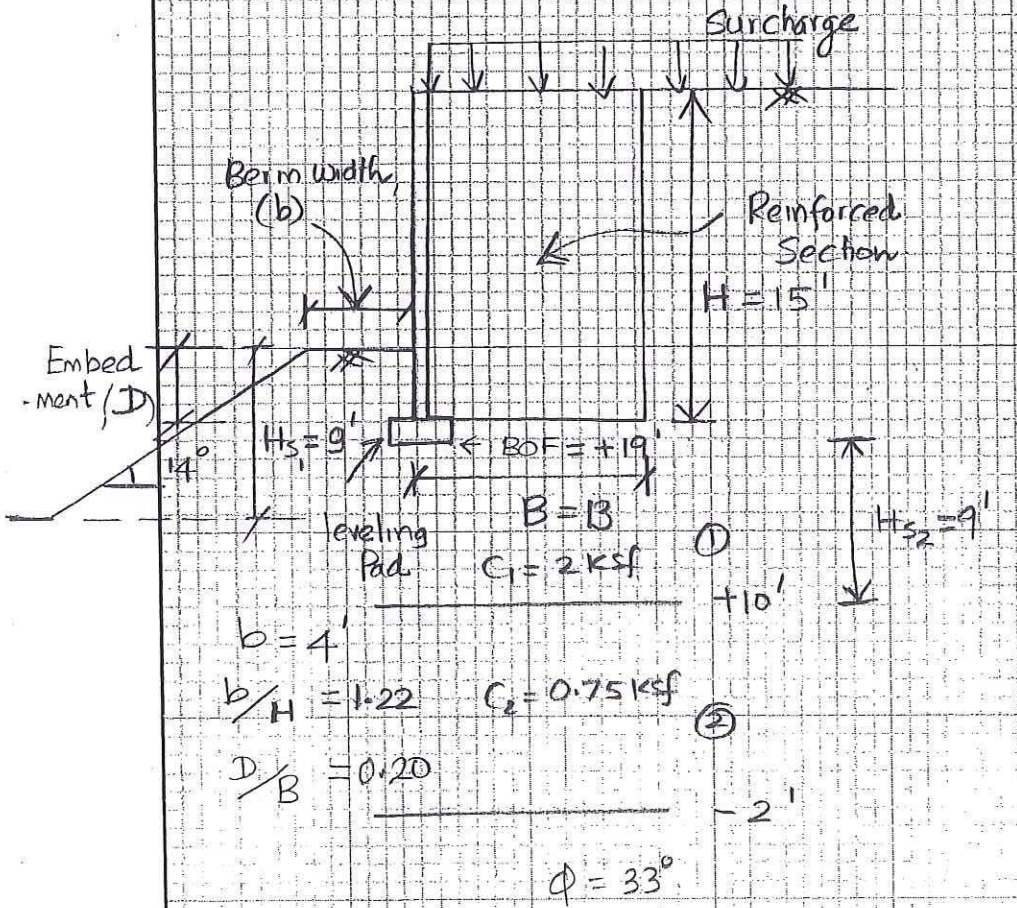
Bearing Capacity Calculations - RW 26

For $H_{max} = 15'$,

$B = 13'$; BOF = +19'

Maximum Bearing Stresses

Strength Limit State = 4300 psf
Extreme Limit State = 4200 psf
Service Limit State = 3200 psf



Per Caltrans BDS,

Minimum b = 4 ft or 0.1H (whichever greater)

Minimum D = 2 ft or 0.1H (whichever greater)

∴ D = 2 + 0.5'
= 2.5'

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 2 of 3

Bearing Capacity Equation (10.6.3.1.2a-1)

$q_u = c N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m}$ ($\because \phi = 0$)

$N_{cm} = N_c s_c i_c$; $N_{qm} = N_q s_q i_q d_q$; $N_{\gamma m} = N_\gamma s_\gamma i_\gamma$

load inclination factors $i_c = i_q = i_\gamma = 1$

shape factors $s_c = s_q = s_\gamma = 1$ ($\phi = 0$, $L \gg B$)

depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ &

For footing near slopes $\Rightarrow N_{qm} = 0$

$\therefore q_u = c N_{cm}$

For $B \geq$ slope height H_s,

$N_s = \frac{\gamma H_s}{c} = \frac{120 \times 9}{2000} = 0.54$

using $D/H = 1.22$ & $D/B = 0.2$ & $i = 14°$,

$N_{cq} = 4.9$ from Figure 10.6.3.1.2e-1

$q_u = c N_{cq}$

$= 2 \times 4.9$

$= 9.8$ ksf //

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 3 of 3

Strength Limit State

$q_{all} = \phi q_u = 0.45 \times 9.8 = 4.4$ ksf >

Bearing Pressure = 4.3 ksf

Extreme Limit State

$q_{all} = \phi q_u = 1 \times 9.8 = 9.8$ ksf >

Bearing Pressure = 4.2 ksf

Service Limit State

$q_{all} = \frac{q_u}{FOS} = \frac{9.8}{3} = 3.3$ ksf >

Bearing Pressure = 3.2 ksf

⇒ CHECK SATISFIED //

⇒ Consider a 3-feet deep of overexcavation.

I-880 Operational & Safety Improvement Project

RW 26 (H = 12.5 and 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 18 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	18	14	0.025	0.13	4.00
CL 2	14	10	0.025	0.13	4.00
CL 3	10	-2	0.025	0.13	5.00
CL 4	-2	-12	0.025	0.13	6.00
CL 5	-12	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initial stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	16	2	4	0.240	**0.593**	**2.199**	**1.61**	0.833	2.439	0.56
CL 2	12	6	4	0.720	**0.522**	**2.166**	**1.64**	1.242	2.886	0.44
CL 3	4	14	12	1.306	**0.395**	**1.935**	**1.54**	1.701	3.240	1.01
CL 4	-7	25	10	1.939	**0.306**	**1.501**	**1.20**	2.245	3.441	0.56
CL 5	-26	44	28	3.034	**0.235**	**0.968**	**0.73**	3.269	4.002	0.74
									Total Settlement (in):	**3.30**

3.3"

After 3' overex ⇒ $\delta = 2.9$"

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/25/11 Checked By Lino Date ____ Sheet 1 of 1

Consolidation Time Calculations - RW 26

Per R-11-021,
Consider the clay layer between El. +18' and El. -2'.

$H_{dr} = \frac{20'}{2} = 10$ ft (∵ Double-drainage)

Based on laboratory test results,

Avg $C_v = 0.35$ ft²/day

Time Factor

Total settlement estimated = 2.9"

Allowable settlement for MSE = 0.5"

Required % consolidation (U) = $\frac{2.9" - 0.5"}{2.9"} \times 100$

= 83 %

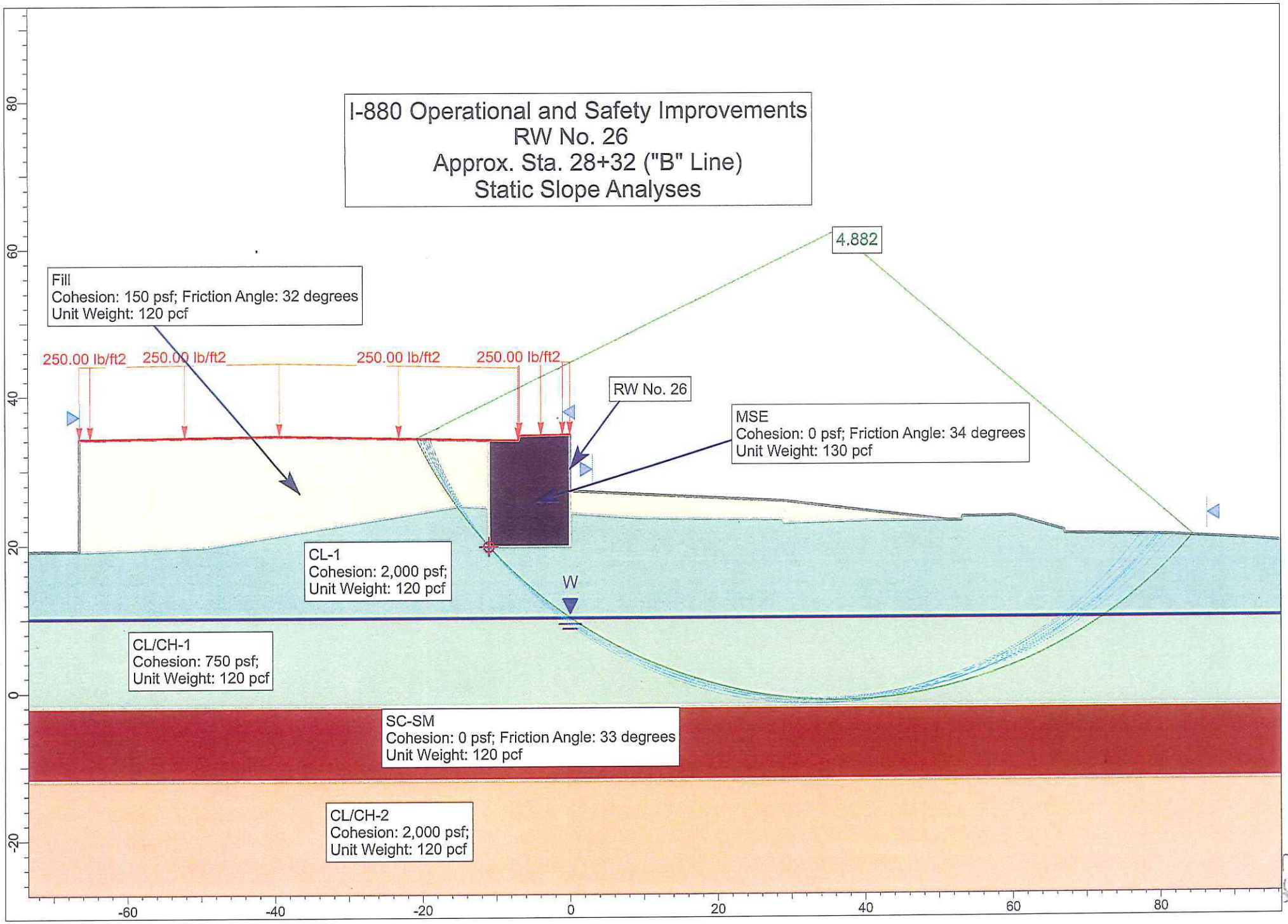
∴ Corresponding Time factor (T) = $1.781 - 0.933 \times \log(100 - U)$ (∵ U > 60%)

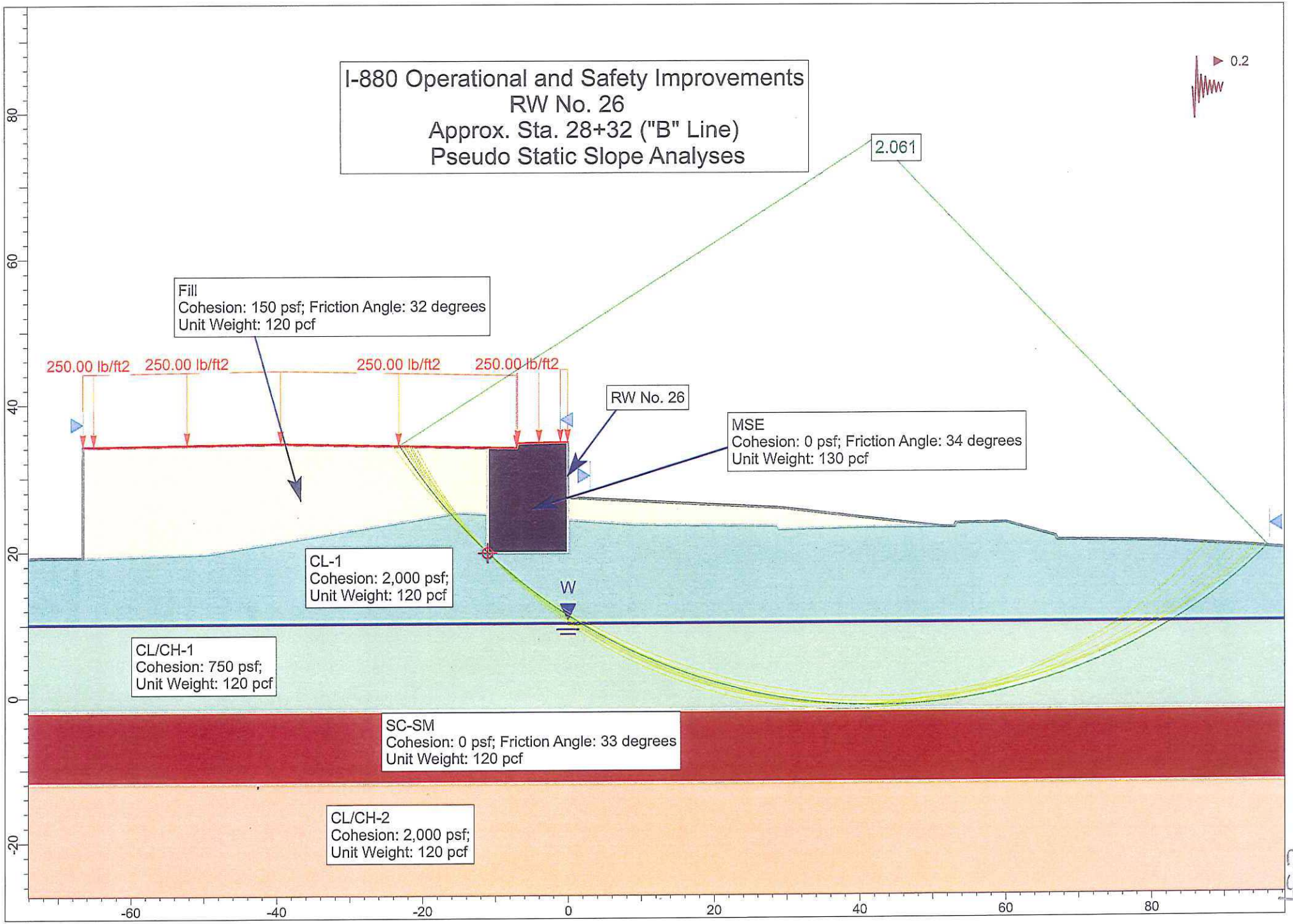
T = 0.633

⇒ Required time (without any surcharge),

$t = \frac{T H_{dr}^2}{C_v} = 180$ days

SAY 6 MONTHS


I-880 Operational and Safety Improvements
RW No. 26
Approx. Sta. 28+32 ("B" Line)
Static Slope Analyses
4.882
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 26
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-1
Cohesion: 750 psf;
Unit Weight: 120 pcf
SC-SM
Cohesion: 0 psf; Friction Angle: 33 degrees
Unit Weight: 120 pcf
CL/CH-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80


I-880 Operational and Safety Improvements
RW No. 26
Approx. Sta. 28+32 ("B" Line)
Pseudo Static Slope Analyses
0.2
2.061
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 26
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-1
Cohesion: 750 psf;
Unit Weight: 120 pcf
SC-SM
Cohesion: 0 psf; Friction Angle: 33 degrees
Unit Weight: 120 pcf
CL/CH-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80

RETAINING WALLS 28 & 29

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 1 of 3

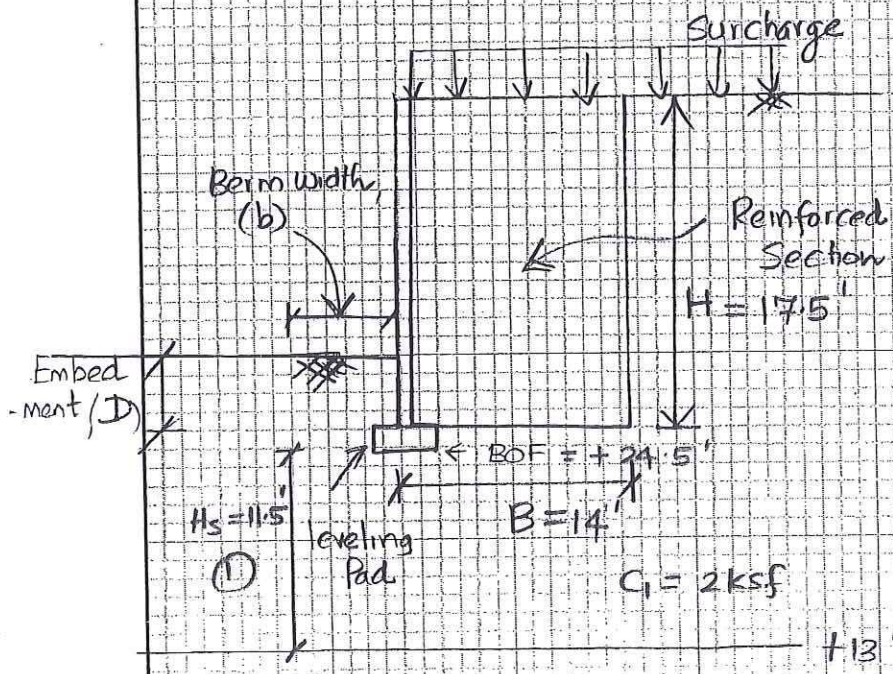
Bearing Capacity Calculations - RW 28 & 29

For $H_{max} = 17.5'$,

$B = 14'$; BOF = +24.5'

Maximum Bearing Stresses

Strength Limit State = 5000 psf
Extreme Limit State = 5300 psf
Service Limit State = 3700 psf



Per Caltrans BDS,
Minimum D = 2 ft
or 0.1H (whichever greater)

$D = 2' + 0.5'$
$= 2.5'$

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 2 of 3

Bearing Capacity Equation (10.6.3.1.2a-1)

$$q_u = C N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \qquad (\because \phi = 0)$$

$N_{cm} = N_c S_c i_c$; $N_{qm} = N_q S_q i_q d_q$; $N_{\gamma m} = N_\gamma S_\gamma i_\gamma$

load inclination factors $i_c = i_q = i_\gamma = 1$

shape factors $S_c = S_q = S_\gamma = 1$ ($\phi = 0$, $L \gg B$)

depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

For strong layer overlies a weak layer,

$$N_{cm} = \left(\frac{1}{\beta_m} + K N_c\right) \leq N_c \leq 5.14$$

$$\beta_m = \frac{BL}{2(B+L)H_s} = 0.43$$

$$K = \frac{C_2}{C_1} = 1.5/2 = 0.75$$

$N_{cm} = 6.1$ $\therefore$ USE $N_{cm} = 5.14$

$\Rightarrow q_u = C N_{cm} + \gamma D N_q$

$= (2 \times 5.14) + (0.12 \times 2.5 \times 1)$

$= 10.5$ ksf

Strength Limit $q_{all} = 4.7 < 5$ ksf [NOT SATISFIED]

Consider 2' of overex and use 4 ksf fill materials

$B_m = 1.21$, $N_{cm} = 3.1$, $K = 0.5$

$\therefore q_u = (4 \times 3.5) + (0.12 \times 2.75) = 12.7$

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 3 of 3

Strength Limit State

$q_{all} = \phi q_u = 0.45 \times 12.7 = 5.7$ ksf >

Bearing Pressure = 5 ksf

Extreme Limit State

$q_{all} = \phi q_u = 1 \times 12.7 = 12.7$ ksf >

Bearing Pressure = 5.3 ksf

service Limit State

$q_{all} = \frac{q_u}{FOS} = \frac{12.7}{3} = 4.2$ ksf >

Bearing Pressure = 3.7 ksf

⇒ CHECK SATISFIED //

⇒ Consider a 3-feet deep of overexcavation

I-880 Operational & Safety Improvement Project

RW 28 & 29 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/20/2012

Checked By: Lino Date: 6/23/2012

Ground Surface El. = 24 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	24	19	0.025	0.13	4.00
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El.	Mid Layer Depth	Layer Thickness	Vertical Overburden Stress	Stress Increase 1 (See Sheet # C4)	Stress Increase 2 (See Sheet # C4)	Net Stress Increase 1-2	Initial Stress	Final Stress	Estimated Settlements
	(ft)	(ft)	(ft)	(ksf)	(ksf)	(ksf)	(ksf)	(ksf)	(ksf)	(in)
CL I	21.5	2.5	5	0.300	**0.263**	**1.796**	**1.53**	0.563	2.096	0.86
CL 2	16	8	6	0.835	**0.204**	**1.703**	**1.50**	1.039	2.538	0.70
CL 3A	9	15	8	1.238	**0.177**	**1.392**	**1.22**	1.415	2.630	0.65
CL 3B	0	24	10	1.757	**0.151**	**1.030**	**0.88**	1.908	2.787	0.49
CL 4A	-10	34	10	2.333	**0.134**	**0.827**	**0.69**	2.467	3.160	0.32
CL 4B	-21	45	12	2.966	**0.112**	**0.629**	**0.52**	3.078	3.595	0.24
CL 5	-38	62	23	3.946	**0.100**	**0.421**	**0.32**	4.046	4.366	0.23
							Total Settlement (in):			**3.49**

3.5"

After 3' overex ⇒ $\delta = 3"$

I-880 Operational & Safety Improvement Project

RW 28 & 29 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/20/2012

Checked By: Lino Date: 6/23/2012

Ground Surface El. = 25 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	25	19	0.025	0.13	4.00
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El.	Mid Layer Depth	Layer Thickness	Vertical Overburden Stress	Stress Increase 1 (See Sheet # C4)	Stress Increase 2 (See Sheet # C4)	Net Stress Increase 1-2	Initial Stress	Final Stress	Estimated Settlements
	(ft)	(ft)	(ft)	(ksf)	(ksf)	(ksf)	(ksf)	(ksf)	(ksf)	(in)
CL I	22	3	6	0.360	**0.449**	**2.293**	**1.84**	0.809	2.653	0.93
CL 2	16	9	6	0.955	**0.435**	**2.154**	**1.72**	1.390	3.109	0.63
CL 3A	9	16	8	1.358	**0.382**	**1.749**	**1.37**	1.740	3.107	0.60
CL 3B	0	25	10	1.877	**0.330**	**1.345**	**1.02**	2.207	3.222	0.49
CL 4A	-10	35	10	2.453	**0.288**	**1.092**	**0.80**	2.741	3.545	0.34
CL 4B	-21	46	12	3.086	**0.244**	**0.840**	**0.60**	3.330	3.926	0.26
CL 5	-38	63	23	4.066	**0.202**	**0.587**	**0.39**	4.267	4.652	0.26
							Total Settlement (in):			**3.51**

3.5"

After 3' overex ⇒ $\delta = 3''$

I-880 Operational & Safety Improvement Project

RW 28 & 29 (H = 12.5 ft and 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/20/2012

Checked By: Lino Date: 6/23/2012

Ground Surface El. = 25 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	25	19	0.025	0.13	4.00
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	22	3	6	0.360	**0.689**	**2.591**	**1.90**	1.049	2.951	0.81
CL 2	16	9	6	0.955	**0.662**	**2.423**	**1.76**	1.617	3.379	0.58
CL 3A	9	16	8	1.358	**0.558**	**1.967**	**1.41**	1.916	3.325	0.57
CL 3B	0	25	10	1.877	**0.452**	**1.531**	**1.08**	2.329	3.408	0.50
CL 4A	-10	35	10	2.453	**0.377**	**1.152**	**0.78**	2.830	3.605	0.32
CL 4B	-21	46	12	3.086	**0.302**	**0.845**	**0.54**	3.388	3.931	0.23
CL 5	-38	63	23	4.066	**0.227**	**0.552**	**0.33**	4.292	4.618	0.22
							Total Settlement (in):			**3.22**

3.3"

After 3' overex ⇒ $\delta = 2.9"$

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/25/11 Checked By Lino Date ____ Sheet 1 of 1

Consolidation Time Calculations - RW 28 & 29

Per URS B-06 & R-11-008,
Consider the clay layer between El. +7' and El. -9'

$H_{dr} = \frac{16'}{2} = 8$ ft (∵ Double-drainage)

Based on laboratory test results,

Avg $C_v = 0.35$ ft²/day

Time Factor

Total settlement estimated = 3"

Allowable settlement for MSE = 0.5"

Required % consolidation (U) = $\frac{3" - 0.5"}{3"} \times 100$

= 83 %

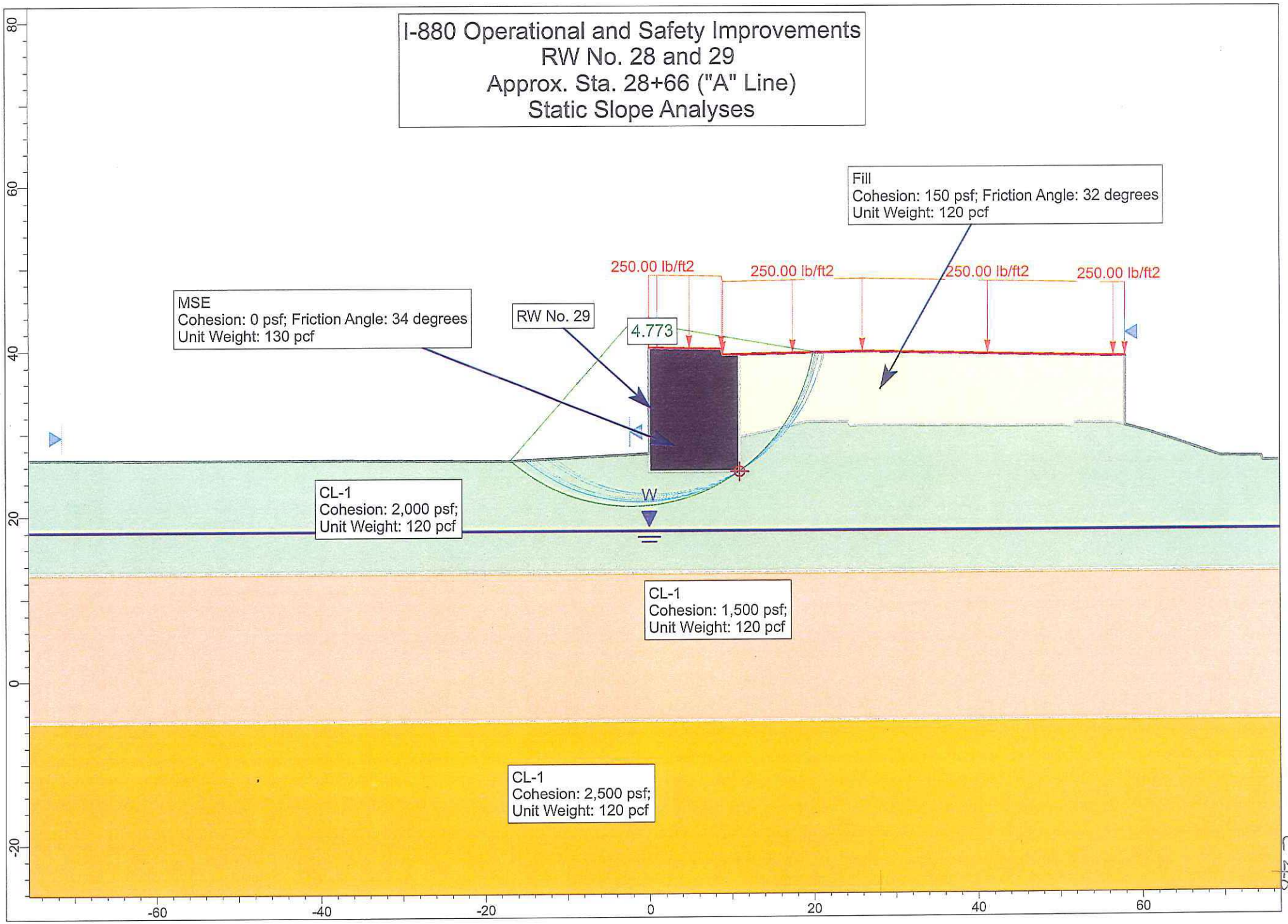
∴ Corresponding Time factor (T) = $1.781 - 0.933 \times \log(100 - U)$ (∵ $U > 60\%$)

$T = 0.632$

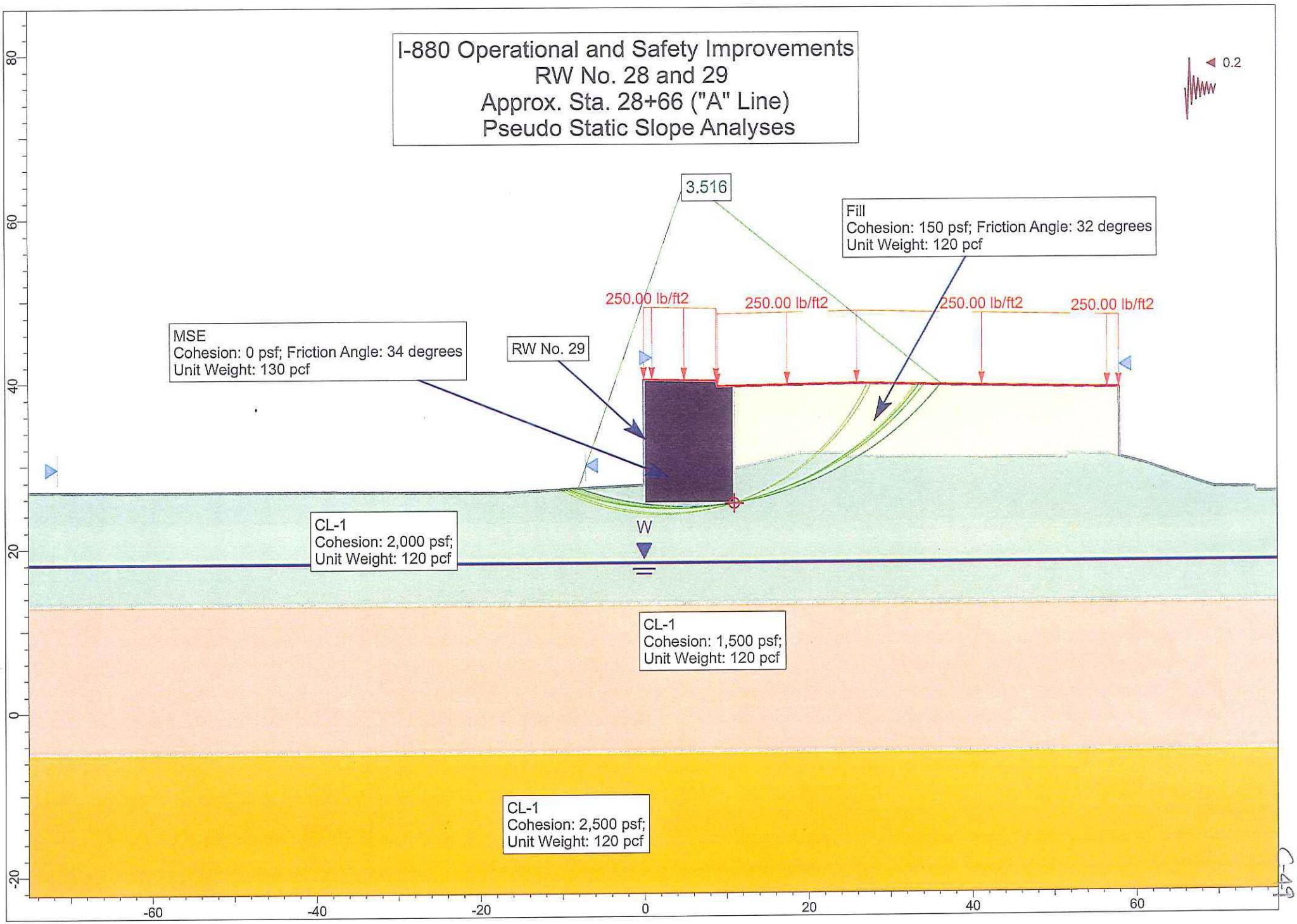
⇒ Required time (without any surcharge),

$t = \frac{T H_{dr}^2}{C_v} = 115$ days

SAY 4 MONTHS


I-880 Operational and Safety Improvements
RW No. 28 and 29
Approx. Sta. 28+66 ("A" Line)
Static Slope Analyses
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 29
4.773
W
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60

C-28


I-880 Operational and Safety Improvements
RW No. 28 and 29
Approx. Sta. 28+66 ("A" Line)
Pseudo Static Slope Analyses
0.2
3.516
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 29
W
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60

RETAINING WALLS 228 & 230

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 1 of 3

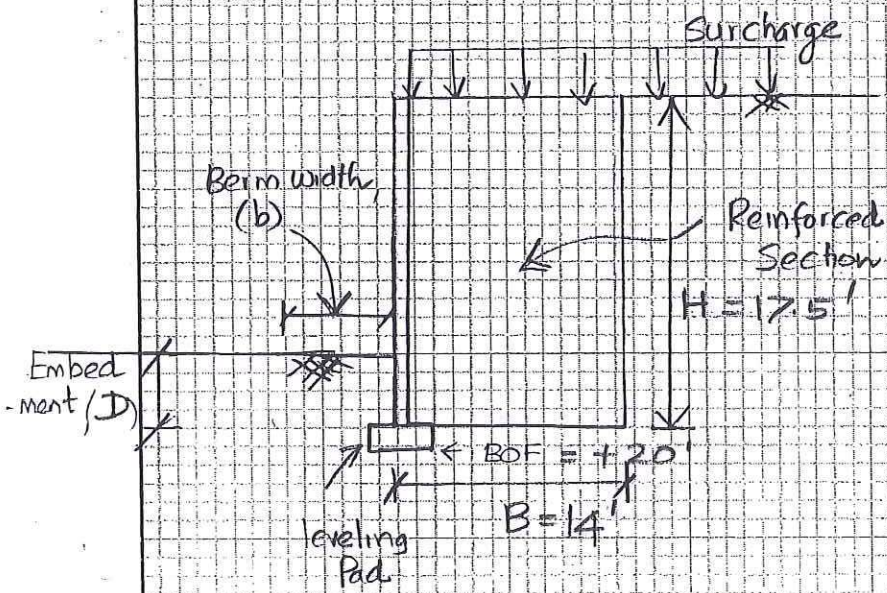
Bearing Capacity Calculations - RW 228 & 230

For $H_{max} = 17.5'$,

$B = 14'$; BOF = +20'

Maximum Bearing Stresses

Strength Limit State = 5000 psf
Extreme Limit State = 5300 psf
Service Limit State = 3700 psf



Per Caltrans BDS,
Minimum D = 2 ft
or 0.1H (whichever greater)

∴ D = 2' + 0.5'
= 2.5'

① $C_1 = 2$ ksf

+14'

② $C_2 = 2$ ksf

+0'

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/15/11 Sheet 3 of 3

Strength Limit State

$q_{all} = \phi q_u = 0.45 \times 12.4 = 5.6$ ksf >

Bearing Pressure = 5 ksf

Extreme Limit State

$q_{all} = \phi q_u = 1 \times 12.4 = 12.4$ ksf >

Bearing Pressure = 5.3 ksf

Service Limit State

$q_{all} = \frac{q_u}{FOS} = \frac{12.4}{3} = 4.1$ ksf >

Bearing Pressure = 3.7 ksf

⇒ CHECK SATISFIED //

⇒ Consider a 3-feet deep of overexcavation.

I-880 Operational & Safety Improvement Project

RW 228 & 230 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	22	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	2	4	0.240	**1.781**	0.240	2.021	1.11
CL 2	16	6	4	0.720	**1.531**	0.720	2.251	0.59
CL 3	7	15	14	1.301	**0.957**	1.301	2.258	1.01
CL 4	-7	29	15	2.107	**0.535**	2.107	2.643	0.44
CL 5	-30	52	20	3.432	**0.340**	3.432	3.772	0.25
							Total Settlement (in):	**3.40**

3.4"

After 3' overex $\Rightarrow$ $\delta = 2.6$"

I-880 Operational & Safety Improvement Project

RW 228 & 230 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	22	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	2	4	0.240	**2.177**	0.240	2.417	1.20
CL 2	16	6	4	0.720	**1.870**	0.720	2.590	0.67
CL 3	7	15	14	1.301	**1.164**	1.301	2.464	1.17
CL 4	-7	29	15	2.107	**0.643**	2.107	2.751	0.52
CL 5	-30	52	20	3.432	**0.405**	3.432	3.837	0.29
							Total Settlement (in):	**3.85**

3.9"

After 3' overex ⇒ $\delta = 3$"

I-880 Operational & Safety Improvement Project

RW 228 & 230 (H = 12.5 to 17.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 1	22	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 1	20	2	4	0.240	**2.473**	0.240	2.713	1.26
CL 2	16	6	4	0.720	**2.106**	0.720	2.826	0.71
CL 3	7	15	14	1.301	**1.228**	1.301	2.529	1.21
CL 4	-7	29	15	2.107	**0.591**	2.107	2.698	0.48
CL 5	-30	52	20	3.432	**0.341**	3.432	3.773	0.25
							Total Settlement (in):	**3.92**

4"

After 3' overex $\Rightarrow \delta = 3"$

RW 228 & 230-Sta. 30+00

C55

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Geotechnical and Earthquake Engineering

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/25/11 Checked By Lino Date ____ Sheet 1 of 1

Consolidation Time Calculations - RW 228 & 230

Per CPT-11-003,
Consider the clay layer between El. +13' and El. -5'

$H_{dr} = \frac{18'}{2} = 9.0$ ft (∵ Double-drainage)

Based on laboratory test results,

Avg $C_v = 0.35$ ft²/day

Time Factor

Total settlement estimated = 3"

Allowable settlement for MSE = 0.5"

Required % consolidation (U) = $\frac{30" - 0.5"}{30"} \times 100$

$= 83\%$

∴ Corresponding Time factor (T) = $1.781 - 0.933 \times \log(100 - U)$ (∵ $U > 60\%$)

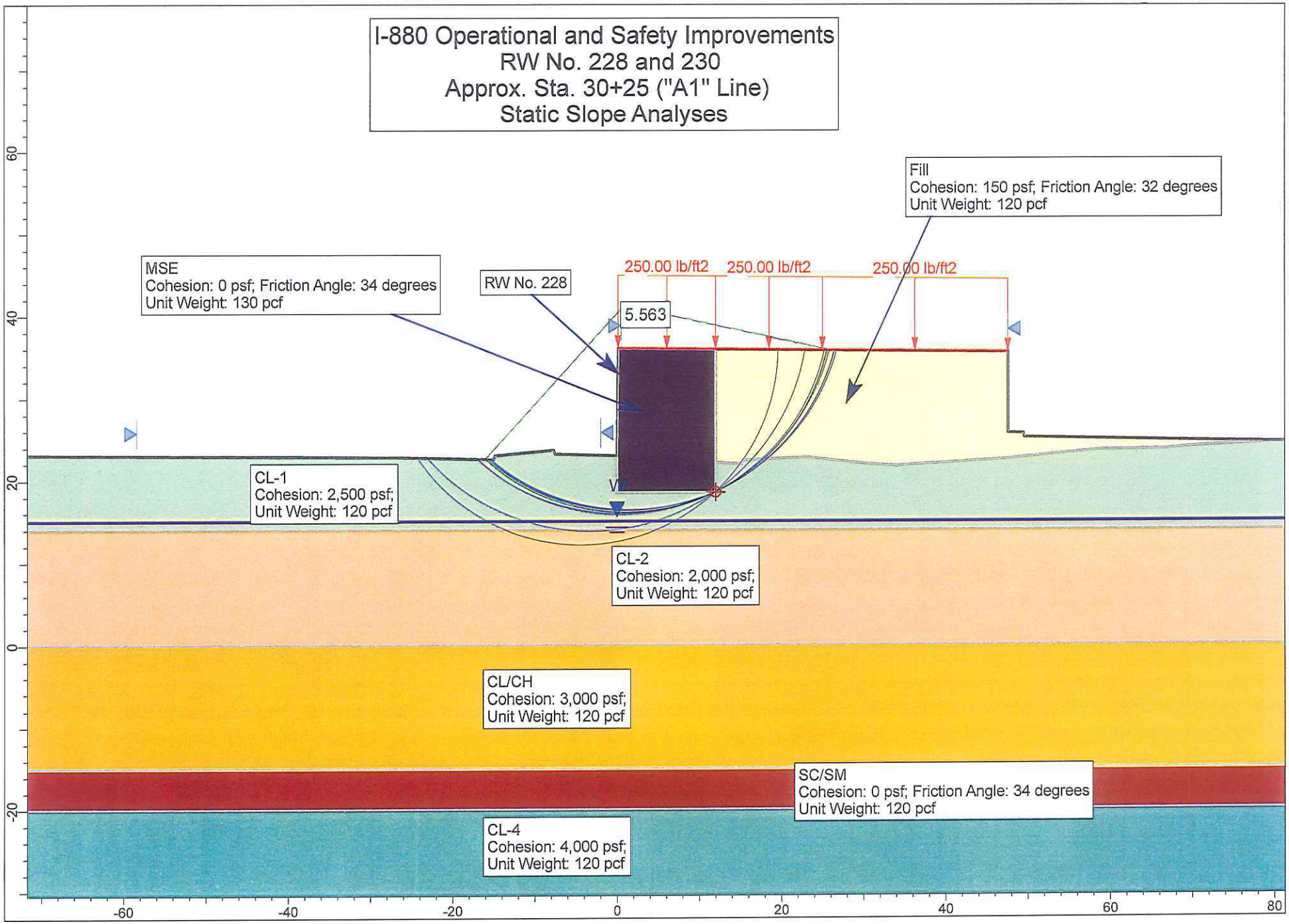
For $U < 60\%$, $T = \frac{\pi}{4}\left(\frac{U}{100}\right)^2$

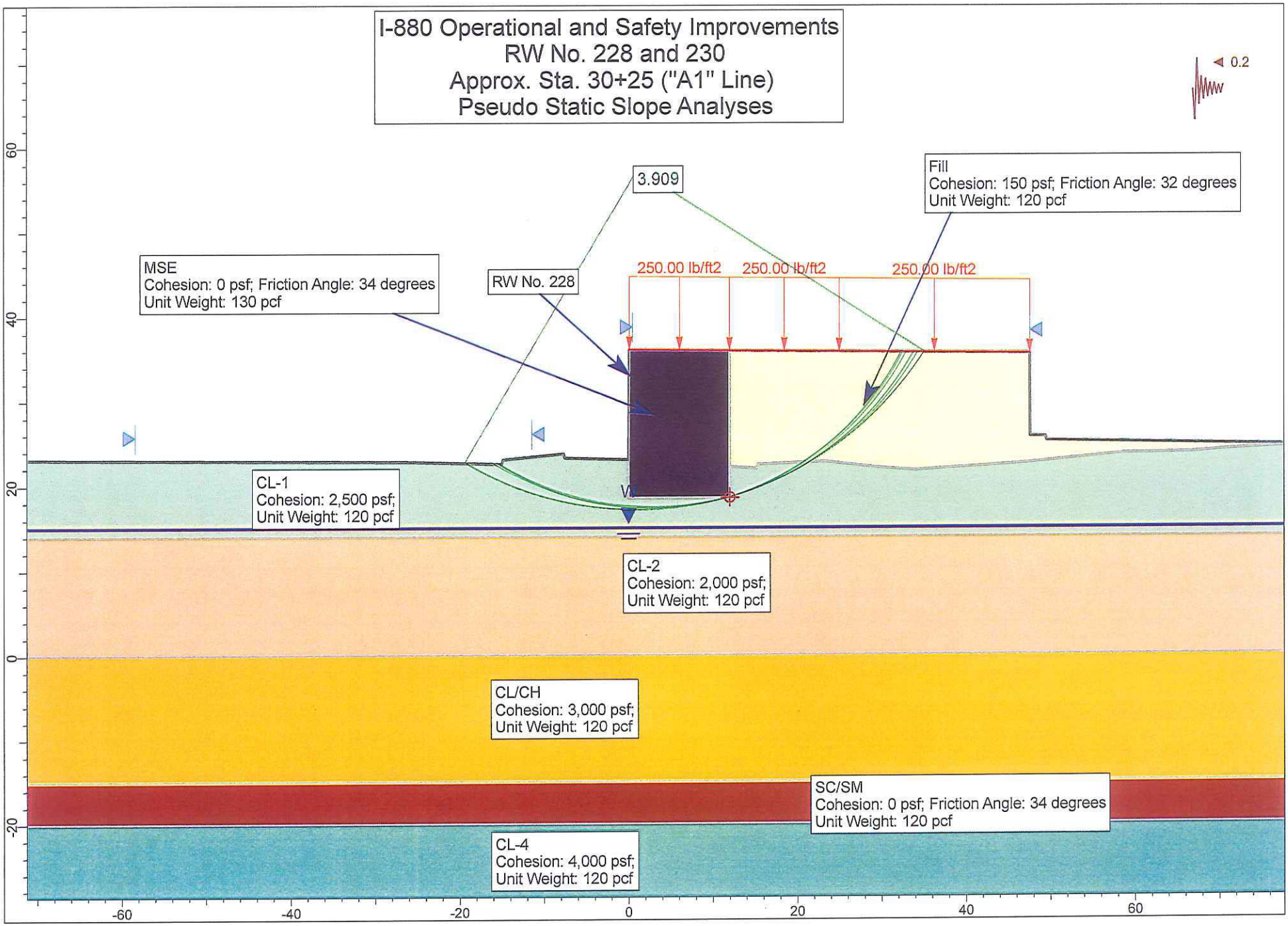
$T = 0.683$

⇒ Required time (without any surcharge),

$t = \frac{T H_{dr}^2}{C_v} = 147$ days

SAY 5 MONTHS


I-880 Operational and Safety Improvements
RW No. 228 and 230
Approx. Sta. 30+25 ("A1" Line)
Static Slope Analyses
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 228
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
5.563
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80


I-880 Operational and Safety Improvements
RW No. 228 and 230
Approx. Sta. 30+25 ("A1" Line)
Pseudo Static Slope Analyses
0.2
3.909
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 228
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
60
40
20
0
-20
-60
-40
-20
0
20
40
60

C-58

SOUNDWALL 232

SOUNDWALL ON BERRIER TYPE 736SV

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/15/11 Checked By Lino Date 8/16/11 Sheet 1 of 3

RW No. 232 - Axial pile Calculations (Using SHAFT 6.0)

Soundwall on Type 736SV Barrier

- Single row of 24-inch diameter CIDH piles

SELECT
pile spacing 'S'= 8', η=1
=40 //

Per AASHTO,
η = 1.0 for 4φ spacing
η = 0.89 for 3φ spacing

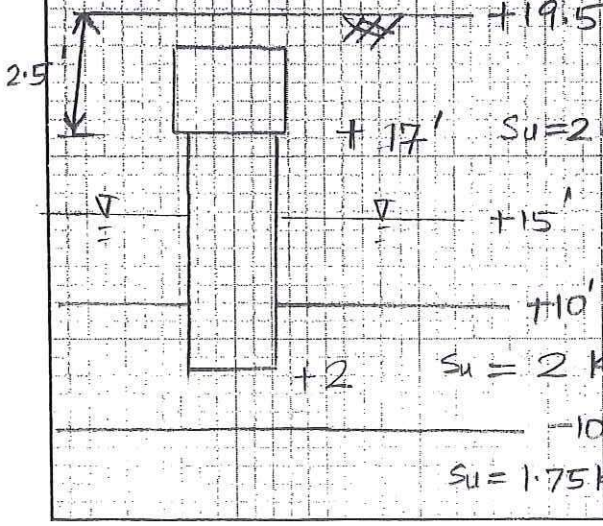
Under strength Limit for retain H = 4';
Axial load per pile = 6.0 X 8 = 48 kips

∴ Nominal resistance = $\frac{48}{0.7}$ = 68.6 kips

Apply η=1.0 ⇒ nominal resistance = $\frac{68.6}{1}$

= 68.6 kips

SELECT 70 kips //



From SHAFT analyses,
Required pile length = 18'
∴ Required pile tip El. =
+19' - 18' = +1' //

Under Service-I Limit,
Nominal resistance = 4.0X8X2
= 64 kips
SELECT 70 kips //

⇒ Req. pile tip El. = +1' //

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By Ranjan Date 8/15/11 Checked By Lino Date 8/16/11 Sheet 2 of 3

Under extreme limit for retain H = 4';

Axial load/ pile = 4.62 × 8 = 37 kips

Apply $\phi = 1.0$ & $\eta = 1.0$ ⇒

nominal resistance = $\frac{37 \times 1}{1}$ = 37 kips

SELECT 40 kips

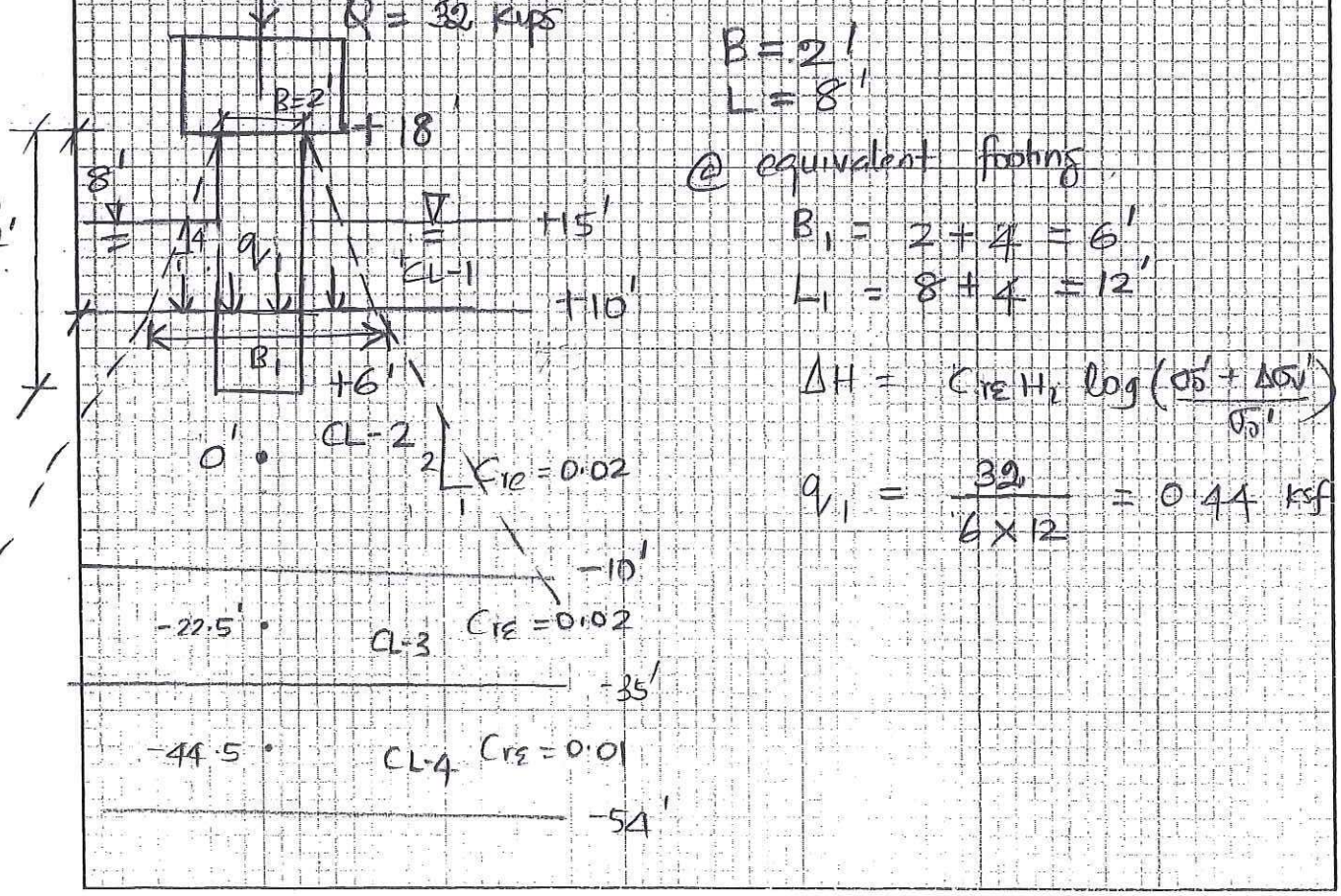
From SHAFT,

Required pile tip El. = +19' − 15' = +4' //

Settlement check

Permissible settlement under service load = 1"

Service load = 4.0 × 8 = 32 kips for retain H = 4'



B = 2'
L = 8'

@ equivalent footing

$B_1 = 2 + 4 = 6'$

$L_1 = 8 + 4 = 12'$

$\Delta H = C_{re} H_i \log\left(\frac{\sigma_0' + \Delta\sigma_v'}{\sigma_0'}\right)$

$q_1 = \frac{32}{6 \times 12} = 0.44$ ksf

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/15/11 Checked By Lino Date 8/16/11 Sheet 3 of 3

layer	H(ft)	C_{rz}	$\bar{\sigma}_o'$(ksf)	$\Delta\sigma_v$(ksf)	ΔH_i (in)
CL-2	20	0.02	1.15	0.10	0.180
CL-3	25	0.02	2.32	0.03	0.040
CL-4	19	0.01	3.48	0.01	0.003

$\Sigma \Delta H_i = 0.23'' < 1''$

$\Rightarrow$ No design tip for settlement for RW 232 //

Similarly,

* For retained H = 2'; under strength limit;
  nominal resistance = 60 kips
  Required pile tip El. = +2 ft //

* under extreme limit,
  nominal resistance = 40 kips
  Required pile tip El. = +4 ft //

* No design tip for settlement //

* Under Service-I Limit,
  Nominal resistance = 60 kips
  Required pile tip El. = +2 ft //

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

I-880 Operational and Safety Improvement Project - RW 232

TOTAL LOAD = 80.0 TONS

NUMBER OF LAYERS = 4

WATER TABLE DEPTH = 4.5 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 1.00

FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00

SOIL INFORMATION

LAYER NO 1----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.600E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.870E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.450E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.870E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.450E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.950E+01

LAYER NO 3----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.700E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.950E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00

C-65

END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.700E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.295E+02

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.300E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.100E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.295E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.300E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.100E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.550E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	= 2.000	FT.
DIAMETER OF BASE	= 2.000	FT.
END OF STEM TO BASE	= 0.000	FT.
ANGLE OF BELL	= 0.000	DEG.
IGNORED TOP PORTION	= 7.500	FT.
IGNORED BOTTOM PORTION	= 2.000	FT.
AREA OF ONE PERCENT STEEL	= 4.524	SQ.IN.
ELASTIC MODULUS, Ec	= 0.360E+07	LB/SQ IN
VOLUME OF UNDERREAM	= 0.000	CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	1.28	3.46	35.35	38.80	38.80	38.80	30.31
12.0	1.40	6.91	35.35	42.26	42.26	42.26	30.26
13.0	1.51	14.69	35.35	50.04	50.04	50.04	33.07
14.0	1.63	19.01	35.35	54.36	54.36	54.36	33.36
15.0	1.75	23.33	35.35	58.68	58.68	58.68	33.61
16.0	1.86	27.65	35.35	63.00	63.00	63.00	33.83
17.0	1.98	31.97	35.35	67.32	67.32	67.32	34.03
18.0	2.09	36.29	35.35	71.64	71.64	71.64	34.20
19.0	2.21	40.61	35.35	75.96	75.96	75.96	34.35
20.0	2.33	44.93	35.35	80.28	80.28	80.28	34.49

Extreme (H=4')
Strength (H=4')
Service-I (H=4')

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.9810E-02	0.1165E-04	0.1164E-02	0.1000E-04
0.4905E-01	0.5823E-04	0.5818E-02	0.5000E-04
0.9810E-01	0.1165E-03	0.1164E-01	0.1000E-03
0.4905E+01	0.5823E-02	0.5818E+00	0.5000E-02
0.7358E+01	0.8734E-02	0.8726E+00	0.7500E-02
0.9830E+01	0.1165E-01	0.1164E+01	0.1000E-01
0.2367E+02	0.2900E-01	0.2909E+01	0.2500E-01
0.3523E+02	0.5612E-01	0.5818E+01	0.5000E-01
0.4428E+02	0.8287E-01	0.8726E+01	0.7500E-01
0.4771E+02	0.1087E+00	0.1164E+02	0.1000E+00
0.5707E+02	0.2611E+00	0.2021E+02	0.2500E+00
0.6104E+02	0.5126E+00	0.2815E+02	0.5000E+00
0.6372E+02	0.6383E+00	0.3083E+02	0.6250E+00

0.6515E+02	0.7950E+00	0.3226E+02	0.7813E+00
0.6718E+02	0.1214E+01	0.3429E+02	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1447E-01	0.1242E-04	0.1738E-02	0.1000E-04
0.7236E-01	0.6210E-04	0.8690E-02	0.5000E-04
0.1447E+00	0.1242E-03	0.1738E-01	0.1000E-03
0.7236E+01	0.6210E-02	0.8690E+00	0.5000E-02
0.1090E+02	0.9320E-02	0.1303E+01	0.7500E-02
0.1456E+02	0.1243E-01	0.1738E+01	0.1000E-01
0.3420E+02	0.3080E-01	0.4345E+01	0.2500E-01
0.4527E+02	0.5802E-01	0.8690E+01	0.5000E-01
0.5143E+02	0.8446E-01	0.1303E+02	0.7500E-01
0.5661E+02	0.1107E+00	0.1738E+02	0.1000E+00
0.6650E+02	0.2633E+00	0.2683E+02	0.2500E+00
0.6870E+02	0.5143E+00	0.3246E+02	0.5000E+00
0.7032E+02	0.6397E+00	0.3408E+02	0.6250E+00
0.7101E+02	0.7961E+00	0.3478E+02	0.7813E+00
0.7141E+02	0.1215E+01	0.3517E+02	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5435E-02	0.1091E-04	0.5891E-03	0.1000E-04
0.2717E-01	0.5455E-04	0.2946E-02	0.5000E-04
0.5435E-01	0.1091E-03	0.5891E-02	0.1000E-03
0.2717E+01	0.5455E-02	0.2946E+00	0.5000E-02
0.4076E+01	0.8182E-02	0.4418E+00	0.7500E-02
0.5435E+01	0.1091E-01	0.5891E+00	0.1000E-01
0.1347E+02	0.2726E-01	0.1473E+01	0.2500E-01
0.2431E+02	0.5411E-01	0.2946E+01	0.5000E-01
0.3249E+02	0.8055E-01	0.4418E+01	0.7500E-01
0.3687E+02	0.1064E+00	0.5891E+01	0.1000E+00
0.4764E+02	0.2589E+00	0.1358E+02	0.2500E+00
0.5337E+02	0.5109E+00	0.2383E+02	0.5000E+00
0.5713E+02	0.6369E+00	0.2759E+02	0.6250E+00
0.5925E+02	0.7938E+00	0.2971E+02	0.7813E+00
0.6277E+02	0.1213E+01	0.3323E+02	0.1200E+01

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Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/15/11 Checked By Lino Date 8/16/11 Sheet 1 of 2

Retaining Wall 232 - Soundwall on Type 736SV Barrier

(A) FOR DEFLECTION (Single row of piles)

* BOF varies between El. +13' and El. +17'

Under Service Limit State,

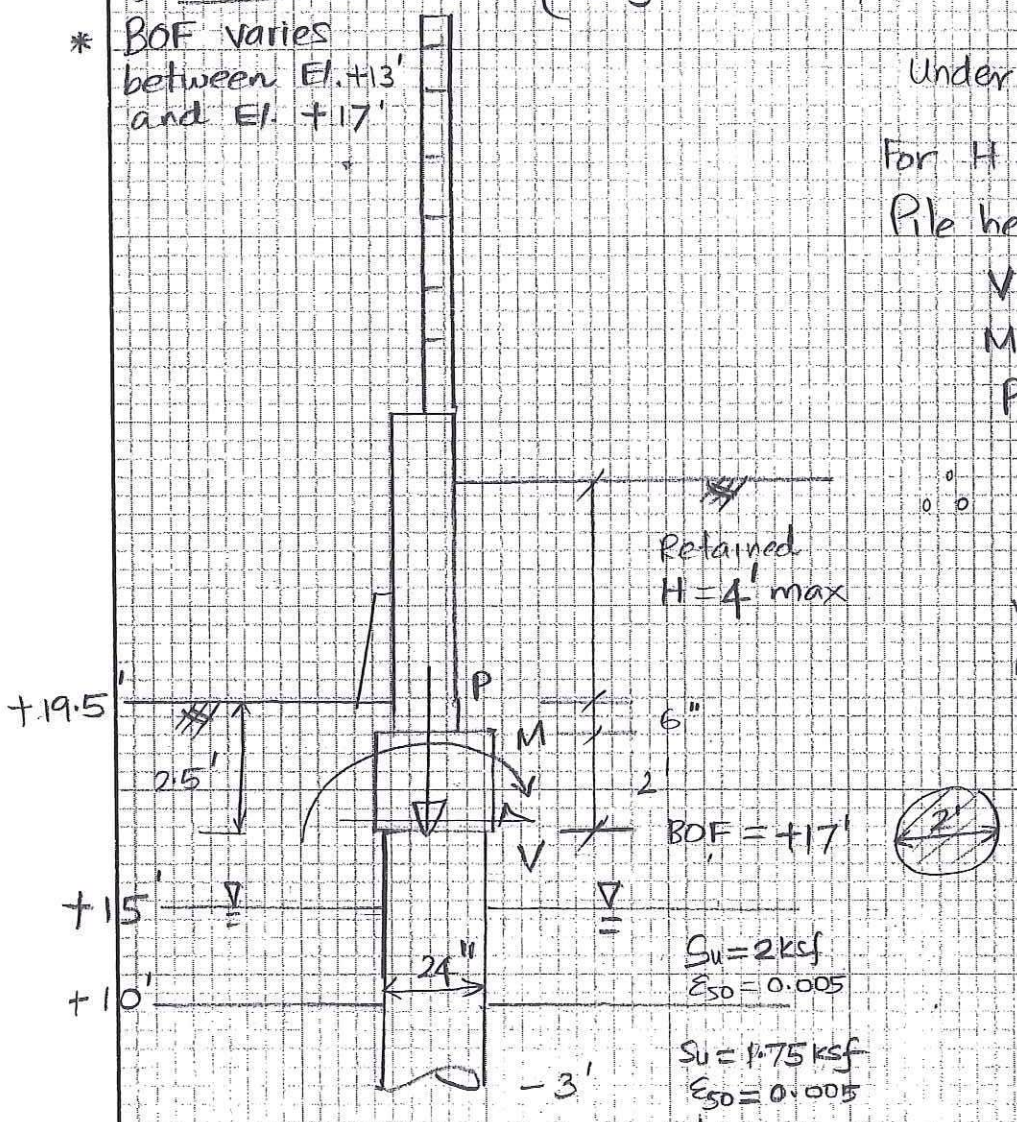
For H = 4',

Pile head demands / 1' of wall:

V = 25 K
M = 11.9 K-ft
P = 3.6 K

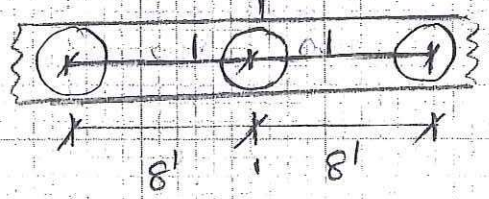
Total pile-head demands using 8' spacing:

V = 20.0 kip
M = 95.2 K-ft
P = 28.8 kip



USE 50% EI,
E = 1.8 x 10^6 psi
I = 16,286 in^4

Assume pile spacing of 8', group efficiency = 1.0



⇒ Pile head deflection under service load condition = 0.23"
< 0.25" allowable

⇒ 20-ft long pile w/ spacing of 8-feet is adequate for SW on Barrier //

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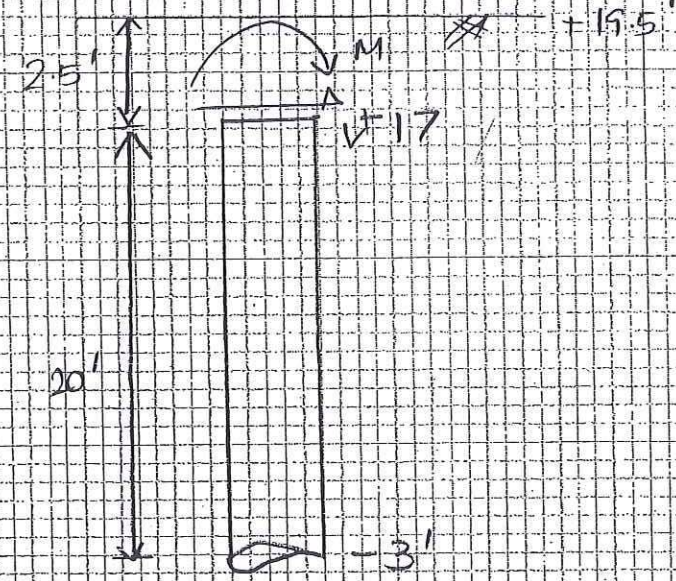
Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/16/11 Checked By Lino Date 8/17/11 Sheet 2 of 2

(B) FOR SIZING REINFORCEMENT



* Select the pile length of 20 feet from lateral deflection analysis.

* Select the controlling pile-head shear and moment for H = 4'

Under Strength Limit (Controlling)

$V = \frac{3.3 \times 8}{0.7} \pm 28$ kip

$M = \frac{16.3 \times 8}{0.7} \pm 187$ k-ft

Based on the analyses,

pile-head deflection $\pm$ 0.7"

M_{max} = 261.5 k-ft

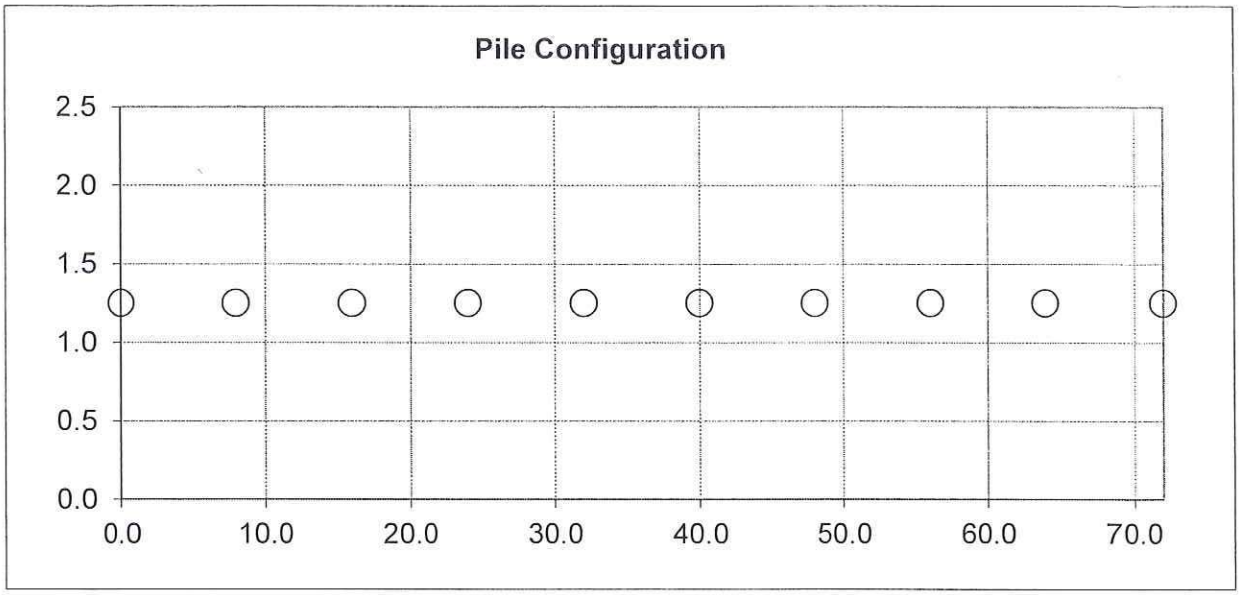
Depth of M_{max} = 4 ft

Max Shear = 41.2 kips

Depth of Max shear = 9.4 ft

Project: I-880 Operational and Safety Improvements
By: Ranjan 8/15/2011

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



Pile Dia.:	2.000
No. of Piles:	10

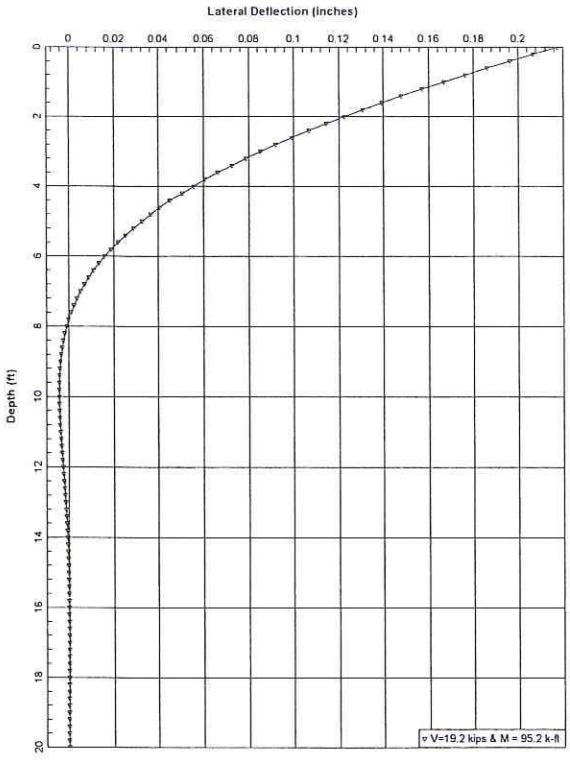
Group Efficiency	X-Dir (Trans)	Y-Dir (Long)
	0.832	1.000

Pile No.	X (Transverse)	Y (Longitudinal)
1	0.000	1.25
2	8.000	1.25
3	16.000	1.25
4	24.000	1.25
5	32.000	1.25
6	40.000	1.25
7	48.000	1.25
8	56.000	1.25
9	64.000	1.25
10	72.000	1.25

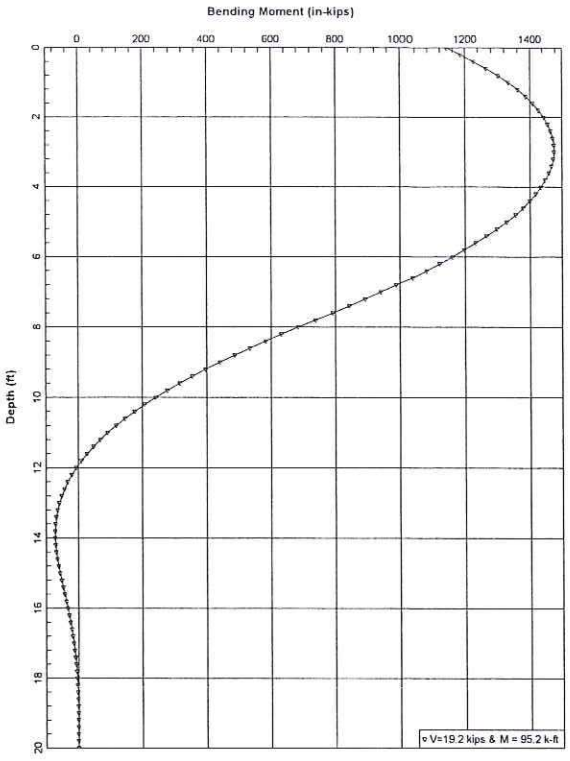
Reduction Factors in X-dir	Reduction Factors in Y-dir
0.813	1.000
0.813	1.000
0.813	1.000
0.813	1.000
0.813	1.000
0.813	1.000
0.813	1.000
0.813	1.000
0.813	1.000
1.000	1.000

Since the loading is in y-direction only,

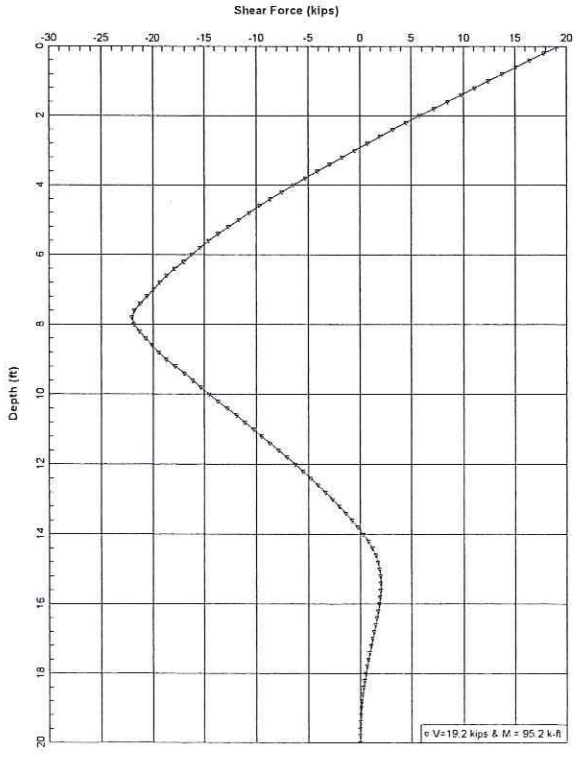
Select $\eta = 1.0$ //



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free

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================================================================================

                  LPile Plus for Windows, Version 6.0 (6.0.09)

                 Analysis of Individual Piles and Drilled Shafts
               Subjected to Lateral Loading Using the p-y Method

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================================================================================

This program is licensed to:


--------------------------------------------------------------------------------
                              Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880\EMI Analyses\LPILE\Type 60D\Retain H = 4 ft and Spacing 8 ft\
Name of input data file:     24-in CIDH at RW 232.lp6d
Name of output file:         24-in CIDH at RW 232.lp6o
Name of plot output file:    24-in CIDH at RW 232.lp6p
Name of runtime file:        24-in CIDH at RW 232.lp6r

--------------------------------------------------------------------------------
                              Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  August 24, 2011     Time:  14:20:26

--------------------------------------------------------------------------------
                                   Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - RW 232
Job Number: 10-133
Client: RBF
Engineer: GJG
Description: 24-in CIDH piles at RW 232


--------------------------------------------------------------------------------
                                   Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =          100
- Maximum number of iterations allowed               =          300
- Deflection tolerance for convergence               =   1.0000E-05  in
- Maximum allowable deflection                       =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1


--------------------------------------------------------------------------------
                          Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Total Number of Sections                            =         1

Total Pile Length                                   =      20.00 ft

Depth of ground surface below top of pile           =      -2.50 ft

Slope angle of ground surface                       =       0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point        Depth              Pile
```

	X ft	Diameter in
1	0.00000	24.0000000
2	20.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	20.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 inA4
Moment of Inertia at Bottom	=	1.629E+04 inA4
Elastic Modulus	=	1800000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	-2.500 ft
Distance from top of pile to bottom of layer	=	2.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	2.000 ft
Distance from top of pile to bottom of layer	=	7.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	7.000 ft
Distance from top of pile to bottom of layer	=	30.000 ft

(Depth of lowest layer extends 10.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-2.50	115.00000
2	2.00	115.00000
3	2.00	52.00000
4	7.00	52.00000
5	7.00	52.00000
6	30.00	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-2.500	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		2.000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	2.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		7.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
3	Soft Clay	7.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		30.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.500	1.0000	1.0000
2	20.000	1.0000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 19200.000 lbs	M = 1142400.000 in-lbs	28800.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 19200.000 lbs
Applied moment at pile head = 1142400.000 in-lbs
Axial thrust load on pile head = 28800.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-inA2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.2176	1142400.	19200.	-0.004479	905.4148	2.931E+10	-564.3707	3112.4690	0.000
2.400	0.2070	1187161.	17846.	-0.004384	938.3959	2.931E+10	-564.0772	6541.4991	0.000
4.800	0.1965	1228666.	16493.	-0.004285	968.9781	2.931E+10	-563.3647	6879.0698	0.000
7.200	0.1864	1266919.	15142.	-0.004183	997.1642	2.931E+10	-562.2296	7239.5384	0.000
9.600	0.1765	1301927.	13795.	-0.004077	1022.9588	2.931E+10	-560.6682	7625.0079	0.000
12.000	0.1668	1333698.	12452.	-0.003970	1046.3685	2.931E+10	-558.6771	8037.8276	0.000
14.400	0.1574	1362243.	11114.	-0.003859	1067.4014	2.931E+10	-556.2527	8480.6280	0.000
16.800	0.1483	1387577.	9782.0386	-0.003747	1086.0679	2.931E+10	-553.3913	8956.3630	0.000
19.200	0.1394	1409715.	8457.8621	-0.003632	1102.3799	2.931E+10	-550.0892	9468.3600	0.000
21.600	0.1309	1428676.	7142.1439	-0.003516	1116.3515	2.931E+10	-546.3426	10020.	0.000
24.000	0.1226	1444483.	5835.9554	-0.003398	1127.9982	2.931E+10	-542.1477	10617.	0.000
26.400	0.1145	1457159.	4541.2919	-0.003280	1137.3381	2.931E+10	-536.7385	11246.	0.000
28.800	0.1068	1466735.	3260.1165	-0.003160	1144.3938	2.931E+10	-530.9076	11929.	0.000
31.200	0.0994	1473244.	1993.4463	-0.003040	1149.1902	2.931E+10	-524.6509	12671.	0.000
33.600	0.0922	1476723.	742.3085	-0.002919	1151.7538	2.931E+10	-517.9639	13479.	0.000
36.000	0.0854	1477211.	-492.2582	-0.002798	1152.1129	2.931E+10	-510.8417	14362.	0.000
38.400	0.0788	1474747.	-1709.2027	-0.002677	1150.2978	2.931E+10	-503.2788	15329.	0.000
40.800	0.0725	1469377.	-2907.4602	-0.002557	1146.3405	2.931E+10	-495.2691	16392.	0.000
43.200	0.0665	1461145.	-4085.9501	-0.002437	1140.2752	2.931E+10	-486.8057	17562.	0.000
45.600	0.0608	1450101.	-5243.5737	-0.002317	1132.1376	2.931E+10	-477.8806	18857.	0.000
48.000	0.0554	1436296.	-6379.2118	-0.002199	1121.9659	2.931E+10	-468.4844	20295.	0.000
50.400	0.0503	1419785.	-7491.7207	-0.002082	1109.7998	2.931E+10	-458.6063	21897.	0.000
52.800	0.0454	1400624.	-8579.9281	-0.001967	1095.6814	2.931E+10	-448.2333	23692.	0.000
55.200	0.0408	1378873.	-9642.6278	-0.001853	1079.6549	2.931E+10	-437.3498	25712.	0.000
57.600	0.0365	1354595.	-10679.	-0.001741	1061.7664	2.931E+10	-425.9371	27998.	0.000
60.000	0.0325	1327857.	-11686.	-0.001631	1042.0645	2.931E+10	-413.9720	30603.	0.000
62.400	0.0287	1298726.	-12665.	-0.001524	1020.6001	2.931E+10	-401.4259	33592.	0.000
64.800	0.0252	1267276.	-13613.	-0.001419	997.4267	2.931E+10	-388.2627	37050.	0.000
67.200	0.0219	1233582.	-14528.	-0.001316	972.6000	2.931E+10	-374.4363	41090.	0.000
69.600	0.0188	1197724.	-15409.	-0.001217	946.1791	2.931E+10	-359.8868	45866.	0.000
72.000	0.0160	1159787.	-16254.	-0.001120	918.2258	2.931E+10	-344.5351	51588.	0.000
74.400	0.0135	1119858.	-17062.	-0.001027	888.8054	2.931E+10	-328.2735	58561.	0.000

C-23

76.800	0.0111	1078033.	-17829.	-0.000937	857.9871	2.931E+10	-310.9521	67242.	0.000
79.200	0.008955	1034410.	-18553.	-0.000851	825.8446	2.931E+10	-292.3536	78350.	0.000
81.600	0.007015	989097.	-19230.	-0.000768	792.4570	2.931E+10	-272.1484	93105.	0.000
84.000	0.005270	942212.	-19903.	-0.000689	757.9102	2.931E+10	-288.8915	131572.	0.000
86.400	0.003709	893656.	-20608.	-0.000614	722.1334	2.931E+10	-298.0213	192835.	0.000
88.800	0.002324	843380.	-21274.	-0.000543	685.0881	2.931E+10	-257.4951	265891.	0.000
91.200	0.001105	791615.	-21827.	-0.000476	646.9464	2.931E+10	-202.9976	440894.	0.000
93.600	4.135E-05	738676.	-22086.	-0.000413	607.9398	2.931E+10	-13.3479	774673.	0.000
96.000	-0.000877	685657.	-21873.	-0.000355	568.8735	2.931E+10	190.8435	522163.	0.000
98.400	-0.001661	633733.	-21358.	-0.000301	530.6143	2.931E+10	238.4478	344544.	0.000
100.800	-0.002320	583178.	-20749.	-0.000251	493.3644	2.931E+10	269.0269	278275.	0.000
103.200	-0.002865	534170.	-20077.	-0.000205	457.2540	2.931E+10	291.2331	243971.	0.000
105.600	-0.003305	486837.	-19358.	-0.000163	422.3773	2.931E+10	308.1573	223798.	0.000
108.000	-0.003649	441276.	-18602.	-0.000125	388.8064	2.931E+10	321.3118	211347.	0.000
110.400	-0.003906	397563.	-17819.	-9.096E-05	356.5974	2.931E+10	331.5661	203722.	0.000
112.800	-0.004085	355757.	-17014.	-6.013E-05	325.7940	2.931E+10	339.4732	199428.	0.000
115.200	-0.004195	315905.	-16192.	-3.263E-05	296.4298	2.931E+10	345.4099	197626.	0.000
117.600	-0.004242	278041.	-15358.	-8.318E-06	268.5303	2.931E+10	349.6468	197821.	0.000
120.000	-0.004235	242189.	-14515.	1.298E-05	242.1136	2.931E+10	352.3860	199716.	0.000
122.400	-0.004180	208365.	-13668.	3.142E-05	217.1915	2.931E+10	353.7832	203144.	0.000
124.800	-0.004084	176578.	-12819.	4.718E-05	193.7699	2.931E+10	353.9616	208018.	0.000
127.200	-0.003953	146829.	-11970.	6.042E-05	171.8499	2.931E+10	353.0209	214318.	0.000
129.600	-0.003794	119113.	-11125.	7.130E-05	151.4276	2.931E+10	351.0434	222073.	0.000
132.000	-0.003611	93417.	-10286.	8.000E-05	132.4946	2.931E+10	348.0978	231359.	0.000
134.400	-0.003410	69727.	-9455.6223	8.668E-05	115.0386	2.931E+10	344.2428	242297.	0.000
136.800	-0.003195	48018.	-8631.0966	9.150E-05	99.0434	2.931E+10	339.5286	255052.	0.000
139.200	-0.002971	28266.	-7826.8633	9.462E-05	84.4889	2.931E+10	333.9991	269845.	0.000
141.600	-0.002741	10436.	-7032.8333	9.621E-05	71.3518	2.931E+10	327.6926	286955.	0.000
144.000	-0.002509	-5505.2775	-6254.8311	9.641E-05	67.7184	2.931E+10	320.6426	306738.	0.000
146.400	-0.002278	-19600.	-5494.6054	9.538E-05	78.1039	2.931E+10	312.8789	329643.	0.000
148.800	-0.002051	-31893.	-4753.8381	9.327E-05	87.1613	2.931E+10	304.4272	356237.	0.000
151.200	-0.001830	-42431.	-4034.1536	9.023E-05	94.9266	2.931E+10	295.3098	387243.	0.000
153.600	-0.001618	-51269.	-3337.1278	8.640E-05	101.4384	2.931E+10	285.5450	423594.	0.000
156.000	-0.001416	-58462.	-2664.2979	8.190E-05	106.7381	2.931E+10	275.1466	466507.	0.000
158.400	-0.001225	-64069.	-2017.1745	7.689E-05	110.8698	2.931E+10	264.1229	517593.	0.000
160.800	-0.001046	-68155.	-1397.2570	7.148E-05	113.8802	2.931E+10	252.4750	579039.	0.000
163.200	-0.000882	-70786.	-806.0548	6.579E-05	115.8189	2.931E+10	240.1935	653877.	0.000
165.600	-0.000731	-72033.	-245.1180	5.994E-05	116.7378	2.931E+10	227.2538	746451.	0.000
168.000	-0.000594	-71971.	283.9158	5.405E-05	116.6919	2.931E+10	213.6077	863229.	0.000
170.400	-0.000471	-70677.	776.3672	4.821E-05	115.7391	2.931E+10	196.7684	1002131.	0.000
172.800	-0.000362	-68251.	1195.4050	4.252E-05	113.9510	2.931E+10	152.4298	1009239.	0.000
175.200	-0.000267	-64945.	1514.0721	3.707E-05	111.5156	2.931E+10	113.1261	1016347.	0.000
177.600	-0.000185	-60988.	1744.2627	3.191E-05	108.5998	2.931E+10	78.8984	1023455.	0.000
180.000	-0.000114	-56577.	1897.4169	2.710E-05	105.3498	2.931E+10	48.9291	1030563.	0.000
182.400	-5.446E-05	-51884.	1984.3884	2.266E-05	101.8918	2.931E+10	23.5472	1037671.	0.000
184.800	-5.170E-06	-47055.	2015.3460	1.861E-05	98.3337	2.931E+10	2.2508	1044779.	0.000
187.200	3.487E-05	-42213.	1999.7048	1.496E-05	94.7659	2.931E+10	-15.2852	1051887.	0.000
189.600	6.663E-05	-37459.	1946.0843	1.170E-05	91.2627	2.931E+10	-28.3985	1058995.	0.000
192.000	9.102E-05	-32874.	1862.2895	8.817E-06	87.8842	2.931E+10	-40.4305	1066103.	0.000
194.400	0.000109	-28521.	1755.3108	6.304E-06	84.6771	2.931E+10	-48.7185	1073211.	0.000
196.800	0.000121	-24449.	1631.3404	4.136E-06	81.6767	2.931E+10	-54.5901	1080319.	0.000
199.200	0.000129	-20691.	1495.8024	2.288E-06	78.9079	2.931E+10	-58.3582	1087427.	0.000
201.600	0.000132	-17269.	1353.3926	7.339E-07	76.3866	2.931E+10	-60.3167	1094536.	0.000
204.000	0.000132	-14195.	1208.1269	-5.541E-07	74.1213	2.931E+10	-60.7381	1101644.	0.000
206.400	0.000130	-11470.	1063.3956	-1.605E-06	72.1137	2.931E+10	-59.8713	1108752.	0.000
208.800	0.000125	-9090.5460	922.0213	-2.446E-06	70.3602	2.931E+10	-57.9406	1115860.	0.000
211.200	0.000118	-7044.3688	786.3192	-3.107E-06	68.8525	2.931E+10	-55.1445	1122968.	0.000
213.600	0.000110	-5315.7843	658.1577	-3.613E-06	67.5788	2.931E+10	-51.6567	1130076.	0.000
216.000	0.000101	-3884.7125	539.0187	-3.989E-06	66.5243	2.931E+10	-47.6257	1137184.	0.000
218.400	9.056E-05	-2727.9429	430.0562	-4.260E-06	65.6720	2.931E+10	-43.1764	1144292.	0.000
220.800	8.006E-05	-1819.8537	332.1516	-4.446E-06	65.0029	2.931E+10	-38.4109	1151400.	0.000
223.200	6.921E-05	-1133.0007	245.9658	-4.567E-06	64.4968	2.931E+10	-33.4106	1158508.	0.000
225.600	5.814E-05	-638.5864	171.9876	-4.640E-06	64.1325	2.931E+10	-28.2379	1165616.	0.000
228.000	4.694E-05	-306.8190	110.5760	-4.678E-06	63.8881	2.931E+10	-22.9384	1172724.	0.000
230.400	3.569E-05	-107.1750	61.9984	-4.695E-06	63.7409	2.931E+10	-17.5429	1179832.	0.000
232.800	2.441E-05	-8.5774	26.5330	-4.700E-06	63.6683	2.931E+10	-12.0117	1181176.	0.000
235.200	1.313E-05	20.8331	4.3675	-4.700E-06	63.6773	2.931E+10	-6.4596	1181176.	0.000
237.600	1.848E-06	13.0362	-4.4755	-4.698E-06	63.6716	2.931E+10	-0.9096	1181176.	0.000
240.000	-9.426E-06	0.000	0.000	-4.698E-06	63.6620	2.931E+10	4.6392	590588.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.2175909 inches
Computed slope at pile head	=	-0.0044791 radians
Maximum bending moment	=	1477211. inch-lbs
Maximum shear force	=	-22086. lbs
Depth of maximum bending moment	=	36.0000000 inches below pile head
Depth of maximum shear force	=	93.6000000 inches below pile head
Number of iterations	=	19
Number of zero deflection points	=	3

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 19200.	M = 1142400.	28800.	0.21759087	1477211.	-22086.	0.00000000

Summary of Warning Messages

The following warning was reported 1782 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil defined using the soft clay criteria. The input value is greater than 8.68 psi (1,250 psf). You should check your input data for correctness.

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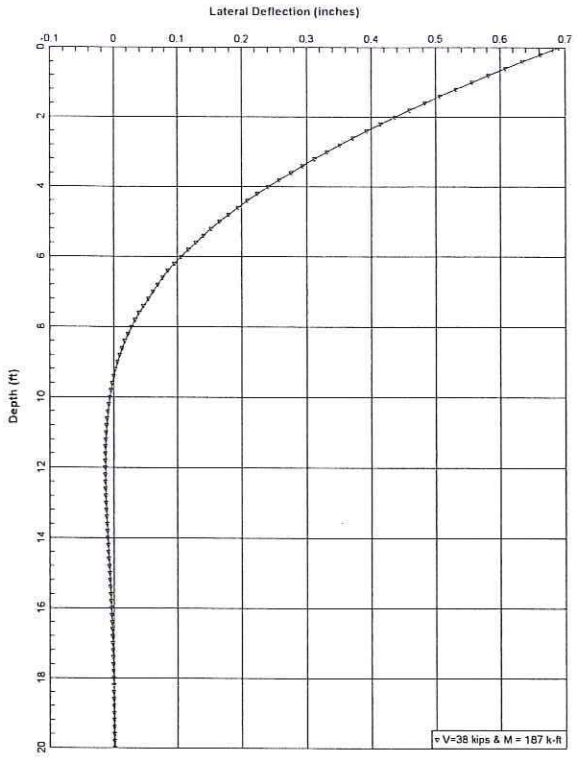
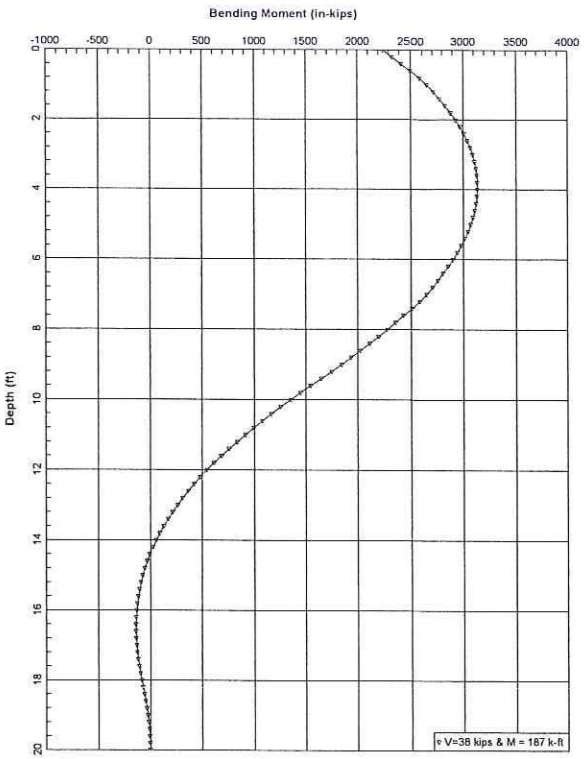
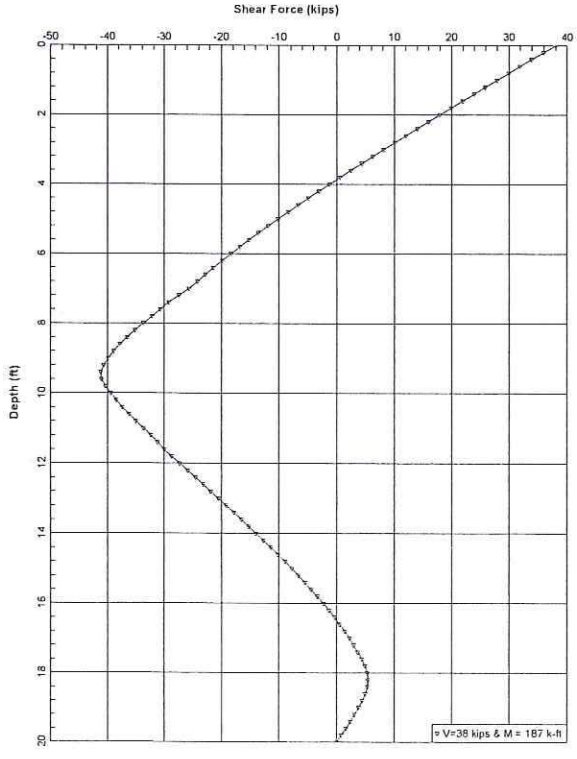


I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free

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================================================================================

                  LPile Plus for Windows, Version 6.0 (6.0.09)

                 Analysis of Individual Piles and Drilled Shafts
                Subjected to Lateral Loading Using the p-y Method

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                            All Rights Reserved

================================================================================

This program is licensed to:


--------------------------------------------------------------------------------
                              Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880\EMI Analyses\LPILE\Type 60D\Retain H = 4 ft and Spacing 8 ft\For Reinforcement\
Name of input data file:     24-in CIDH at RW 232.lp6d
Name of output file:         24-in CIDH at RW 232.lp6o
Name of plot output file:    24-in CIDH at RW 232.lp6p
Name of runtime file:        24-in CIDH at RW 232.lp6r


--------------------------------------------------------------------------------
                            Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  August 25, 2011     Time:  16:36:13


--------------------------------------------------------------------------------
                                  Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - RW 232
Job Number: 10-133
Client: RBF
Engineer: GJG
Description: 24-in CIDH piles at RW 232


--------------------------------------------------------------------------------
                                  Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =         100
- Maximum number of iterations allowed               =         300
- Deflection tolerance for convergence               =  1.0000E-05  in
- Maximum allowable deflection                       =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1


--------------------------------------------------------------------------------
                        Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Total Number of Sections                            =         1

Total Pile Length                                   =     20.00 ft

Depth of ground surface below top of pile           =     -2.50 ft

Slope angle of ground surface                       =      0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point         Depth              Pile
```

	X ft	Diameter in
1	0.00000	24.0000000
2	20.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	20.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 in^4
Moment of Inertia at Bottom	=	1.629E+04 in^4
Elastic Modulus	=	1800000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	-2.500 ft
Distance from top of pile to bottom of layer	=	2.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	2.000 ft
Distance from top of pile to bottom of layer	=	7.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	7.000 ft
Distance from top of pile to bottom of layer	=	30.000 ft

(Depth of lowest layer extends 10.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-2.50	115.00000
2	2.00	115.00000
3	2.00	52.00000
4	7.00	52.00000
5	7.00	52.00000
6	30.00	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-2.500	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		2.000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	2.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		7.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
3	Soft Clay	7.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		30.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--

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p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.500	1.0000	1.0000
2	20.000	1.0000	1.0000

Loading Type

---

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 38000.000 lbs	M = 2244000.000 in-lbs	50000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 38000.000 lbs
Applied moment at pile head = 2244000.000 in-lbs
Axial thrust load on pile head = 50000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-inA2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.6899	2244000.	38000.	-0.0116	1763.9673	2.931E+10	-829.1130	1442.0453	0.000
2.400	0.6624	2334188.	36008.	-0.0114	1830.4201	2.931E+10	-831.2915	3011.7520	0.000
4.800	0.6354	2419564.	34010.	-0.0112	1893.3279	2.931E+10	-832.9821	3146.3586	0.000
7.200	0.6088	2500119.	32010.	-0.0110	1952.6829	2.931E+10	-834.1804	3288.4242	0.000
9.600	0.5827	2575844.	30007.	-0.0108	2008.4794	2.931E+10	-834.8821	3438.5105	0.000
12.000	0.5572	2646735.	28003.	-0.0105	2060.7139	2.931E+10	-835.0830	3597.2326	0.000
14.400	0.5321	2712790.	25999.	-0.0103	2109.3851	2.931E+10	-834.7787	3765.2650	0.000
16.800	0.5076	2774010.	23997.	-0.0101	2154.4937	2.931E+10	-833.9651	3943.3493	0.000
19.200	0.4836	2830399.	21997.	-0.009876	2196.0428	2.931E+10	-832.6378	4132.3016	0.000
21.600	0.4602	2881964.	20001.	-0.009642	2234.0376	2.931E+10	-830.7924	4333.0226	0.000
24.000	0.4373	2928716.	18010.	-0.009404	2268.4855	2.931E+10	-828.4246	4546.5084	0.000
26.400	0.4150	2970667.	16026.	-0.009163	2299.3963	2.931E+10	-824.3599	4767.0967	0.000
28.800	0.3933	3007841.	14053.	-0.008918	2326.7868	2.931E+10	-819.8053	5002.2863	0.000
31.200	0.3722	3040263.	12092.	-0.008670	2350.6763	2.931E+10	-814.7565	5253.3942	0.000
33.600	0.3517	3067962.	10143.	-0.008420	2371.0858	2.931E+10	-809.2093	5521.8910	0.000
36.000	0.3318	3090970.	8208.1167	-0.008168	2388.0387	2.931E+10	-803.1591	5809.4233	0.000
38.400	0.3125	3109321.	6288.4044	-0.007914	2401.5605	2.931E+10	-796.6012	6117.8399	0.000
40.800	0.2938	3123053.	4385.0463	-0.007659	2411.6789	2.931E+10	-789.5306	6449.2233	0.000
43.200	0.2757	3132208.	2499.2795	-0.007403	2418.4238	2.931E+10	-781.9418	6805.9273	0.000
45.600	0.2583	3136827.	632.3545	-0.007146	2421.8274	2.931E+10	-773.8290	7190.6215	0.000
48.000	0.2414	3136958.	-1214.4636	-0.006890	2421.9241	2.931E+10	-765.1861	7606.3455	0.000
50.400	0.2252	3132651.	-3039.8942	-0.006633	2418.7505	2.931E+10	-756.0061	8056.5741	0.000
52.800	0.2096	3123958.	-4842.6391	-0.006377	2412.3456	2.931E+10	-746.2814	8545.2973	0.000
55.200	0.1946	3110937.	-6621.3812	-0.006122	2402.7509	2.931E+10	-736.0037	9077.1180	0.000
57.600	0.1802	3093645.	-8374.7819	-0.005868	2390.0098	2.931E+10	-725.1636	9657.3741	0.000
60.000	0.1664	3072146.	-10101.	-0.005615	2374.1688	2.931E+10	-713.7505	10292.	0.000
62.400	0.1533	3046506.	-11800.	-0.005365	2355.2762	2.931E+10	-701.7524	10989.	0.000
64.800	0.1407	3016793.	-13469.	-0.005117	2333.3832	2.931E+10	-689.1556	11757.	0.000
67.200	0.1287	2983081.	-15107.	-0.004871	2308.5435	2.931E+10	-675.9440	12605.	0.000
69.600	0.1173	2945447.	-16713.	-0.004628	2280.8135	2.931E+10	-662.0993	13546.	0.000
72.000	0.1065	2903970.	-18285.	-0.004389	2250.2521	2.931E+10	-647.5995	14596.	0.000
74.400	0.0962	2858734.	-19821.	-0.004153	2216.9211	2.931E+10	-632.4190	15772.	0.000

76.800	0.0866	2809828.	-21319.	-0.003921	2180.8854	2.931E+10	-616.5267	17096.	0.000
79.200	0.0774	2757343.	-22779.	-0.003693	2142.2127	2.931E+10	-599.8853	18597.	0.000
81.600	0.0688	2701375.	-24198.	-0.003470	2100.9741	2.931E+10	-582.4489	20311.	0.000
84.000	0.0608	2642026.	-25680.	-0.003251	2057.2440	2.931E+10	-652.4408	25770.	0.000
86.400	0.0532	2578893.	-27331.	-0.003037	2010.7256	2.931E+10	-723.8513	32643.	0.000
88.800	0.0462	2511565.	-29036.	-0.002829	1961.1165	2.931E+10	-696.9505	36218.	0.000
91.200	0.0396	2440198.	-30675.	-0.002626	1908.5313	2.931E+10	-668.5456	40475.	0.000
93.600	0.0336	2364956.	-32243.	-0.002429	1853.0910	2.931E+10	-638.4217	45630.	0.000
96.000	0.0280	2286013.	-33737.	-0.002239	1794.9240	2.931E+10	-606.2820	52002.	0.000
98.400	0.0228	2203556.	-35150.	-0.002055	1734.1673	2.931E+10	-571.7012	60095.	0.000
100.800	0.0181	2117785.	-36477.	-0.001878	1670.9683	2.931E+10	-534.0418	70749.	0.000
103.200	0.0138	2028916.	-37709.	-0.001709	1605.4875	2.931E+10	-492.2859	85515.	0.000
105.600	0.009915	1937192.	-38833.	-0.001546	1537.9026	2.931E+10	-444.6544	107632.	0.000
108.000	0.006394	1842888.	-39832.	-0.001391	1468.4165	2.931E+10	-387.5600	145462.	0.000
110.400	0.003236	1746333.	-40671.	-0.001245	1397.2723	2.931E+10	-311.5689	231082.	0.000
112.800	0.000421	1647967.	-41220.	-0.001106	1324.7930	2.931E+10	-145.7246	831537.	0.000
115.200	-0.002071	1548745.	-41067.	-0.000975	1251.6833	2.931E+10	272.9520	316323.	0.000
117.600	-0.004258	1451080.	-40319.	-0.000852	1179.7209	2.931E+10	350.1001	197325.	0.000
120.000	-0.006160	1355417.	-39420.	-0.000737	1109.2339	2.931E+10	399.3119	155569.	0.000
122.400	-0.007796	1262041.	-38418.	-0.000630	1040.4317	2.931E+10	435.5329	134078.	0.000
124.800	-0.009184	1171161.	-37339.	-0.000530	973.4689	2.931E+10	463.7886	121201.	0.000
127.200	-0.0103	1082941.	-36199.	-0.000438	908.4660	2.931E+10	486.4714	112897.	0.000
129.600	-0.0113	997513.	-35009.	-0.000353	845.5199	2.931E+10	504.9344	107372.	0.000
132.000	-0.0120	914983.	-33779.	-0.000275	784.7096	2.931E+10	520.0280	103700.	0.000
134.400	-0.0126	835439.	-32516.	-0.000203	726.0897	2.931E+10	532.3267	101360.	0.000
136.800	-0.0130	758954.	-31227.	-0.000138	669.7431	2.931E+10	542.2397	100033.	0.000
139.200	-0.0133	685584.	-29916.	-7.854E-05	615.6823	2.931E+10	550.0706	99521.	0.000
141.600	-0.0134	615376.	-28589.	-2.528E-05	563.9511	2.931E+10	556.0522	99693.	0.000
144.000	-0.0134	548365.	-27249.	2.236E-05	514.5754	2.931E+10	560.3673	100465.	0.000
146.400	-0.0133	484576.	-25901.	6.464E-05	467.5740	2.931E+10	563.1632	101783.	0.000
148.800	-0.0131	424027.	-24547.	0.000102	422.9592	2.931E+10	564.5607	103618.	0.000
151.200	-0.0128	366725.	-23192.	0.000134	380.7375	2.931E+10	564.6602	105954.	0.000
153.600	-0.0124	312672.	-21838.	0.000162	340.9096	2.931E+10	563.5469	108791.	0.000
156.000	-0.0120	261861.	-20489.	0.000186	303.4711	2.931E+10	561.2936	112141.	0.000
158.400	-0.0115	214282.	-19146.	0.000205	268.4130	2.931E+10	557.9632	116024.	0.000
160.800	-0.0110	169914.	-17812.	0.000221	235.7214	2.931E+10	553.6109	120475.	0.000
163.200	-0.0105	128733.	-16489.	0.000233	205.3782	2.931E+10	548.2851	125537.	0.000
165.600	-0.009910	90709.	-15181.	0.000242	177.3611	2.931E+10	542.0287	131265.	0.000
168.000	-0.009321	55806.	-13889.	0.000248	151.6437	2.931E+10	534.8801	137728.	0.000
170.400	-0.008720	23984.	-12615.	0.000251	128.1960	2.931E+10	526.8731	145010.	0.000
172.800	-0.008115	-4804.3716	-11361.	0.000252	114.0643	2.931E+10	518.0377	153213.	0.000
175.200	-0.007510	-30608.	-10129.	0.000251	133.0773	2.931E+10	508.4001	162462.	0.000
177.600	-0.006912	-53484.	-8921.3124	0.000247	149.9325	2.931E+10	497.9828	172908.	0.000
180.000	-0.006324	-73490.	-7739.5685	0.000242	164.6737	2.931E+10	486.8038	184737.	0.000
182.400	-0.005751	-90692.	-6585.5521	0.000235	177.3484	2.931E+10	474.8766	198178.	0.000
184.800	-0.005195	-105157.	-5461.0493	0.000227	188.0069	2.931E+10	462.2090	213518.	0.000
187.200	-0.004660	-116959.	-4367.8369	0.000218	196.7031	2.931E+10	448.8014	231120.	0.000
189.600	-0.004149	-126175.	-3307.7012	0.000208	203.4936	2.931E+10	434.6450	251450.	0.000
192.000	-0.003661	-132886.	-2282.4652	0.000198	208.4385	2.931E+10	419.7183	275120.	0.000
194.400	-0.003200	-137178.	-1294.0243	0.000186	211.6011	2.931E+10	403.9824	302950.	0.000
196.800	-0.002766	-139142.	-344.3972	0.000175	213.0481	2.931E+10	387.3735	336076.	0.000
199.200	-0.002360	-138873.	564.2009	0.000164	212.8501	2.931E+10	369.7915	376122.	0.000
201.600	-0.001980	-136473.	1429.2487	0.000153	211.0816	2.931E+10	351.0816	425517.	0.000
204.000	-0.001628	-132050.	2247.7492	0.000142	207.8221	2.931E+10	331.0021	488098.	0.000
206.400	-0.001301	-125718.	3015.9515	0.000131	203.1569	2.931E+10	309.1664	570384.	0.000
208.800	-0.000999	-117604.	3728.8625	0.000121	197.1786	2.931E+10	284.9261	684571.	0.000
211.200	-0.000720	-107849.	4379.2955	0.000112	189.9901	2.931E+10	257.1014	856953.	0.000
213.600	-0.000462	-96611.	4949.0741	0.000103	181.7097	2.931E+10	217.7141	1130076.	0.000
216.000	-0.000224	-84118.	5337.5142	9.601E-05	172.5046	2.931E+10	105.9859	1137184.	0.000
218.400	-1.519E-06	-71014.	5465.5665	8.966E-05	162.8491	2.931E+10	0.7243	1144292.	0.000
220.800	0.000207	-57805.	5347.4448	8.438E-05	153.1900	2.931E+10	-99.1591	1151400.	0.000
223.200	0.000404	-45366.	4994.7134	8.016E-05	143.9513	2.931E+10	-194.7838	1158508.	0.000
225.600	0.000591	-33949.	4461.0848	7.691E-05	135.5390	2.931E+10	-249.9067	1014100.	0.000
228.000	0.000773	-23971.	3831.3590	7.454E-05	128.1871	2.931E+10	-274.8649	853747.	0.000
230.400	0.000949	-15577.	3146.1230	7.292E-05	122.0015	2.931E+10	-296.1652	748822.	0.000
232.800	0.001123	-8887.4955	2414.4463	7.192E-05	117.0728	2.931E+10	-313.5654	670313.	0.000
235.200	0.001294	-4004.4790	1643.6059	7.139E-05	113.4749	2.931E+10	-328.8016	609833.	0.000
237.600	0.001465	-1015.3205	837.8257	7.118E-05	111.2724	2.931E+10	-342.6819	561250.	0.000
240.000	0.001636	0.000	0.000	7.114E-05	110.5243	2.931E+10	-355.5061	260745.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.6899475 inches
Computed slope at pile head	=	-0.0115541 radians
Maximum bending moment	=	3136958. inch-lbs
Maximum shear force	=	-41220. lbs
Depth of maximum bending moment	=	48.0000000 inches below pile head
Depth of maximum shear force	=	112.8000000 inches below pile head
Number of iterations	=	22
Number of zero deflection points	=	2

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

C-80

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 38000.	M = 2244000.	50000.	0.68994754	3136958.	-41220.	0.00000000

Summary of Warning Messages

The following warning was reported 2079 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil defined using the soft clay criteria. The input value is greater than 8.68 psi (1,250 psf). You should check your input data for correctness.

SOUNDWALL ON RETAINING WALL 7SWBP

Earth Mechanics, Inc.
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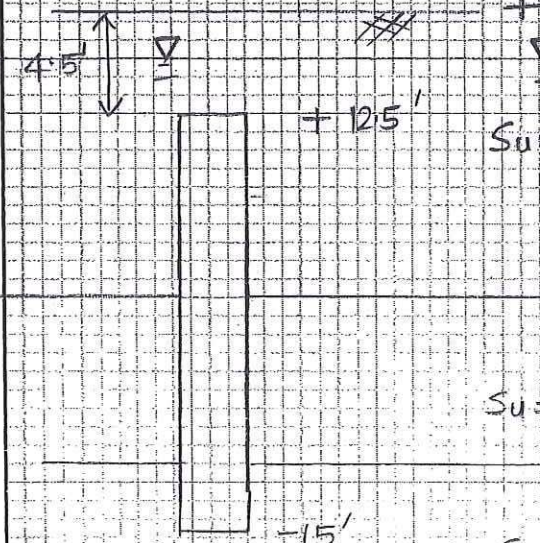
Soundwall on Type 7 wall (7SWBP)

- two rows of 24-inch diameter piles (see attached layouts)

Per AASHTO, group reduction $\eta_{avg} = 0.8$ //

For Design H = 6 ft;
under strength Limit state,
compression = 106 kips
Apply $\phi = 0.7$ & $\eta = 0.8$,
$\Rightarrow$ Nominal resistance = $\frac{106}{0.7} \times \frac{1}{0.8} \approx 189$ kips
SELECT 190 kips //



From SHAFT analyses,
Required pile tip El. =
+17' − 35'
= −18 ft //

Under Service-I Limit,
Compression = 78 kips
Apply FOS=2 & $\eta = 0.8$ $\Rightarrow$
Nominal resistance =
$78 \times 2 \times \frac{1}{0.8} = 195$ kips
SELECT 200 kips //

$\Rightarrow$ Required pile tip El. = −19 ft //

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under extreme limit state,

Compression = 97 kips & Tension = −71 kips

nominal resistance = $\frac{97}{1.0 \times 0.8}$ = 121 kips

SELECT 130 kips for compression

⇒ From SHAFT, Required pile tip El = +17' − 30'
= −13 ft //

For tension,

nominal resistance = $\frac{71}{1.0 \times 0.8}$ = 89 kips SELECT 90 kips //

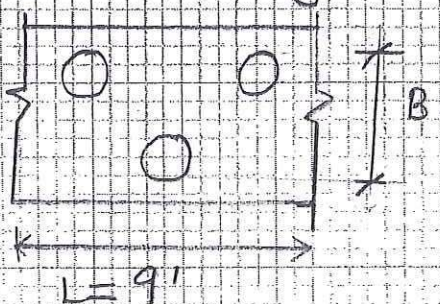
∴ Required skin resistance = $\frac{89}{0.7}$ = 127 kips ≈ 130 kips

From SHAFT, Required pile tip El = +17' − 30'
= −13 ft

⇒ SELECT −13 ft, SAME AS FOR H = 5' //

Settlement Check

Consider 9 ft long portion,



Total Service load =
3 × 78 ≈ 234 kips

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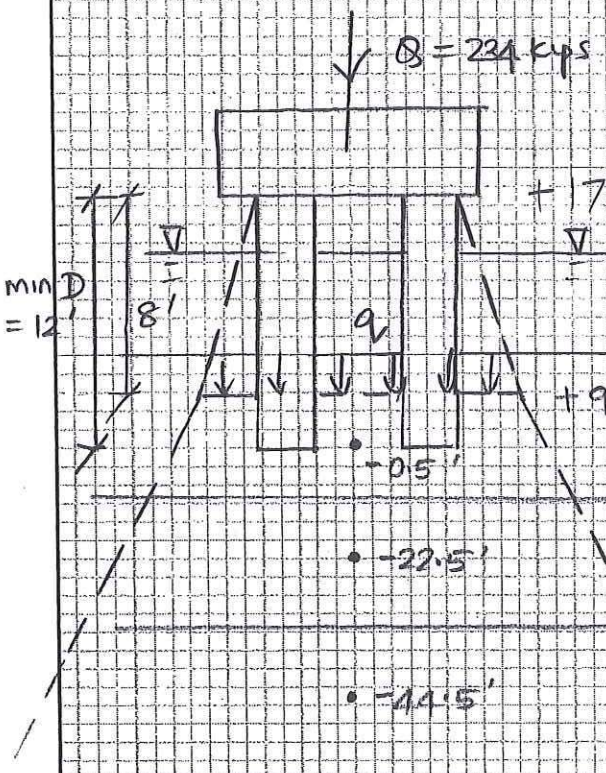

@ equivalent footing

$B_1 = 6.25' + 4'$
$= 10.25'$

$L_1 = 9' + 4'$
$= 13'$

$\Delta H = C_{r2} H_2 \log\left(\frac{\sigma_0' + \Delta\sigma_v'}{\sigma_0'}\right)$

layer	H (ft)	C_{r2}	σ_0 (ksf)	$\Delta\sigma_v$ (ksf)	ΔH_i (in)
CL-2	19	0.02	1.05	0.52	0.81
CL-3	25	0.02	2.20	0.18	0.12
CL-4	19	0.01	3.36	0.07	0.003

$\Sigma H_i = 0.93'' < 1''$

$\Rightarrow$ No design tip for settlement for SW 232.

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Similarly for Design H = 5 ft ;

* under strength limit state,
  Nominal resistance = 170 kips
  ∴ Required pile tip El. = -16 ft //

* under extreme limit state,
  Nominal resistance = 110 kips for compression
  Required pile tip El. = -11 ft //
  Nominal resistance = 100 kips for tension
  ∴ Required pile tip El. = -10 ft //

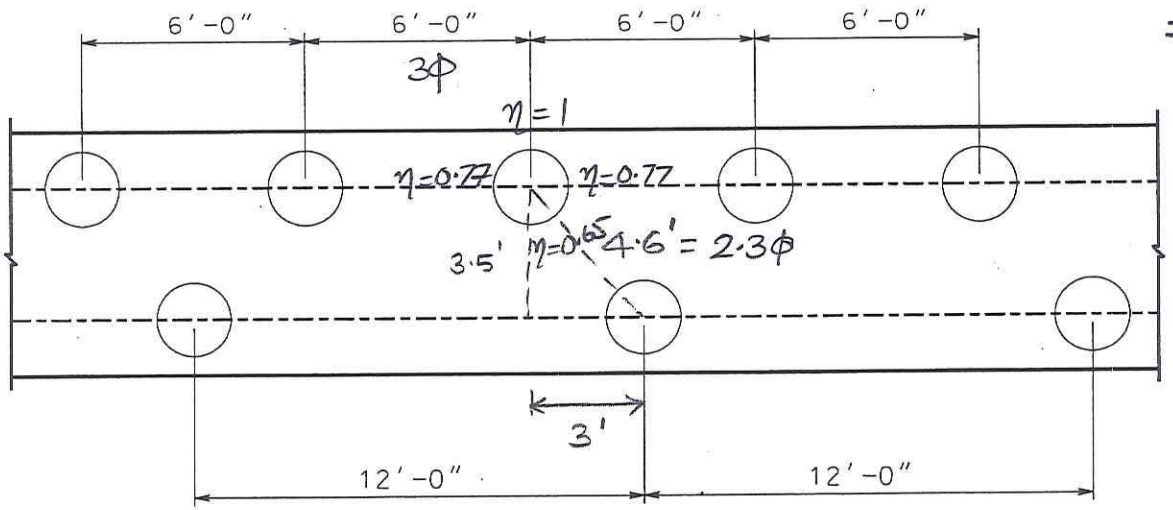
* No design tip for settlement //

* Under Service-I Limit,
  Nominal resistance = 170 kips for compression
  ∴ Required pile tip El. = -16 ft //

TYPE 7 WALL (MODIFIED) PILE LAYOUT

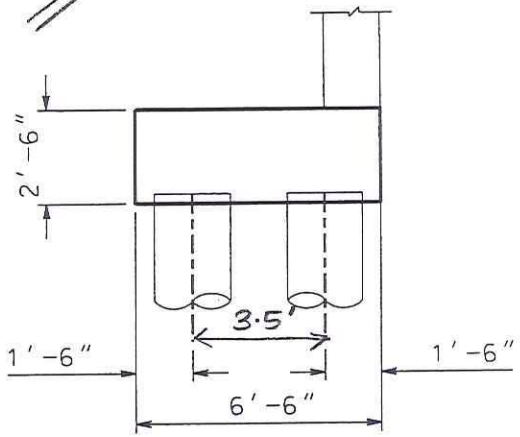
GROUP REDUCTION FOR AXIAL PILE

DESIGN H = 4.0FT, 5.0FT

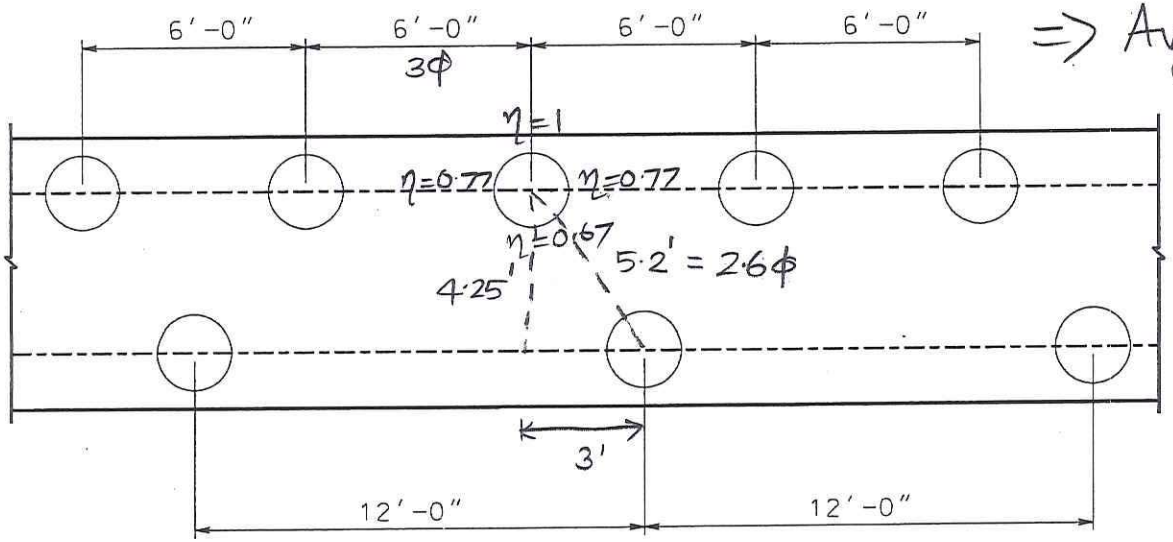


$\Rightarrow$ Avg $\eta = \frac{1+0.77+0.77+0.65}{4}$

≈ 0.8 //

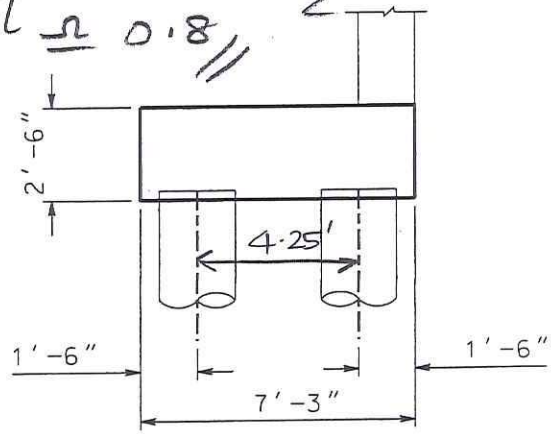


DESIGN H = 6.0FT



$\Rightarrow$ Avg $\eta = \frac{1+0.77+0.77+0.67}{2}$

≈ 0.8 //



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By Ranjan Date 5/21/12 Checked By Lino Date 5/24/12 Sheet 1 of 3

Soundwall on Type 7 wall (7SWBP) - Utility Corridor

Per Structural Designers,

Strength Limit State ; Compression = 185 kip

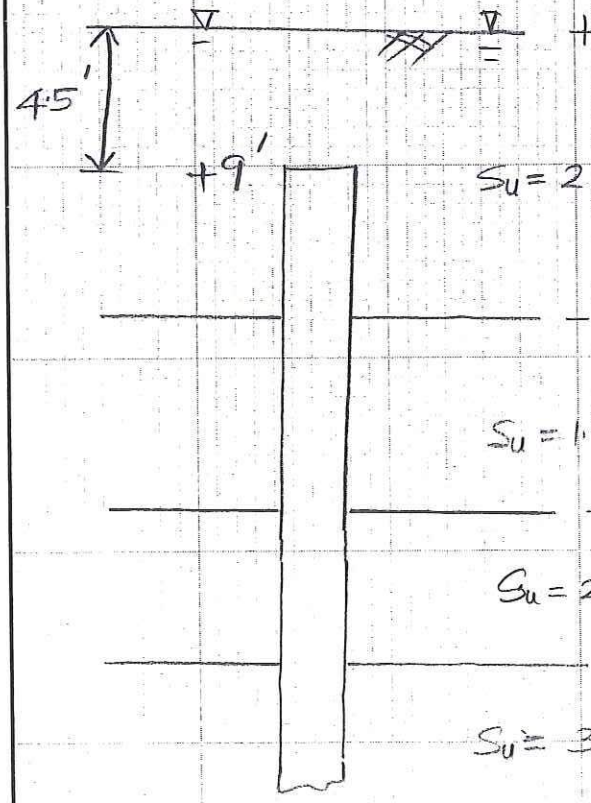
Apply $\phi = 0.7$ & $\eta = 0.8$,

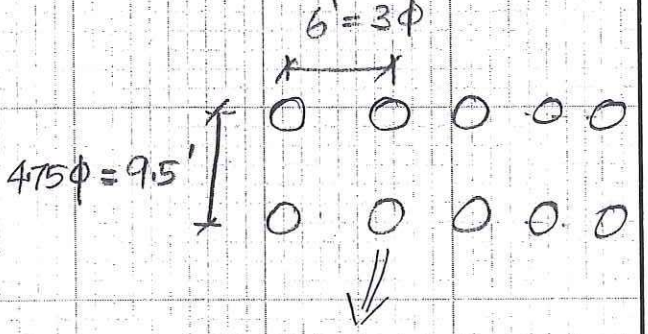
$\Rightarrow$ Nominal resistance = $\frac{185}{0.7} \times \frac{1}{0.8} \simeq 331$ kips

SELECT 340 kips //

From SHAFT analyses,

Required pile tip El. = $+13.5' - 50' = -36.5'$ //





$\eta_{avg} = \frac{1 + (0.7 \times 2) + 0.875}{4}$

$= 0.82$

SELECT $\eta_{avg} = 0.8$ //

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By Ranjan Date 5/21/12 Checked By Lino Date 5/24/12 Sheet 2 of 3

Service-I Limit

Compression = 140 kip

Apply FOS = 2 & $\eta = 0.8$ =>

Nominal resistance = $140 \times 2 \times \frac{1}{0.8}$ = 350 kips

SELECT 350 kips //

SHAFT Analyses,

Required pile tip El. = +13.5' - 51' = -37.5' //

Extreme Limit State

Compression = 124 kips & Tension = 28 kips

For compression,

Nominal resistance = $\frac{124}{1 \times 0.8}$ = 155 kips SELECT 160 kips //

=> From SHAFT, required pile tip El. = +13.5' - 32' = -18.5' //

For Tension,

Nominal resistance = $\frac{28}{1 \times 0.8}$ = 35 kips

SELECT 40 kips //

Required skin = $\frac{40}{0.7}$ = 57 kips ≈ 60 kips //

=> From SHAFT, required pile tip El. = +13.5' - 22'

= -8.5' //

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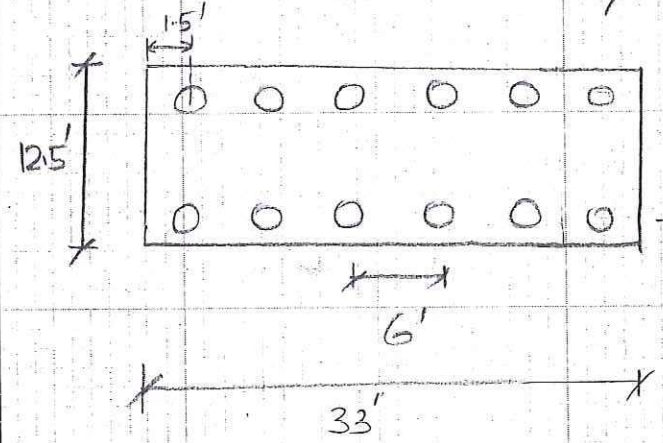
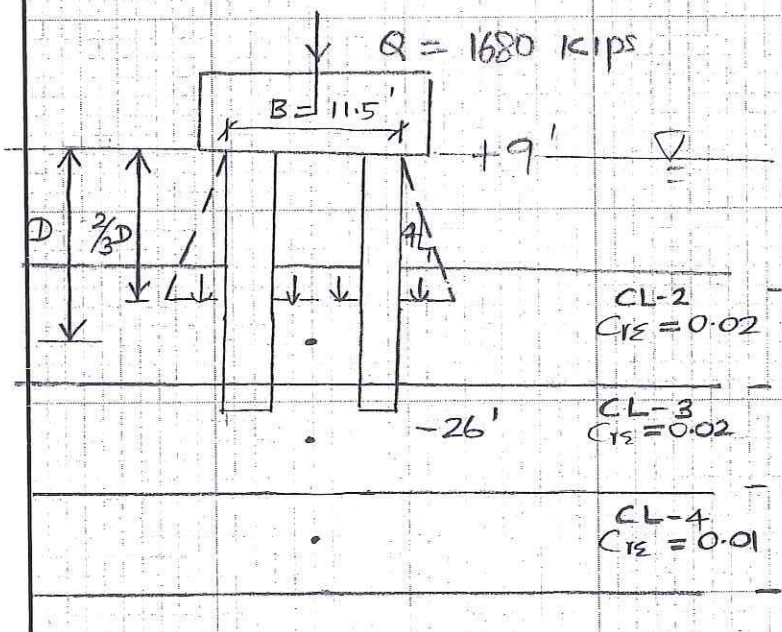
Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 5/21/12 Checked By Lino Date 5/24/12 Sheet 3 of 3

Settlement Check - Utility Corridor



Total Service Load
= 12 × 140
= 1680 kips.



Select D = 35'

2/3 D = 23.3'

@ Equivalent footing,

$B_1 = 11.5' + \left(\frac{24}{2}\right)$
$= 23.5'$

$L_1 = 32 + \left(\frac{24}{2}\right)$
$= 44'$

$\Delta H = C_{r\varepsilon} H_i \log\left(\frac{\sigma_o' + \Delta\sigma_v}{\sigma_o'}\right)$

layer	H (ft)	$C_{r\varepsilon}$	σ_o (ksf)	$\Delta\sigma_v$ (ksf)	ΔH_i (in)
CL-2	10.7	0.02	1.65	1.14	0.58
CL-3	10	0.02	2.25	0.70	0.28
CL-4	19	0.01	3.67	0.41	0.11

$\Sigma \Delta H_i$ = 0.97 inches < 1"

⇒ Design tip El. for settlement = -26 ft //

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

I-880 Operational and Safety Improvement Project - RW 232

TOTAL LOAD = 225.0 TONS

NUMBER OF LAYERS = 5

WATER TABLE DEPTH = 2.0 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 1.00

FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00

SOIL INFORMATION

LAYER NO 1----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.600E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.720E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.200E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.720E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.200E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.700E+01

LAYER NO 3----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.700E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.700E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00

END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.250E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.700E+01
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.270E+02

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.300E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.100E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.270E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.300E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.100E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.520E+02

LAYER NO 5----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.300E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.520E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.300E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.710E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 2.000 FT.
DIAMETER OF BASE = 2.000 FT.
END OF STEM TO BASE = 0.000 FT.
ANGLE OF BELL = 0.000 DEG.
IGNORED TOP PORTION = 12.500 FT.
IGNORED BOTTOM PORTION = 2.000 FT.
AREA OF ONE PERCENT STEEL = 4.524 SQ.IN.
ELASTIC MODULUS, Ec = 0.360E+07 LB/SQ IN
VOLUME OF UNDERREAM = 0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
16.0	1.86	4.32	35.35	39.67	39.67	39.67	21.30
17.0	1.98	8.64	35.35	43.99	43.99	43.99	22.24
18.0	2.09	12.96	35.35	48.31	48.31	48.31	23.06
19.0	2.21	17.28	35.35	52.63	52.63	52.63	23.80

20.0	2.33	21.60	35.35	56.95	56.95	56.95	24.47
21.0	2.44	25.92	35.35	61.27	61.27	61.27	25.07
22.0	2.56	30.24	35.35	65.59	65.59	65.59	25.62
23.0	2.68	34.56	35.35	69.91	69.91	69.91	26.12
24.0	2.79	38.88	37.87	76.75	76.75	76.75	27.48
25.0	2.91	43.20	40.90	84.10	84.10	84.10	28.91
26.0	3.03	47.52	42.42	89.94	89.94	89.94	29.73
27.0	3.14	51.84	42.42	94.26	94.26	94.26	30.00
28.0	3.26	56.16	42.42	98.58	98.58	98.58	30.25
29.0	3.37	60.48	42.42	102.90	102.90	102.90	30.49
30.0	3.49	69.99	42.42	112.41	112.41	112.41	32.20
31.0	3.61	75.17	42.42	117.59	117.59	117.59	32.60
32.0	3.72	80.36	42.42	122.77	122.77	122.77	32.97
33.0	3.84	85.54	42.42	127.96	127.96	127.96	33.32
34.0	3.96	90.73	42.42	133.14	133.14	133.14	33.65
35.0	4.07	95.91	42.42	138.33	138.33	138.33	33.96
36.0	4.19	101.09	42.42	143.51	143.51	143.51	34.26
37.0	4.31	106.28	42.42	148.70	148.70	148.70	34.53
38.0	4.42	111.46	42.42	153.88	153.88	153.88	34.80
39.0	4.54	116.65	42.42	159.06	159.06	159.06	35.05
40.0	4.65	121.83	42.42	164.25	164.25	164.25	35.29
41.0	4.77	127.02	42.42	169.43	169.43	169.43	35.51
42.0	4.89	132.20	42.42	174.62	174.62	174.62	35.73
43.0	5.00	137.38	42.42	179.80	179.80	179.80	35.93
44.0	5.12	142.57	42.42	184.99	184.99	184.99	36.13
45.0	5.24	147.75	42.42	190.17	190.17	190.17	36.32
46.0	5.35	152.94	42.42	195.35	195.35	195.35	36.49
47.0	5.47	158.12	42.42	200.54	200.54	200.54	36.67
48.0	5.59	163.31	42.42	205.72	205.72	205.72	36.83
49.0	5.70	168.49	42.42	210.91	210.91	210.91	36.99
50.0	5.82	173.67	42.42	216.09	216.09	216.09	37.14
51.0	5.93	178.86	42.42	221.28	221.28	221.28	37.28
52.0	6.05	184.04	42.42	226.46	226.46	226.46	37.42

Extreme - Tension (Utility Corridor)

Extreme - Comp & Tension

Extreme - Comp (Utility Corridor)

Strength - Comp

Service - Comp

Strength - Comp (Utility Corridor)

Service - Comp (Utility Corridor)

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6187E-01	0.3340E-04	0.1396E-02	0.1000E-04
0.3093E+00	0.1670E-03	0.6981E-02	0.5000E-04
0.6187E+00	0.3340E-03	0.1396E-01	0.1000E-03
0.3141E+02	0.1682E-01	0.6981E+00	0.5000E-02
0.4723E+02	0.2528E-01	0.1047E+01	0.7500E-02
0.6239E+02	0.3368E-01	0.1396E+01	0.1000E-01
0.1216E+03	0.7491E-01	0.3491E+01	0.2500E-01
0.1647E+03	0.1204E+00	0.6981E+01	0.5000E-01
0.1841E+03	0.1566E+00	0.1047E+02	0.7500E-01
0.1904E+03	0.1854E+00	0.1396E+02	0.1000E+00
0.2009E+03	0.3437E+00	0.2425E+02	0.2500E+00
0.1925E+03	0.5928E+00	0.3377E+02	0.5000E+00
0.1958E+03	0.7202E+00	0.3700E+02	0.6250E+00
0.1975E+03	0.8777E+00	0.3872E+02	0.7813E+00
0.1999E+03	0.1298E+01	0.4114E+02	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1055E+00	0.4783E-04	0.2086E-02	0.1000E-04
0.5274E+00	0.2391E-03	0.1043E-01	0.5000E-04
0.1055E+01	0.4783E-03	0.2086E-01	0.1000E-03
0.5410E+02	0.2427E-01	0.1043E+01	0.5000E-02
0.7977E+02	0.3635E-01	0.1564E+01	0.7500E-02
0.1011E+03	0.4771E-01	0.2086E+01	0.1000E-01
0.1667E+03	0.9529E-01	0.5214E+01	0.2500E-01
0.1928E+03	0.1348E+00	0.1043E+02	0.5000E-01
0.2041E+03	0.1667E+00	0.1564E+02	0.7500E-01
0.2126E+03	0.1971E+00	0.2086E+02	0.1000E+00
0.2224E+03	0.3554E+00	0.3220E+02	0.2500E+00
0.2139E+03	0.6036E+00	0.3895E+02	0.5000E+00
0.2158E+03	0.7300E+00	0.4090E+02	0.6250E+00
0.2167E+03	0.8869E+00	0.4173E+02	0.7813E+00
0.2171E+03	0.1306E+01	0.4220E+02	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2977E-01	0.2191E-04	0.7069E-03	0.1000E-04
0.1488E+00	0.1096E-03	0.3535E-02	0.5000E-04
0.2977E+00	0.2191E-03	0.7069E-02	0.1000E-03
0.1496E+02	0.1097E-01	0.3535E+00	0.5000E-02
0.2250E+02	0.1648E-01	0.5302E+00	0.7500E-02
0.3005E+02	0.2199E-01	0.7069E+00	0.1000E-01
0.7115E+02	0.5390E-01	0.1767E+01	0.2500E-01
0.1210E+03	0.1005E+00	0.3535E+01	0.5000E-01
0.1487E+03	0.1389E+00	0.5302E+01	0.7500E-01
0.1635E+03	0.1711E+00	0.7069E+01	0.1000E+00
0.1791E+03	0.3320E+00	0.1630E+02	0.2500E+00
0.1712E+03	0.5821E+00	0.2860E+02	0.5000E+00
0.1757E+03	0.7104E+00	0.3310E+02	0.6250E+00
0.1783E+03	0.8685E+00	0.3565E+02	0.7813E+00

0.1825E+03 0.1290E+01 0.3987E+02 0.1200E+01

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

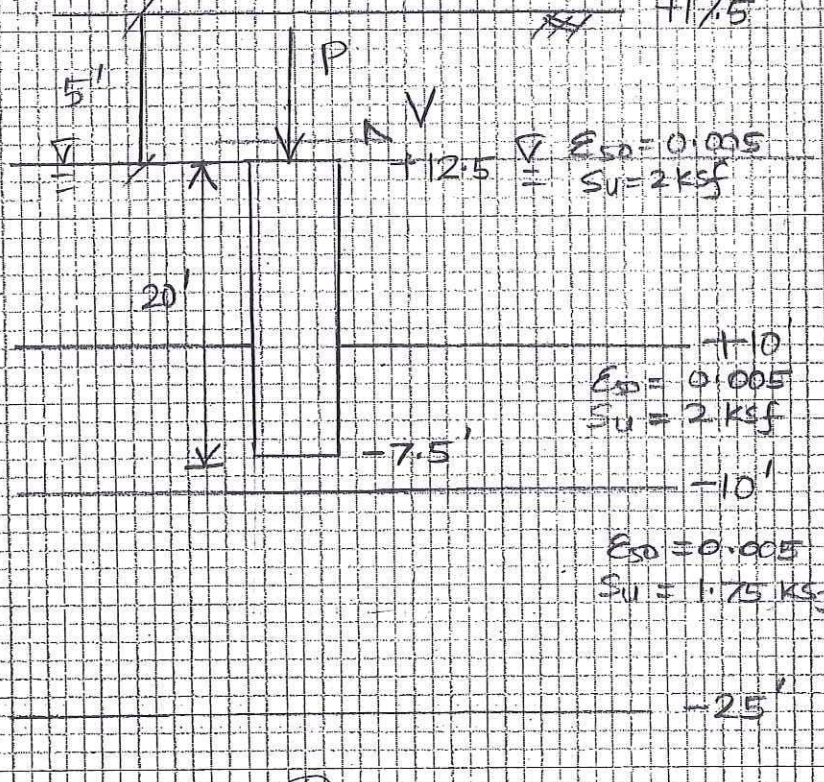
Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/16/11 Checked By Lino Date 8/17/11 Sheet 1 of 2

Retaining Wall - 232 - Soundwall on Type 7 wall (7SWBP)

A) FOR DEFLECTION

Under service Limit,
for $H_1 = 6'$
$V = 26$ kips
$P = 78$ kips



USE 50% EI

From Group 7.0, group reduction factor $\eta = 0.77$

pile head deflection $\approx 0.13'' < 0.25''$

$\Rightarrow$ Pile tip elevation for lateral load will not control //

Similarly, pile head deflection will be less than 0.25" for $H_1 = 5'$ //

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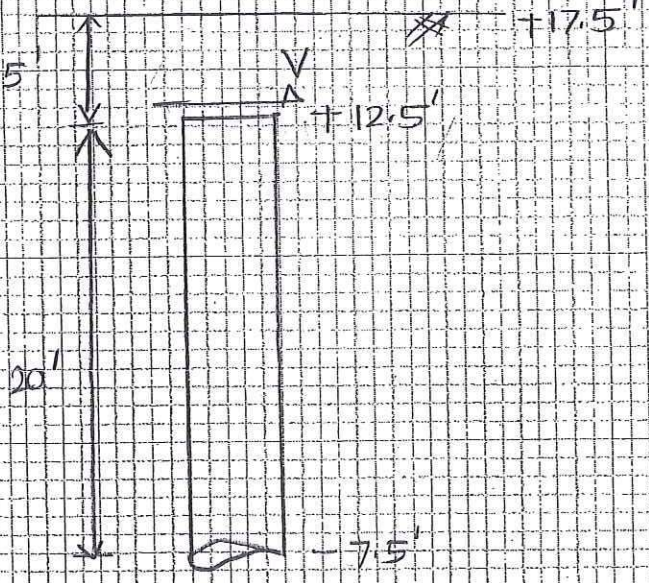
Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/16/11 Checked By Lino Date 8/17/11 Sheet 2 of 2

(B) FOR SIZING REINFORCEMENT



* Select the pile length of 20 feet from lateral deflection analysis.
* Select the controlling pile head shear and moment for H = 6'

Under Strength Limit (controlling)

$$V = \frac{35}{0.7} = 50 \text{ kip}$$

Based on the analyses;

Pile-head deflection = 0.45"

M_{max} = 150 k-ft

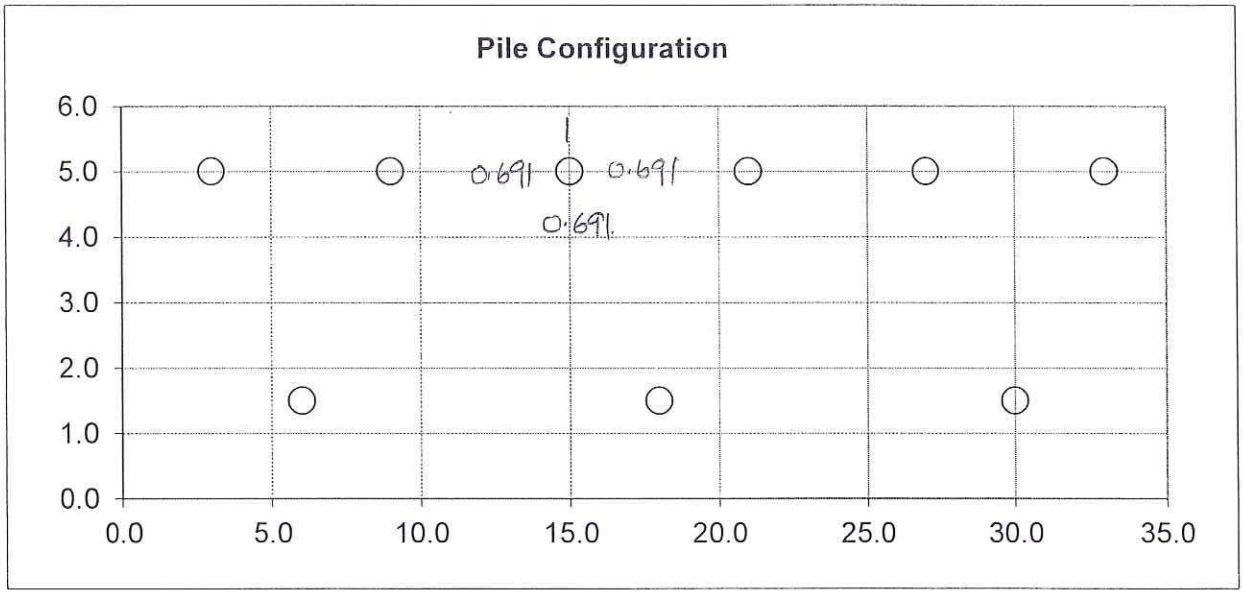
Depth of M_{max} = 5.8 ft

Max Shear = 50 kips

Depth of Max shear = 0 ft

Project: I-880 Operational and Safety Improvements
By: Ranjan 8/15/2011

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



Pile Dia.: 2.000
No. of Piles: 9

Group Efficiency	X-Dir (Trans)	Y-Dir (Long)
	0.570	0.691

Pile No.	X (Transverse)	Y (Longitudinal)
1	3.000	5.00
2	9.000	5.00
3	15.000	5.00
4	21.000	5.00
5	27.000	5.00
6	33.000	5.00
7	6.000	1.50
8	18.000	1.50
9	30.000	1.50

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.536	0.801
0.492	0.745
0.499	0.745
0.492	0.745
0.526	0.745
0.800	0.801
0.562	0.548
0.562	0.539
0.665	0.548

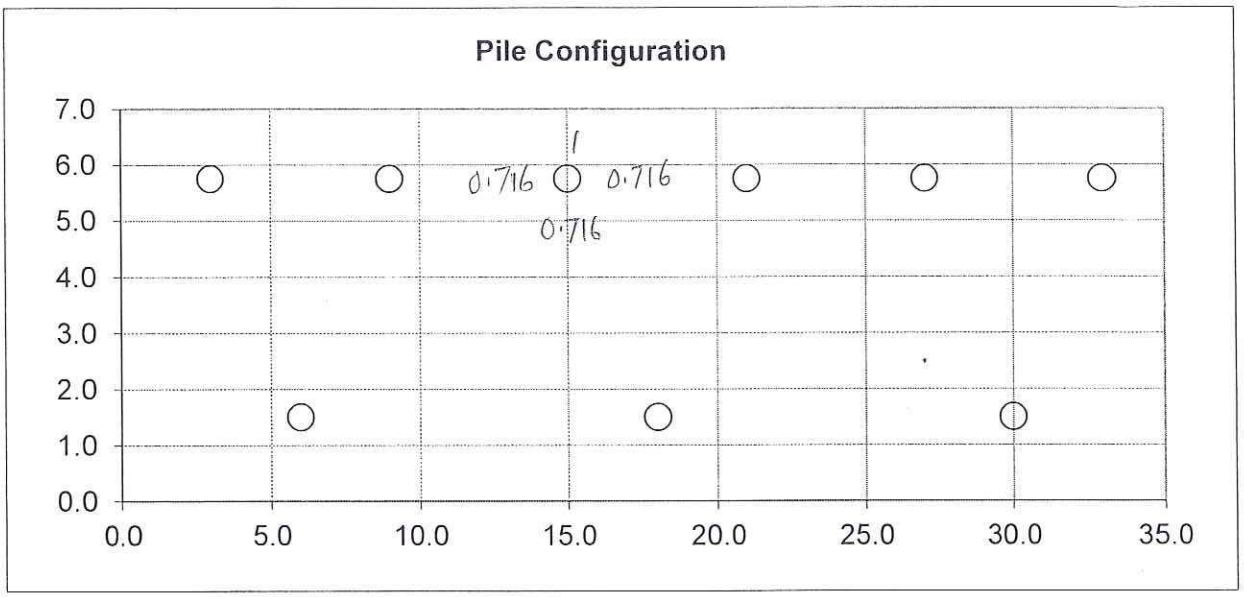
Since the loading is in y-dir only,

$\eta_{avg} = \frac{1 + (0.691 \times 3)}{4} \approx 0.77$ //

7SWP-H=4 or 5 ft

Project: I-880 Operational and Safety Improvements
By: Ranjan 8/15/2011

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



Pile Dia.:	2.000
No. of Piles:	9

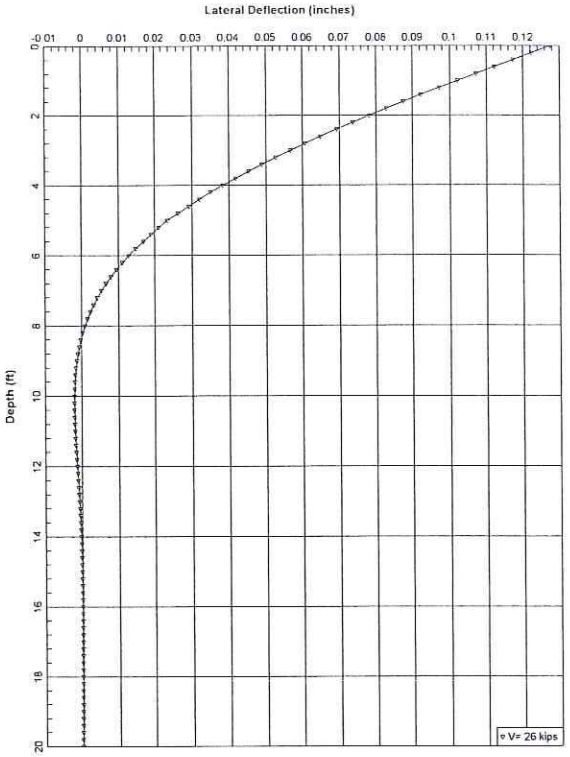
Group Efficiency	X-Dir (Trans)	Y-Dir (Long)
	0.614	0.716

Pile No.	X (Transverse)	Y (Longitudinal)
1	3.000	5.75
2	9.000	5.75
3	15.000	5.75
4	21.000	5.75
5	27.000	5.75
6	33.000	5.75
7	6.000	1.50
8	18.000	1.50
9	30.000	1.50

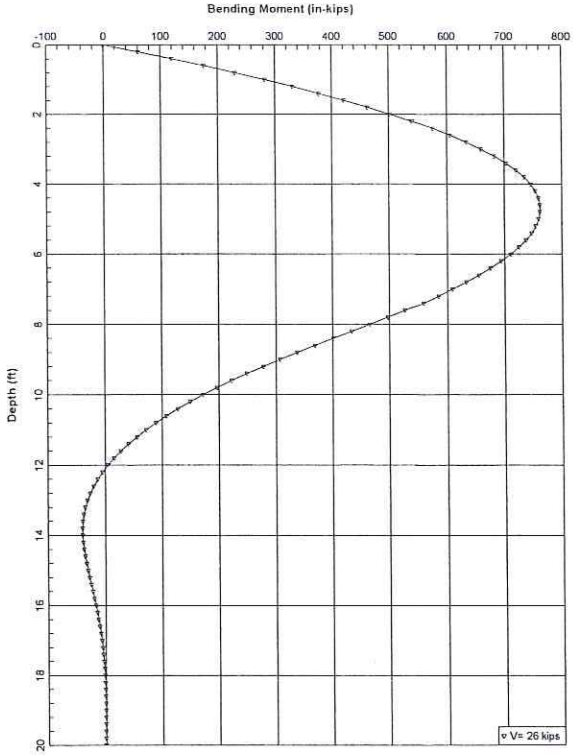
Reduction Factors in X-dir	Reduction Factors in Y-dir
0.571	0.831
0.519	0.773
0.532	0.773
0.519	0.773
0.561	0.773
0.829	0.831
0.631	0.567
0.631	0.556
0.735	0.567

Since the loading is in y-dir only,

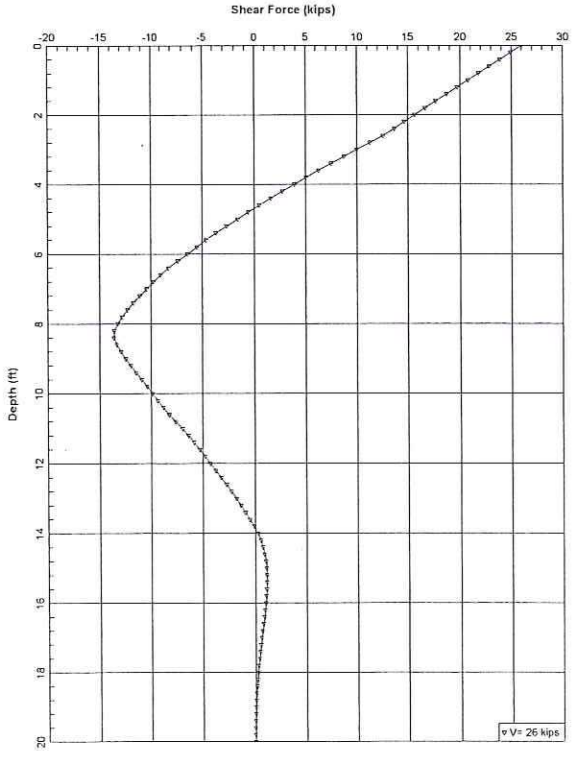
$$\eta_{avg} = \frac{1 + (0.716 \times 3)}{4} \approx 0.79$$



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free

```
================================================================================

                LPile Plus for Windows, Version 6.0 (6.0.09)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

                      (c) 1985-2010 by Ensoft, Inc.
                           All Rights Reserved

================================================================================

This program is licensed to:


--------------------------------------------------------------------------------
                          Files Used for Analysis
--------------------------------------------------------------------------------


Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880 North Safety & Operational Improvements at 23rd & 29th Ave\Report\FR\RW\Analyses\LPILE\7SWP\Design H = 6 ft\For Deflection\
Name of input data file:     24-in CIDH at RW 232.lp6d
Name of output file:         24-in CIDH at RW 232.lp6o
Name of plot output file:    24-in CIDH at RW 232.lp6p
Name of runtime file:        24-in CIDH at RW 232.lp6r

--------------------------------------------------------------------------------
                        Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  January 6, 2012     Time:  13:43:30

--------------------------------------------------------------------------------
                             Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - RW 232

Job Number: 10-133

Client: RBF

Engineer: GJG

Description: 24-in CIDH piles at RW 232


--------------------------------------------------------------------------------
                            Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                    =          100
- Maximum number of iterations allowed         =          300
- Deflection tolerance for convergence         =   1.0000E-05  in
- Maximum allowable deflection                 =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Total Number of Sections                      =          1

Total Pile Length                             =      20.00 ft

Depth of ground surface below top of pile     =      -5.00 ft

Slope angle of ground surface                 =       0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.
```

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	20.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	20.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 in^4
Moment of Inertia at Bottom	=	1.629E+04 in^4
Elastic Modulus	=	1800000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	-5.000 ft
Distance from top of pile to bottom of layer	=	0.100 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	0.100 ft
Distance from top of pile to bottom of layer	=	2.500 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	2.500 ft
Distance from top of pile to bottom of layer	=	22.500 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	22.500 ft
Distance from top of pile to bottom of layer	=	47.500 ft

(Depth of lowest layer extends 27.50 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-5.00	115.00000
2	0.10	115.00000
3	0.10	52.00000
4	2.50	52.00000
5	2.50	52.00000
6	22.50	52.00000
7	22.50	52.00000
8	47.50	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-5.000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		0.10000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	0.10000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--

3	Soft Clay	2.500	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		2.500	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
4	Soft Clay	22.500	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		22.500	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--
		47.500	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--

---

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-5.000	0.7700	1.0000
2	34.000	0.7700	1.0000

Loading Type

---

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1		Condition 2		Axial Thrust Force, lbs
1	1	V =	26000.000 lbs	M =	0.000 in-lbs	78000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 26000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 78000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-inA2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1275	4.238E-07	26000.	-0.002129	172.4179	2.931E+10	-437.8789	4119.7710	0.000
2.400	0.1224	61537.	24950.	-0.002127	217.7604	2.931E+10	-437.5065	8576.1131	0.000
4.800	0.1173	120554.	23901.	-0.002119	261.2454	2.931E+10	-436.5295	8928.7116	0.000
7.200	0.1123	177054.	22855.	-0.002107	302.8764	2.931E+10	-435.2498	9304.9023	0.000
9.600	0.1072	231045.	21812.	-0.002090	342.6581	2.931E+10	-433.6655	9706.7357	0.000
12.000	0.1022	282534.	20773.	-0.002069	380.5967	2.931E+10	-431.7744	10136.	0.000
14.400	0.0973	331531.	19740.	-0.002044	416.6996	2.931E+10	-429.5748	10597.	0.000
16.800	0.0924	378050.	18712.	-0.002015	450.9755	2.931E+10	-427.0646	11090.	0.000
19.200	0.0876	422102.	17690.	-0.001982	483.4347	2.931E+10	-424.2420	11620.	0.000
21.600	0.0829	463705.	16676.	-0.001946	514.0886	2.931E+10	-421.1050	12191.	0.000
24.000	0.0783	502874.	15669.	-0.001906	542.9500	2.931E+10	-417.6519	12805.	0.000
26.400	0.0738	539631.	14671.	-0.001864	570.0331	2.931E+10	-413.8810	13468.	0.000
28.800	0.0693	573995.	13683.	-0.001818	595.3536	2.931E+10	-409.7906	14185.	0.000
31.200	0.0650	605990.	12545.	-0.001770	618.9285	2.931E+10	-538.4140	19872.	0.000
33.600	0.0608	634874.	11261.	-0.001719	640.2113	2.931E+10	-532.0975	20991.	0.000
36.000	0.0568	660684.	9991.6091	-0.001666	659.2287	2.931E+10	-525.3522	22208.	0.000
38.400	0.0528	683458.	8739.3753	-0.001611	676.0090	2.931E+10	-518.1759	23535.	0.000
40.800	0.0490	703236.	7504.8848	-0.001554	690.5824	2.931E+10	-510.5661	24986.	0.000
43.200	0.0454	720063.	6289.1816	-0.001496	702.9809	2.931E+10	-502.5199	26576.	0.000
45.600	0.0419	733984.	5093.3170	-0.001436	713.2385	2.931E+10	-494.0339	28324.	0.000
48.000	0.0385	745049.	3918.3514	-0.001376	721.3911	2.931E+10	-485.1041	30251.	0.000
50.400	0.0353	753308.	2765.3554	-0.001315	727.4764	2.931E+10	-475.7258	32383.	0.000
52.800	0.0322	758815.	1635.4124	-0.001253	731.5342	2.931E+10	-465.8933	34750.	0.000
55.200	0.0292	761627.	529.6208	-0.001190	733.6060	2.931E+10	-455.5997	37389.	0.000
57.600	0.0265	761803.	-550.9027	-0.001128	733.7357	2.931E+10	-444.8366	40344.	0.000
60.000	0.0238	759405.	-1605.0187	-0.001066	731.9688	2.931E+10	-433.5935	43668.	0.000
62.400	0.0213	754498.	-2631.5599	-0.001004	728.3531	2.931E+10	-421.8575	47429.	0.000

64.800	0.0190	747149.	-3629.3241	-0.000942	722.9385	2.931E+10	-409.6126	51708.	0.000
67.200	0.0168	737430.	-4597.0653	-0.000882	715.7770	2.931E+10	-396.8384	56611.	0.000
69.600	0.0148	725413.	-5533.4817	-0.000822	706.9229	2.931E+10	-383.5086	62273.	0.000
72.000	0.0129	711177.	-6437.1997	-0.000763	696.4330	2.931E+10	-369.5898	68870.	0.000
74.400	0.0111	694800.	-7306.7526	-0.000705	684.3664	2.931E+10	-355.0376	76637.	0.000
76.800	0.009494	676368.	-8140.5498	-0.000649	670.7852	2.931E+10	-339.7934	85896.	0.000
79.200	0.008002	655969.	-8936.8344	-0.000595	655.7542	2.931E+10	-323.7772	97104.	0.000
81.600	0.006640	633694.	-9693.6205	-0.000542	639.3417	2.931E+10	-306.8778	110925.	0.000
84.000	0.005401	609642.	-10409.	-0.000491	621.6195	2.931E+10	-288.9358	128382.	0.000
86.400	0.004283	583917.	-11079.	-0.000442	602.6642	2.931E+10	-269.7127	151136.	0.000
88.800	0.003279	556629.	-11701.	-0.000395	582.5576	2.931E+10	-248.8331	182114.	0.000
91.200	0.002385	527899.	-12271.	-0.000351	561.3887	2.931E+10	-225.6588	227086.	0.000
93.600	0.001594	497861.	-12780.	-0.000309	539.2560	2.931E+10	-198.9722	299526.	0.000
96.000	0.000901	466670.	-13218.	-0.000270	516.2733	2.931E+10	-165.9382	441767.	0.000
98.400	0.000300	434515.	-13549.	-0.000233	492.5810	2.931E+10	-110.1097	879724.	0.000
100.800	-0.000215	401720.	-13586.	-0.000198	468.4165	2.931E+10	79.5683	886832.	0.000
103.200	-0.000652	369377.	-13308.	-0.000167	444.5852	2.931E+10	152.3439	560667.	0.000
105.600	-0.001016	337906.	-12911.	-0.000138	421.3963	2.931E+10	178.0971	420561.	0.000
108.000	-0.001314	307455.	-12463.	-0.000112	398.9594	2.931E+10	195.5861	357191.	0.000
110.400	-0.001552	278126.	-11978.	-8.754E-05	377.3491	2.931E+10	208.3536	322285.	0.000
112.800	-0.001734	249993.	-11466.	-6.592E-05	356.6200	2.931E+10	217.9234	301566.	0.000
115.200	-0.001868	223112.	-10935.	-4.655E-05	336.8130	2.931E+10	225.1127	289228.	0.000
117.600	-0.001958	197524.	-10388.	-2.933E-05	317.9588	2.931E+10	230.4187	282466.	0.000
120.000	-0.002009	173259.	-9830.6845	-1.415E-05	300.0804	2.931E+10	234.1708	279778.	0.000
122.400	-0.002026	150342.	-9265.7592	-9.074E-07	283.1938	2.931E+10	236.6003	280316.	0.000
124.800	-0.002013	128784.	-8696.3860	1.052E-05	267.3097	2.931E+10	237.8775	283592.	0.000
127.200	-0.001975	108595.	-8125.1744	2.024E-05	252.4337	2.931E+10	238.1322	289343.	0.000
129.600	-0.001916	89776.	-7554.4563	2.836E-05	238.5672	2.931E+10	237.4663	297454.	0.000
132.000	-0.001839	72323.	-6986.3424	3.499E-05	225.7075	2.931E+10	235.9619	307924.	0.000
134.400	-0.001748	56228.	-6422.7646	4.025E-05	213.8484	2.931E+10	233.6863	320845.	0.000
136.800	-0.001646	41479.	-5865.5060	4.425E-05	202.9805	2.931E+10	230.6958	336393.	0.000
139.200	-0.001536	28057.	-5316.2251	4.710E-05	193.0912	2.931E+10	227.0382	354836.	0.000
141.600	-0.001420	15943.	-4776.4738	4.890E-05	184.1652	2.931E+10	222.7546	376534.	0.000
144.000	-0.001301	5111.8251	-4247.7118	4.976E-05	176.1844	2.931E+10	217.8804	401965.	0.000
146.400	-0.001181	-4464.5424	-3731.3190	4.979E-05	175.7075	2.931E+10	212.4469	431744.	0.000
148.800	-0.001061	-12817.	-3228.6054	4.908E-05	181.8619	2.931E+10	206.4812	466666.	0.000
151.200	-0.000945	-19980.	-2740.8198	4.774E-05	187.1399	2.931E+10	200.0068	507757.	0.000
153.600	-0.000833	-25991.	-2269.1589	4.586E-05	191.5687	2.931E+10	193.0439	556352.	0.000
156.000	-0.000725	-30889.	-1814.7756	4.353E-05	195.1780	2.931E+10	185.6089	614217.	0.000
158.400	-0.000624	-34718.	-1378.7885	4.084E-05	197.9992	2.931E+10	177.7137	683716.	0.000
160.800	-0.000529	-37523.	-962.2945	3.789E-05	200.0657	2.931E+10	169.3647	768090.	0.000
163.200	-0.000442	-39351.	-522.2444	3.474E-05	201.4131	2.931E+10	197.3437	1071642.	0.000
165.600	-0.000362	-40043.	-89.9337	3.149E-05	201.9224	2.931E+10	162.9152	1078750.	0.000
168.000	-0.000291	-39795.	263.4552	2.822E-05	201.7396	2.931E+10	131.5755	1085858.	0.000
170.400	-0.000227	-38789.	545.3926	2.500E-05	200.9984	2.931E+10	103.3723	1092966.	0.000
172.800	-0.000171	-37186.	763.3809	2.189E-05	199.8178	2.931E+10	78.2845	1100074.	0.000
175.200	-0.000122	-35133.	924.8039	1.893E-05	198.3045	2.931E+10	56.2346	1107182.	0.000
177.600	-7.991E-05	-32754.	1036.8055	1.616E-05	196.5522	2.931E+10	37.1001	1114290.	0.000
180.000	-4.435E-05	-30162.	1106.1943	1.358E-05	194.6420	2.931E+10	20.7239	1121398.	0.000
182.400	-1.473E-05	-27450.	1139.3717	1.122E-05	192.6436	2.931E+10	6.9239	1128506.	0.000
184.800	9.509E-06	-24697.	1142.2809	9.087E-06	190.6154	2.931E+10	-4.4996	1135614.	0.000
187.200	2.889E-05	-21970.	1120.3741	7.176E-06	188.6061	2.931E+10	-13.7561	1142722.	0.000
189.600	4.396E-05	-19322.	1078.5958	5.486E-06	186.6549	2.931E+10	-21.0592	1149830.	0.000
192.000	5.522E-05	-16795.	1021.3792	4.008E-06	184.7929	2.931E+10	-26.6214	1156938.	0.000
194.400	6.319E-05	-14421.	952.6539	2.730E-06	183.0436	2.931E+10	-30.6497	1164046.	0.000
196.800	6.833E-05	-12223.	875.8631	1.639E-06	181.4243	2.931E+10	-33.3426	1171155.	0.000
199.200	7.106E-05	-10217.	793.9878	7.206E-07	179.9463	2.931E+10	-34.8868	1178263.	0.000
201.600	7.179E-05	-8412.3638	709.7275	-4.205E-08	178.6163	2.931E+10	-35.3301	1181176.	0.000
204.000	7.086E-05	-6810.6961	625.4830	-6.652E-07	177.4362	2.931E+10	-34.8737	1181176.	0.000
206.400	6.859E-05	-5409.7964	543.1242	-1.165E-06	176.4039	2.931E+10	-33.7587	1181176.	0.000
208.800	6.526E-05	-4203.2638	464.0692	-1.559E-06	175.5149	2.931E+10	-32.1205	1181176.	0.000
211.200	6.111E-05	-3181.6807	389.4336	-1.861E-06	174.7622	2.931E+10	-30.0758	1181176.	0.000
213.600	5.633E-05	-2333.2857	320.0744	-2.087E-06	174.1371	2.931E+10	-27.7235	1181176.	0.000
216.000	5.109E-05	-1644.5424	256.6315	-2.250E-06	173.6296	2.931E+10	-25.1456	1181176.	0.000
218.400	4.553E-05	-1100.6123	199.5665	-2.362E-06	173.2288	2.931E+10	-22.4086	1181176.	0.000
220.800	3.975E-05	-685.7388	149.1980	-2.435E-06	172.9231	2.931E+10	-19.5652	1181176.	0.000
223.200	3.384E-05	-383.5500	105.7333	-2.479E-06	172.7005	2.931E+10	-16.6554	1181176.	0.000
225.600	2.785E-05	-177.2907	69.2965	-2.502E-06	172.5485	2.931E+10	-13.7086	1181176.	0.000
228.000	2.183E-05	-49.9901	39.9526	-2.511E-06	172.4547	2.931E+10	-10.7446	1181176.	0.000
230.400	1.580E-05	15.4221	17.7280	-2.513E-06	172.4292	2.931E+10	-7.7758	1181176.	0.000
232.800	9.770E-06	36.0453	2.6268	-2.511E-06	172.4444	2.931E+10	-4.8085	1181176.	0.000
235.200	3.748E-06	28.9709	-5.3570	-2.508E-06	172.4392	2.931E+10	-1.8447	1181176.	0.000
237.600	-2.268E-06	11.2705	-6.2311	-2.506E-06	172.4262	2.931E+10	1.1163	1181176.	0.000
240.000	-8.282E-06	0.000	0.000	-2.506E-06	172.4179	2.931E+10	4.0763	590588.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.1275446 inches
Computed slope at pile head	=	-0.0021290 radians
Maximum bending moment	=	761803. inch-lbs
Maximum shear force	=	26000. lbs
Depth of maximum bending moment	=	57.6000000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	19
Number of zero deflection points	=	3

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 26000.	M = 0.000	78000.	0.12754462	761803.	26000.	0.00000000

Summary of Warning Messages

The following warning was reported 1818 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil defined using the soft clay criteria. The input value is greater than 8.68 psi (1,250 psf). You should check your input data for correctness.

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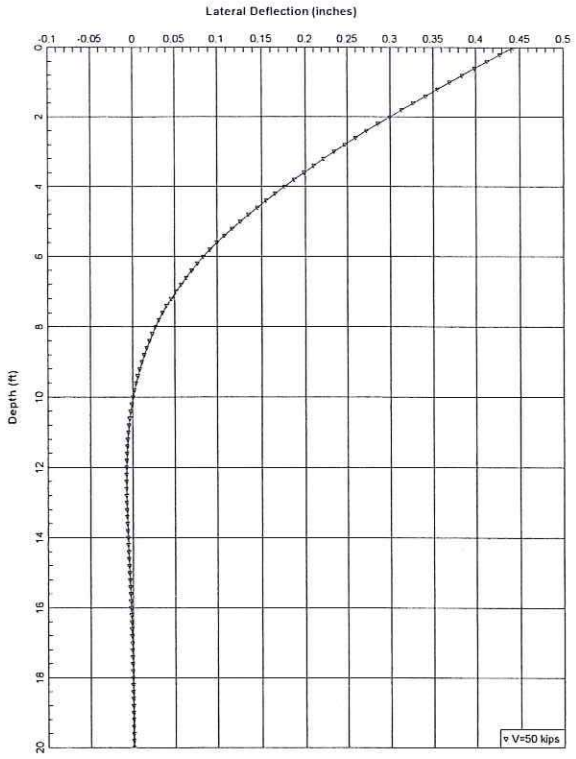
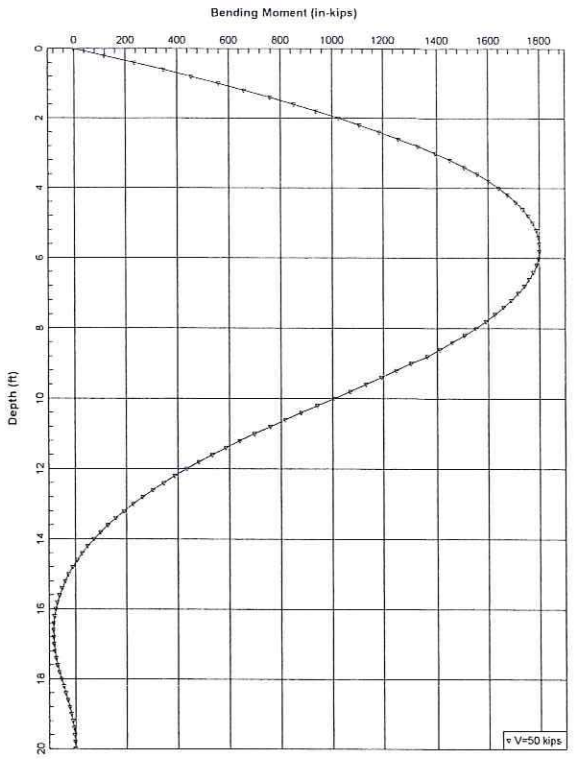
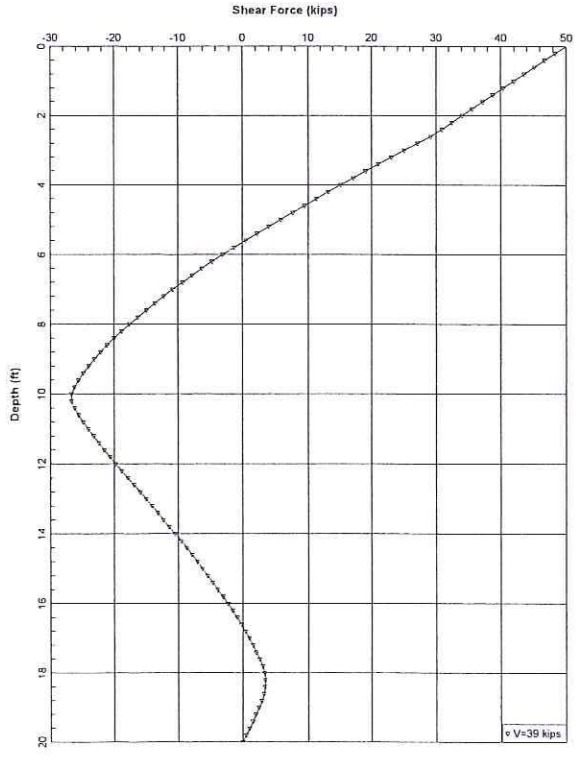


I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free



I-880 Operational and Safety Improvements - RW 232 - 24" CIDH - Free

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================================================================================

                LPile Plus for Windows, Version 6.0 (6.0.09)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

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================================================================================

This program is licensed to:


--------------------------------------------------------------------------------
                            Files Used for Analysis
--------------------------------------------------------------------------------


Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880 North Safety & Operational Improvements at 23rd & 29th Ave\Report\FR\RW\Analyses\LPILE\7SWP\Design H = 6 ft\For Reinforcement\
Name of input data file:     24-in CIDH at RW 232.lp6d
Name of output file:         24-in CIDH at RW 232.lp6o
Name of plot output file:    24-in CIDH at RW 232.lp6p
Name of runtime file:        24-in CIDH at RW 232.lp6r

--------------------------------------------------------------------------------
                          Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  January 6, 2012     Time:  13:31:57

--------------------------------------------------------------------------------
                               Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - RW 232

Job Number: 10-133

Client: RBF

Engineer: GJG

Description: 24-in CIDH piles at RW 232


--------------------------------------------------------------------------------
                               Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                    =          100
- Maximum number of iterations allowed         =          300
- Deflection tolerance for convergence         =   1.0000E-05  in
- Maximum allowable deflection                 =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1

--------------------------------------------------------------------------------
                     Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Total Number of Sections                       =         1

Total Pile Length                              =      20.00 ft

Depth of ground surface below top of pile      =      -5.00 ft

Slope angle of ground surface                  =       0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.
```


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Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	20.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	20.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 inA4
Moment of Inertia at Bottom	=	1.629E+04 inA4
Elastic Modulus	=	1800000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	-5.000 ft
Distance from top of pile to bottom of layer	=	0.100 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	0.100 ft
Distance from top of pile to bottom of layer	=	2.500 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	2.500 ft
Distance from top of pile to bottom of layer	=	22.500 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	22.500 ft
Distance from top of pile to bottom of layer	=	47.500 ft

(Depth of lowest layer extends 27.50 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-5.00	115.00000
2	0.10	115.00000
3	0.10	52.00000
4	2.50	52.00000
5	2.50	52.00000
6	22.50	52.00000
7	22.50	52.00000
8	47.50	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-5.000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		0.10000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	0.10000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--

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3	Soft Clay	2.500	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		2.500	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		22.500	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
4	Soft Clay	22.500	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--
		47.500	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--

---

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-5.000	0.7700	1.0000
2	34.000	0.7700	1.0000

Loading Type

---

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 50000.000 lbs	M = 0.000 in-lbs	124000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 50000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 124000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.4428	1.130E-06	50000.	-0.006104	274.1002	2.931E+10	-662.9978	1796.8665	0.000
?.400	0.4281	119907.	48408.	-0.006099	362.4512	2.931E+10	-664.0343	3722.5171	0.000
4.800	0.4135	235987.	46814.	-0.006085	447.9818	2.931E+10	-664.2683	3855.5496	0.000
7.200	0.3989	348234.	45219.	-0.006061	530.6889	2.931E+10	-664.1573	3995.7981	0.000
9.600	0.3844	456647.	43626.	-0.006028	610.5710	2.931E+10	-663.6987	4143.7783	0.000
12.000	0.3700	561227.	42034.	-0.005986	687.6280	2.931E+10	-662.8896	4300.0529	0.000
14.400	0.3557	661974.	40445.	-0.005936	761.8616	2.931E+10	-661.7275	4465.2370	0.000
16.800	0.3415	758894.	38858.	-0.005878	833.2749	2.931E+10	-660.2098	4640.0038	0.000
19.200	0.3275	851993.	37276.	-0.005812	901.8725	2.931E+10	-658.3341	4825.0912	0.000
21.600	0.3136	941278.	35699.	-0.005738	967.6607	2.931E+10	-656.0978	5021.3092	0.000
24.000	0.2999	1026762.	34127.	-0.005658	1030.6475	2.931E+10	-653.4987	5229.5484	0.000
26.400	0.2864	1108456.	32562.	-0.005571	1090.8424	2.931E+10	-650.5346	5450.7893	0.000
28.800	0.2732	1186377.	31005.	-0.005477	1148.2564	2.931E+10	-647.2032	5686.1135	0.000
31.200	0.2601	1260540.	29203.	-0.005376	1202.9022	2.931E+10	-854.6832	7884.9898	0.000
33.600	0.2474	1329750.	27158.	-0.005270	1253.8981	2.931E+10	-849.2287	8239.4283	0.000
36.000	0.2348	1394036.	25127.	-0.005159	1301.2658	2.931E+10	-843.2804	8617.8344	0.000
38.400	0.2226	1453431.	23111.	-0.005042	1345.0295	2.931E+10	-836.8358	9022.3799	0.000
40.800	0.2106	1507970.	21111.	-0.004921	1385.2155	2.931E+10	-829.8923	9455.4911	0.000
43.200	0.1990	1557692.	19128.	-0.004796	1421.8522	2.931E+10	-822.4471	9919.8861	0.000
45.600	0.1876	1602639.	17164.	-0.004666	1454.9704	2.931E+10	-814.4972	10419.	0.000
48.000	0.1766	1642856.	15219.	-0.004533	1484.6030	2.931E+10	-806.0396	10955.	0.000
50.400	0.1653	1678389.	13295.	-0.004397	1510.7852	2.931E+10	-797.0709	11533.	0.000
52.800	0.1555	1709291.	11394.	-0.004259	1533.5543	2.931E+10	-787.5874	12158.	0.000
55.200	0.1454	1735614.	9515.5805	-0.004118	1552.9502	2.931E+10	-777.5851	12833.	0.000
57.600	0.1357	1757417.	7662.0071	-0.003975	1569.0147	2.931E+10	-767.0594	13565.	0.000
60.000	0.1263	1774758.	5834.3292	-0.003830	1581.7921	2.931E+10	-756.0054	14361.	0.000
62.400	0.1173	1787701.	4033.8219	-0.003684	1591.3292	2.931E+10	-744.4174	15228.	0.000

64.800	0.1087	1796313.	2261.7746	-0.003538	1597.6747	2.931E+10	-732.2687	16174.	0.000
67.200	0.1003	1800663.	519.4940	-0.003390	1600.8800	2.931E+10	-719.6118	17211.	0.000
69.600	0.0924	1800825.	-1191.6939	-0.003243	1600.9989	2.931E+10	-706.3781	18350.	0.000
72.000	0.0848	1796873.	-2870.4402	-0.003096	1598.0875	2.931E+10	-692.5772	19606.	0.000
74.400	0.0775	1788889.	-4515.3692	-0.002949	1592.2044	2.931E+10	-678.1970	20995.	0.000
76.800	0.0706	1776955.	-6125.0731	-0.002803	1583.4109	2.931E+10	-663.2230	22538.	0.000
79.200	0.0641	1761157.	-7698.1063	-0.002658	1571.7707	2.931E+10	-647.6380	24259.	0.000
81.600	0.0579	1741586.	-9232.9772	-0.002515	1557.3502	2.931E+10	-631.4210	26188.	0.000
84.000	0.0520	1718335.	-10728.	-0.002373	1540.2185	2.931E+10	-614.5465	28363.	0.000
86.400	0.0465	1691503.	-12182.	-0.002233	1520.4479	2.931E+10	-596.9830	30829.	0.000
88.800	0.0413	1661191.	-13593.	-0.002096	1498.1132	2.931E+10	-578.6914	33644.	0.000
91.200	0.0364	1627506.	-14959.	-0.001962	1473.2926	2.931E+10	-559.6225	36885.	0.000
93.600	0.0319	1590557.	-16278.	-0.001830	1446.0677	2.931E+10	-539.7135	40650.	0.000
96.000	0.0276	1550461.	-17548.	-0.001701	1416.5236	2.931E+10	-518.8831	45073.	0.000
98.400	0.0237	1507338.	-18767.	-0.001576	1384.7495	2.931E+10	-497.0244	50335.	0.000
100.800	0.0201	1461315.	-19933.	-0.001455	1350.8388	2.931E+10	-473.9931	56699.	0.000
103.200	0.0167	1412527.	-21041.	-0.001337	1314.8903	2.931E+10	-449.5899	64549.	0.000
105.600	0.0136	1361115.	-22089.	-0.001223	1277.0083	2.931E+10	-423.5298	74488.	0.000
108.000	0.0108	1307230.	-23071.	-0.001114	1237.3043	2.931E+10	-395.3864	87511.	0.000
110.400	0.008298	1251036.	-23983.	-0.001010	1195.8988	2.931E+10	-364.4842	105420.	0.000
112.800	0.005998	1192711.	-24816.	-0.000909	1152.9239	2.931E+10	-329.6562	131908.	0.000
115.200	0.003932	1132459.	-25558.	-0.000814	1108.5285	2.931E+10	-288.6021	176139.	0.000
117.600	0.002089	1070517.	-26187.	-0.000724	1062.8879	2.931E+10	-235.5642	270588.	0.000
120.000	0.000457	1007193.	-26685.	-0.000639	1016.2283	2.931E+10	-179.5607	943697.	0.000
122.400	-0.000978	942809.	-26678.	-0.000559	968.7885	2.931E+10	185.5471	455267.	0.000
124.800	-0.002228	879471.	-26160.	-0.000485	922.1194	2.931E+10	246.0172	265048.	0.000
127.200	-0.003304	817529.	-25526.	-0.000415	876.4785	2.931E+10	282.6764	205308.	0.000
129.600	-0.004221	757195.	-24816.	-0.000351	832.0227	2.931E+10	308.9693	175696.	0.000
132.000	-0.004988	698622.	-24050.	-0.000291	788.8646	2.931E+10	329.0563	158332.	0.000
134.400	-0.005618	641927.	-23241.	-0.000236	747.0905	2.931E+10	344.8556	147324.	0.000
136.800	-0.006122	587204.	-22399.	-0.000186	706.7685	2.931E+10	357.4335	140128.	0.000
139.200	-0.006510	534524.	-21529.	-0.000140	667.9530	2.931E+10	367.4539	135459.	0.000
141.600	-0.006794	483949.	-20637.	-9.832E-05	630.6874	2.931E+10	375.3621	132600.	0.000
144.000	-0.006982	435523.	-19729.	-6.068E-05	595.0062	2.931E+10	381.4743	131123.	0.000
146.400	-0.007085	389285.	-18808.	-2.692E-05	560.9362	2.931E+10	386.0248	130761.	0.000
148.800	-0.007112	345260.	-17878.	3.149E-06	528.4975	2.931E+10	389.1926	131345.	0.000
151.200	-0.007070	303469.	-16942.	2.970E-05	497.7045	2.931E+10	391.1188	132769.	0.000
153.600	-0.006969	263923.	-16002.	5.293E-05	468.5659	2.931E+10	391.9167	134970.	0.000
156.000	-0.006816	226628.	-15062.	7.301E-05	441.0860	2.931E+10	391.6796	137916.	0.000
158.400	-0.006618	191583.	-14123.	9.013E-05	415.2643	2.931E+10	390.4851	141598.	0.000
160.800	-0.006383	158784.	-13188.	0.000104	391.0964	2.931E+10	388.3990	146030.	0.000
163.200	-0.006117	128217.	-12260.	0.000116	368.5742	2.931E+10	385.4778	151242.	0.000
165.600	-0.005825	99868.	-11339.	0.000126	347.6856	2.931E+10	381.7703	157283.	0.000
168.000	-0.005514	73715.	-10428.	0.000133	328.4155	2.931E+10	377.3190	164220.	0.000
170.400	-0.005189	49734.	-9528.7323	0.000138	310.7455	2.931E+10	372.1615	172141.	0.000
172.800	-0.004853	27895.	-8642.5417	0.000141	294.6541	2.931E+10	366.3307	181154.	0.000
175.200	-0.004512	8165.8374	-7771.1180	0.000142	280.1170	2.931E+10	359.8556	191395.	0.000
177.600	-0.004170	-9490.9306	-6915.9774	0.000142	281.0934	2.931E+10	352.7615	203032.	0.000
180.000	-0.003829	-25116.	-6078.5799	0.000141	292.6060	2.931E+10	345.0698	216272.	0.000
182.400	-0.003494	-38752.	-5260.3381	0.000138	302.6537	2.931E+10	336.7984	231371.	0.000
184.800	-0.003166	-50447.	-4462.6274	0.000135	311.2713	2.931E+10	327.9605	248650.	0.000
187.200	-0.002847	-60253.	-3686.7972	0.000130	318.4961	2.931E+10	318.5647	268515.	0.000
189.600	-0.002541	-68222.	-2934.1842	0.000125	324.3678	2.931E+10	308.6129	291486.	0.000
192.000	-0.002248	-74411.	-2206.1301	0.000119	328.9284	2.931E+10	298.0989	318241.	0.000
194.400	-0.001970	-78882.	-1504.0049	0.000113	332.2225	2.931E+10	287.0054	349687.	0.000
196.800	-0.001707	-81697.	-829.2392	0.000106	334.2972	2.931E+10	275.2994	387065.	0.000
199.200	-0.001460	-82925.	-183.3698	9.942E-05	335.2019	2.931E+10	262.9251	432133.	0.000
201.600	-0.001230	-82637.	430.8313	9.264E-05	334.9893	2.931E+10	248.9092	485760.	0.000
204.000	-0.001016	-80912.	1009.7538	8.595E-05	333.7188	2.931E+10	233.5262	551870.	0.000
206.400	-0.000817	-77841.	1550.6408	7.945E-05	331.4557	2.931E+10	217.2130	637885.	0.000
208.800	-0.000634	-73517.	2050.8296	7.325E-05	328.2694	2.931E+10	199.6110	755358.	0.000
211.200	-0.000466	-68041.	2565.3662	6.746E-05	324.2345	2.931E+10	229.1696	1181176.	0.000
213.600	-0.000310	-61243.	3023.7073	6.216E-05	319.2258	2.931E+10	152.7813	1181176.	0.000
216.000	-0.000167	-53564.	3305.8233	5.746E-05	313.5676	2.931E+10	82.3153	1181176.	0.000
218.400	-3.460E-05	-45409.	3425.0367	5.341E-05	307.5591	2.931E+10	17.0292	1181176.	0.000
220.800	8.913E-05	-37156.	3392.8327	5.003E-05	301.4775	2.931E+10	-43.8658	1181176.	0.000
223.200	0.000206	-29154.	3218.7925	4.732E-05	295.5813	2.931E+10	-101.1677	1181176.	0.000
225.600	0.000316	-21734.	2910.6107	4.524E-05	290.1141	2.931E+10	-155.6504	1181176.	0.000
228.000	0.000423	-15210.	2474.1925	4.372E-05	285.3070	2.931E+10	-208.0314	1181176.	0.000
230.400	0.000526	-9883.4190	1999.4942	4.270E-05	281.3826	2.931E+10	-187.5506	855522.	0.000
232.800	0.000628	-5637.3647	1535.7412	4.206E-05	278.2540	2.931E+10	-198.9103	760606.	0.000
235.200	0.000728	-2536.8963	1046.2531	4.173E-05	275.9694	2.931E+10	-208.9965	688970.	0.000
237.600	0.000828	-640.1858	533.6780	4.160E-05	274.5719	2.931E+10	-218.1494	632373.	0.000
240.000	0.000928	0.000	0.000	4.157E-05	274.1002	2.931E+10	-226.5823	293091.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      0.4427693 inches
Computed slope at pile head      =     -0.0061041 radians
Maximum bending moment           =      1800825. inch-lbs
Maximum shear force              =        50000. lbs
Depth of maximum bending moment  =     69.6000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             23
Number of zero deflection points =              2
```

Summary of Pile Response(s)

C-19

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 50000.	M = 0.000	124000.	0.44276930	1800825.	50000.	0.00000000

Summary of Warning Messages

The following warning was reported 2222 times

"*** Warning ***

An unreasonable input value for shear strength has been specified for a soil defined using the soft clay criteria. The input value is greater than 8.68 psi (1,250 psf). You should check your input data for correctness.

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

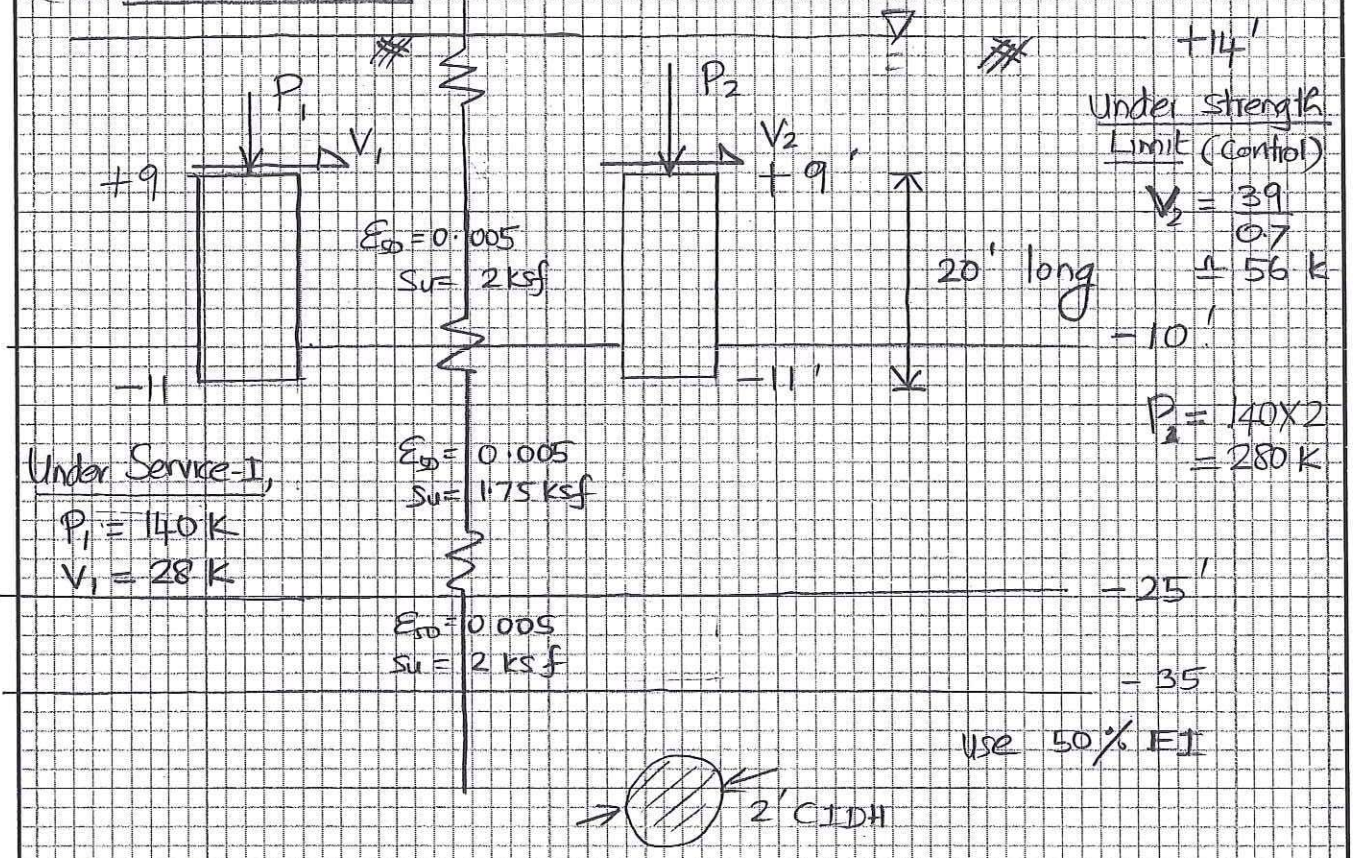
Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 5/21/12 Checked By Lino Date 5/24/12 Sheet 1 of 1

SW 232 ON RW TYPE 7SWBP (UTILITY CORRIDOR) - LATERAL PILE ANALYSIS

(A) FOR DEFLECTION

(B) FOR SIZING REINFORCEMENT



Under Service-I,
P_1 = 140 K
V_1 = 28 K

Under Strength Limit (Control)
$V_2 = \frac{39}{07} \pm 56$ K
P_2 = 140 X 2 = 280 K

Use 50% EI

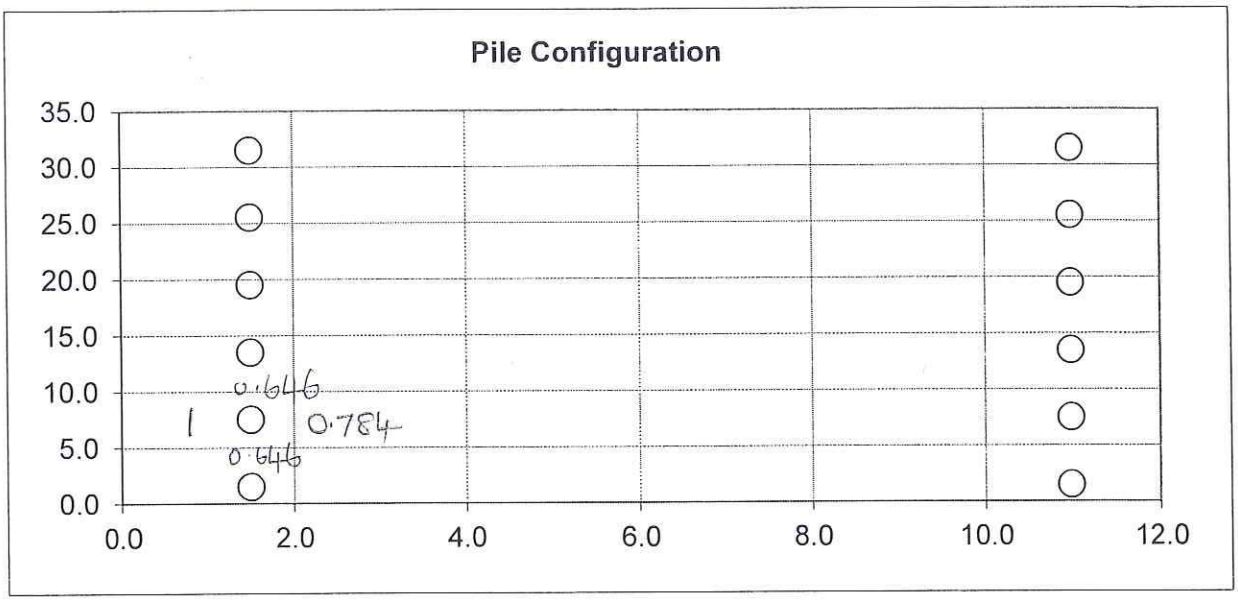
From Group 7.0, group reduction factor $\eta_{avg} = 0.77$

From deflection anlayses,
Pile head deflection $\pm$ 0.17" $\leq$ 0.25"
$\Rightarrow$ Pile tip EI. for lateral load will not control //

For sizing reinforcement, (using 20" long pile from deflection analyses and using controlling V = 56 k)
Pile head deflection $\pm$ 0.67"
Mmax = 182 k-ft
Max. Shear = 56 K @ pile head

Project: I-880 Operational and Safety Improvements
By: Ranjan 5/21/2012 (SW 232 Utility Corridor)

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



Pile Dia.: 2.000
No. of Piles: 12

Group Efficiency	X-Dir (Trans)	Y-Dir (Long)
	0.784	0.646

Pile No.	X (Transverse)	Y (Longitudinal)
1	1.500	1.50
2	11.000	1.50
3	1.500	7.50
4	11.000	7.50
5	1.500	13.50
6	11.000	13.50
7	1.500	19.50
8	11.000	19.50
9	1.500	25.50
10	11.000	25.50
11	1.500	31.50
12	11.000	31.50

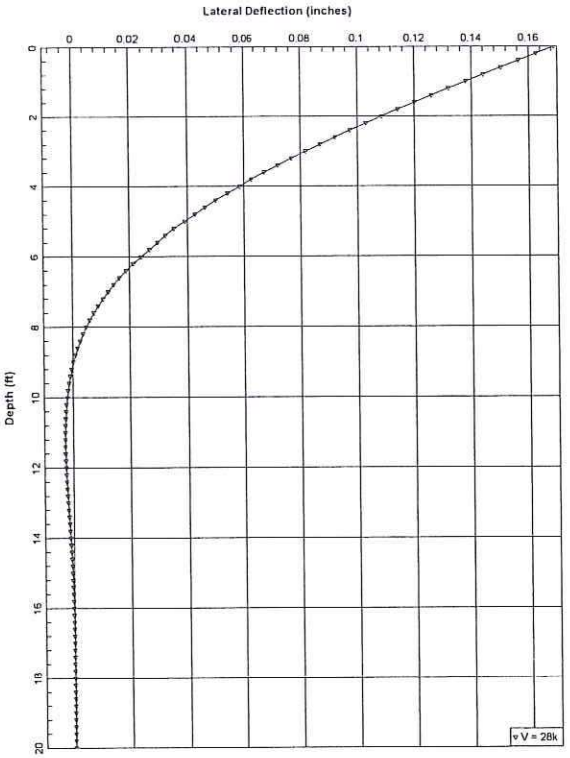
Reduction Factors in X-dir	Reduction Factors in Y-dir
0.764	0.677
0.930	0.677
0.673	0.630
0.865	0.630
0.673	0.630
0.865	0.630
0.673	0.630
0.865	0.630
0.673	0.665
0.865	0.665
0.764	0.931
0.930	0.931

Since loading is only in X-dir (transverse),

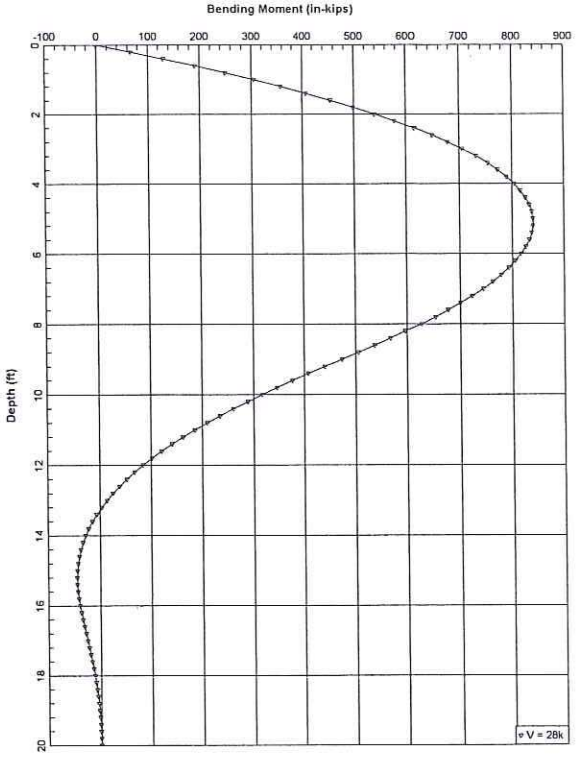
$$\eta_{avg} = \frac{1 + (2 \times 0.646) + 0.784}{4}$$

$$= 0.77$$

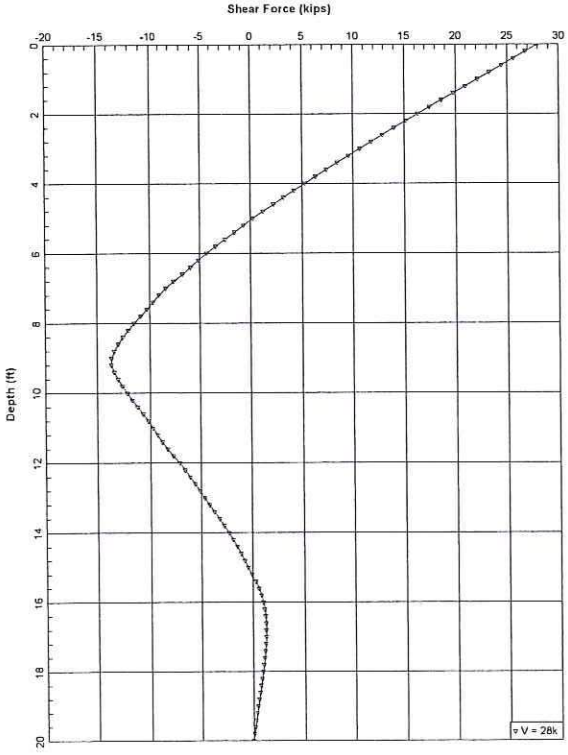
FOR DEFLECTION



I880 - SW 232 on Type 7SWBP (Utility Corridor)



I880 - SW 232 on Type 7SWBP (Utility Corridor)



I880 - SW 232 on Type 7SWBP (Utility Corridor)

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

Files Used for Analysis

Path to file locations: X:\Projects\2010\10-133 - RBF, I-880 North Safety & Operational Improvements at 23rd & 29th Ave\Report\FR\RW\Analyses\LPILE\7SWP\Utility Corridor\For Deflection\
Name of input data file: 24-in CIDH at RW 232.lp6d
Name of output file: 24-in CIDH at RW 232.lp6o
Name of plot output file: 24-in CIDH at RW 232.lp6p
Name of runtime file: 24-in CIDH at RW 232.lp6r

Date and Time of Analysis

Date: June 21, 2012 Time: 13:00:38

Problem Title

Project Name: I-880 Operational and Safety Improvements - RW 232

Job Number: 10-133

Client: RBF

Engineer: GJG

Description: 24-in CIDH piles at RW 232

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:

- Number of pile increments	=	100	
- Maximum number of iterations allowed	=	300	
- Deflection tolerance for convergence	=	1.0000E-05	in
- Maximum allowable deflection	=	100.0000	in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 20.00 ft

Depth of ground surface below top of pile = -5.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	20.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	20.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 in^4
Moment of Inertia at Bottom	=	1.629E+04 in^4
Elastic Modulus	=	1800000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -5.000 ft
Distance from top of pile to bottom of layer = 19.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 19.000 ft
Distance from top of pile to bottom of layer = 34.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 34.000 ft
Distance from top of pile to bottom of layer = 44.000 ft

(Depth of lowest layer extends 24.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-5.00	152.00000
2	19.00	52.00000
3	19.00	52.00000

4	34.00	52.00000
5	34.00	52.00000
6	44.00	52.00000

**** Warning - POSSIBLE INPUT DATA ERROR ****

Values entered for effective unit weights of soil were outside
the limits of 0.011574 pci (20 pcf) or 0.0810019 pci (140 pcf)
This data may be erroneous. Please check your data.

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-5.000	152.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		19.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	19.000	52.000	1750.000	--	--	--	0.00500	--	--	--	--	--	--
		34.000	52.000	1750.000	--	--	--	0.00500	--	--	--	--	--	--
3	Soft Clay	34.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		44.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-5.000	0.7700	1.0000
2	34.000	0.7700	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 28000.000 lbs	M = 0.000 in-lbs	140000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	28000.000 lbs
Applied moment at pile head	=	0.000 in-lbs
Axial thrust load on pile head	=	140000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1690	4.238E-06	28000.	-0.002594	309.4679	2.931E+10	-487.9713	3465.2076	0.000
2.400	0.1628	66666.	26828.	-0.002591	358.5894	2.931E+10	-488.5071	7203.3648	0.000
4.800	0.1565	130517.	25656.	-0.002583	405.6363	2.931E+10	-488.7206	7492.4552	0.000
7.200	0.1504	191548.	24483.	-0.002570	450.6062	2.931E+10	-488.6102	7798.9320	0.000
9.600	0.1442	249761.	23311.	-0.002552	493.4986	2.931E+10	-488.1740	8124.1649	0.000
12.000	0.1381	305154.	22140.	-0.002529	534.3141	2.931E+10	-487.4104	8469.6625	0.000
14.400	0.1321	357732.	20971.	-0.002502	573.0547	2.931E+10	-486.3179	8837.0898	0.000
16.800	0.1261	407498.	19806.	-0.002470	609.7241	2.931E+10	-484.8948	9228.2875	0.000
19.200	0.1202	454460.	18644.	-0.002435	644.3273	2.931E+10	-483.1396	9645.2954	0.000
21.600	0.1144	498627.	17487.	-0.002396	676.8707	2.931E+10	-481.0508	10090.	0.000
24.000	0.1087	540010.	16336.	-0.002354	707.3624	2.931E+10	-478.6269	10566.	0.000
26.400	0.1031	578620.	15190.	-0.002308	735.8118	2.931E+10	-475.8665	11075.	0.000
28.800	0.0976	614474.	14052.	-0.002259	762.2298	2.931E+10	-472.7682	11621.	0.000
31.200	0.0923	647588.	12921.	-0.002207	786.6289	2.931E+10	-469.3304	12207.	0.000
33.600	0.0870	677980.	11800.	-0.002153	809.0229	2.931E+10	-465.5516	12836.	0.000
36.000	0.0819	705672.	10687.	-0.002096	829.4274	2.931E+10	-461.4302	13515.	0.000
38.400	0.0770	730687.	9585.1192	-0.002038	847.8592	2.931E+10	-456.9648	14246.	0.000
40.800	0.0722	753050.	8494.1775	-0.001977	864.3367	2.931E+10	-452.1533	15038.	0.000
43.200	0.0675	772788.	7415.2006	-0.001914	878.8800	2.931E+10	-446.9941	15895.	0.000
45.600	0.0630	789930.	6349.0258	-0.001850	891.5105	2.931E+10	-441.4849	16825.	0.000
48.000	0.0586	804507.	5296.4957	-0.001785	902.2513	2.931E+10	-435.6235	17838.	0.000
50.400	0.0544	816552.	4258.4588	-0.001719	911.1270	2.931E+10	-429.4073	18942.	0.000
52.800	0.0504	826102.	3235.7703	-0.001652	918.1636	2.931E+10	-422.8332	20151.	0.000
55.200	0.0465	833194.	2229.2932	-0.001584	923.3889	2.931E+10	-415.8977	21476.	0.000
57.600	0.0428	837867.	1239.8996	-0.001515	926.8322	2.931E+10	-408.5969	22934.	0.000
60.000	0.0392	840164.	268.4722	-0.001447	928.5244	2.931E+10	-400.9260	24543.	0.000
62.400	0.0358	840128.	-684.0939	-0.001378	928.4980	2.931E+10	-392.8791	26326.	0.000
64.800	0.0326	837806.	-1616.8882	-0.001309	926.7871	2.931E+10	-384.4495	28310.	0.000
67.200	0.0295	833246.	-2528.9821	-0.001241	923.4276	2.931E+10	-375.6288	30526.	0.000
69.600	0.0266	826500.	-3419.4248	-0.001173	918.4570	2.931E+10	-366.4068	33013.	0.000
72.000	0.0239	817621.	-4287.2382	-0.001105	911.9145	2.931E+10	-356.7710	35821.	0.000
74.400	0.0213	806665.	-5131.4105	-0.001039	903.8413	2.931E+10	-346.7059	39008.	0.000
76.800	0.0189	793689.	-5950.8877	-0.000973	894.2803	2.931E+10	-336.1918	42653.	0.000
79.200	0.0167	778754.	-6744.5626	-0.000909	883.2763	2.931E+10	-325.2039	46851.	0.000
81.600	0.0146	761926.	-7511.2596	-0.000846	870.8764	2.931E+10	-313.7103	51733.	0.000
84.000	0.0126	743269.	-8249.7155	-0.000784	857.1296	2.931E+10	-301.6696	57469.	0.000
86.400	0.0108	722854.	-8958.5508	-0.000724	842.0874	2.931E+10	-289.0266	64295.	0.000
88.800	0.009121	700755.	-9636.2311	-0.000666	825.8038	2.931E+10	-275.7070	72544.	0.000
91.200	0.007592	677048.	-10281.	-0.000610	808.3360	2.931E+10	-261.6077	82704.	0.000
93.600	0.006195	651815.	-10891.	-0.000555	789.7441	2.931E+10	-246.5815	95528.	0.000
96.000	0.004926	625145.	-11463.	-0.000503	770.0924	2.931E+10	-230.4085	112249.	0.000
98.400	0.003781	597130.	-11995.	-0.000453	749.4503	2.931E+10	-212.7429	135053.	0.000
100.800	0.002752	567873.	-12482.	-0.000405	727.8931	2.931E+10	-192.9955	168299.	0.000
103.200	0.001835	537489.	-12918.	-0.000360	705.5053	2.931E+10	-170.0343	222350.	0.000
105.600	0.001024	506111.	-13291.	-0.000317	682.3849	2.931E+10	-141.1760	330857.	0.000
108.000	0.000312	473906.	-13572.	-0.000277	658.6552	2.931E+10	-93.3366	717343.	0.000
110.400	-0.000306	441150.	-13574.	-0.000240	634.5196	2.931E+10	92.3217	723125.	0.000
112.800	-0.000838	408913.	-13301.	-0.000205	610.7670	2.931E+10	135.0891	386700.	0.000
115.200	-0.001290	377444.	-12950.	-0.000173	587.5794	2.931E+10	157.2369	292518.	0.000
117.600	-0.001668	346870.	-12554.	-0.000143	565.0516	2.931E+10	172.6459	248477.	0.000
120.000	-0.001977	317281.	-12126.	-0.000116	543.2494	2.931E+10	184.1537	223567.	0.000
122.400	-0.002224	288743.	-11673.	-9.110E-05	522.2223	2.931E+10	193.0067	208290.	0.000
124.800	-0.002414	261310.	-11202.	-6.858E-05	502.0086	2.931E+10	199.8798	198708.	0.000
127.200	-0.002553	235021.	-10716.	-4.826E-05	482.6378	2.931E+10	205.1861	192884.	0.000
129.600	-0.002646	209907.	-10219.	-3.005E-05	464.1332	2.931E+10	209.2000	189764.	0.000
132.000	-0.002697	185992.	-9712.9329	-1.384E-05	446.5121	2.931E+10	212.1145	188734.	0.000
134.400	-0.002712	163294.	-9201.5092	4.554E-07	429.7875	2.931E+10	214.0719	189426.	0.000
136.800	-0.002695	141824.	-8686.4064	1.295E-05	413.9682	2.931E+10	215.1805	191618.	0.000
139.200	-0.002650	121590.	-8169.5596	2.373E-05	399.0592	2.931E+10	215.5252	195184.	0.000
141.600	-0.002581	102595.	-7652.7202	3.291E-05	385.0625	2.931E+10	215.1743	200067.	0.000
144.000	-0.002492	84835.	-7137.4904	4.058E-05	371.9770	2.931E+10	214.1838	206262.	0.000
146.400	-0.002386	68307.	-6625.3493	4.685E-05	359.7987	2.931E+10	212.6004	213807.	0.000
148.800	-0.002267	53002.	-6117.6726	5.181E-05	348.5214	2.931E+10	210.4636	222780.	0.000
151.200	-0.002138	38908.	-5615.7477	5.557E-05	338.1362	2.931E+10	207.8072	233300.	0.000
153.600	-0.002001	26009.	-5120.7862	5.823E-05	328.6323	2.931E+10	204.6607	245525.	0.000
156.000	-0.001858	14289.	-4633.9337	5.988E-05	319.9963	2.931E+10	201.0498	259665.	0.000
158.400	-0.001713	3726.0668	-4156.2773	6.062E-05	312.2134	2.931E+10	196.9972	275984.	0.000
160.800	-0.001567	-5702.0661	-3688.8531	6.054E-05	313.6694	2.931E+10	192.5230	294816.	0.000
163.200	-0.001423	-14021.	-3232.6518	5.973E-05	319.7991	2.931E+10	187.6448	316581.	0.000
165.600	-0.001281	-21259.	-2788.6242	5.829E-05	325.1321	2.931E+10	182.3782	341809.	0.000
168.000	-0.001143	-27446.	-2357.6866	5.629E-05	329.6907	2.931E+10	176.7365	371178.	0.000
170.400	-0.001010	-32614.	-1940.7260	5.383E-05	333.4986	2.931E+10	170.7307	405554.	0.000
172.800	-0.000884	-36797.	-1538.6064	5.099E-05	336.5813	2.931E+10	164.3690	446071.	0.000
175.200	-0.000766	-40033.	-1152.1759	4.785E-05	338.9656	2.931E+10	157.6564	494229.	0.000
177.600	-0.000655	-42360.	-783.2037	4.448E-05	340.6799	2.931E+10	149.8204	549224.	0.000
180.000	-0.000552	-43823.	-433.5613	4.095E-05	341.7576	2.931E+10	141.5483	615309.	0.000
182.400	-0.000458	-44469.	-62.7628	3.733E-05	342.2336	2.931E+10	167.4504	877205.	0.000
184.800	-0.000373	-44149.	301.7356	3.371E-05	341.9981	2.931E+10	136.2983	877205.	0.000
187.200	-0.000296	-43043.	595.2737	3.014E-05	341.1832	2.931E+10	108.3168	877205.	0.000
189.600	-0.000228	-41312.	825.3657	2.668E-05	339.9076	2.931E+10	83.4265	877205.	0.000
192.000	-0.000168	-39099.	999.2812	2.339E-05	338.2772	2.931E+10	61.5031	877205.	0.000
194.400	-0.000116	-36531.	1123.9501	2.030E-05	336.3850	2.931E+10	42.3877	877205.	0.000
196.800	-7.085E-05	-33718.	1205.8902	1.742E-05	334.3121	2.931E+10	25.8957	877205.	0.000
199.200	-3.235E-05	-30754.	1251.1555	1.478E-05	332.1287	2.931E+10	11.8253	877205.	0.000
201.600	9.967E-08	-27722.	1265.3021	1.239E-05	329.8944	2.931E+10	-0.0364	877205.	0.000
204.000	2.711E-05	-24689.	1253.3697	1.024E-05	327.6597	2.931E+10	-9.9073	877205.	0.000

206.400	4.926E-05	-21713.	1219.8750	8.342E-06	325.4666	2.931E+10	-18.0050	877205.	0.000
208.800	6.715E-05	-18839.	1168.8169	6.682E-06	323.3494	2.931E+10	-24.5434	877205.	0.000
211.200	8.134E-05	-16107.	1103.6902	5.252E-06	321.3360	2.931E+10	-29.7288	877205.	0.000
213.600	9.236E-05	-13545.	1027.5067	4.038E-06	319.4485	2.931E+10	-33.7575	877205.	0.000
216.000	0.000101	-11178.	942.8217	3.026E-06	317.7040	2.931E+10	-36.8133	877205.	0.000
218.400	0.000107	-9021.7781	851.7659	2.199E-06	316.1154	2.931E+10	-39.0665	877205.	0.000
220.800	0.000111	-7090.6662	756.0801	1.540E-06	314.6925	2.931E+10	-40.6717	877205.	0.000
223.200	0.000114	-5393.6282	657.1528	1.029E-06	313.4421	2.931E+10	-41.7677	877205.	0.000
225.600	0.000116	-3937.0238	556.0600	6.467E-07	312.3689	2.931E+10	-42.4763	877205.	0.000
228.000	0.000117	-2724.9749	456.8233	3.740E-07	311.4758	2.931E+10	-40.2209	822380.	0.000
230.400	0.000118	-1744.5231	363.2693	1.910E-07	310.7534	2.931E+10	-37.7409	767555.	0.000
232.800	0.000118	-981.4108	272.5810	7.943E-08	310.1911	2.931E+10	-37.8327	767555.	0.000
235.200	0.000118	-436.1878	181.7464	2.140E-08	309.7893	2.931E+10	-37.8628	767555.	0.000
237.600	0.000118	-109.0427	90.8723	-9.209E-10	309.5483	2.931E+10	-37.8655	767555.	0.000
240.000	0.000118	0.000	0.000	-5.385E-09	309.4679	2.931E+10	-37.8614	383777.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.1689843 inches
Computed slope at pile head	=	-0.0025936 radians
Maximum bending moment	=	840164. inch-lbs
Maximum shear force	=	28000. lbs
Depth of maximum bending moment	=	60.0000000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	20
Number of zero deflection points	=	2

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 28000.	M = 0.000	140000.	0.16898427	840164.	28000.	0.00000000

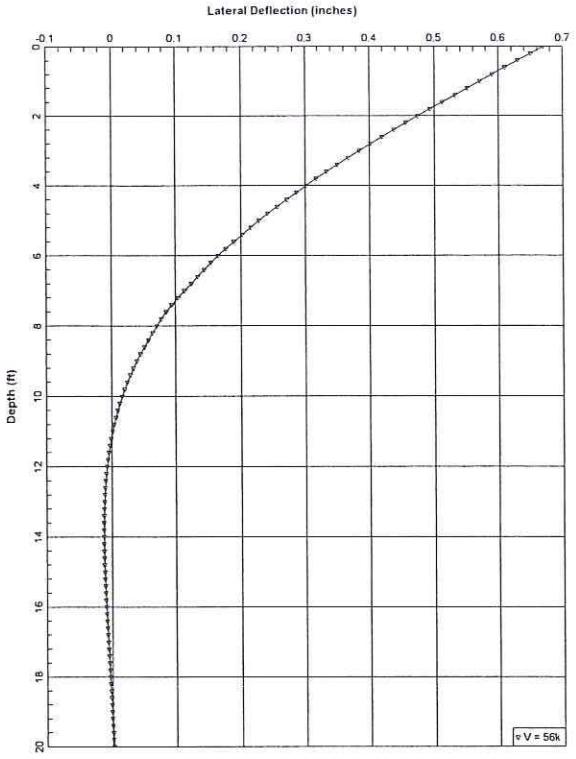
Summary of Warning Messages

The following warning was reported 1900 times

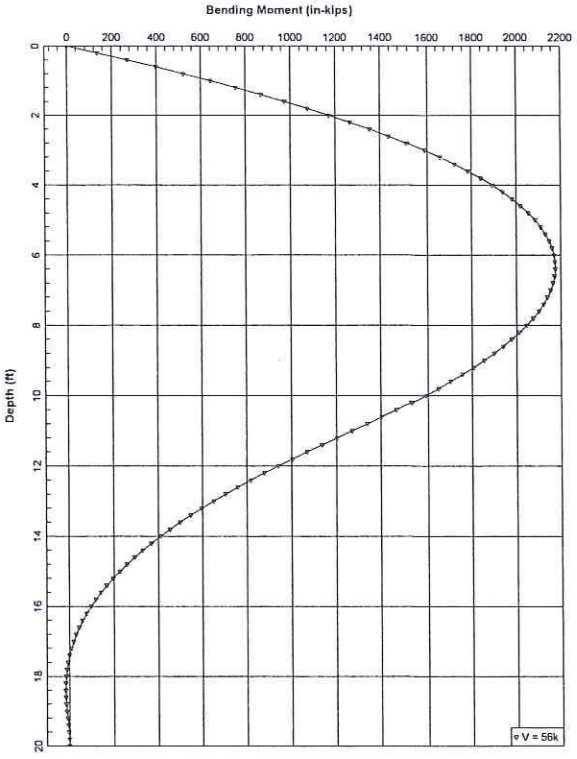
**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68
psi (1,250 psf). You should check your input data for correctness.

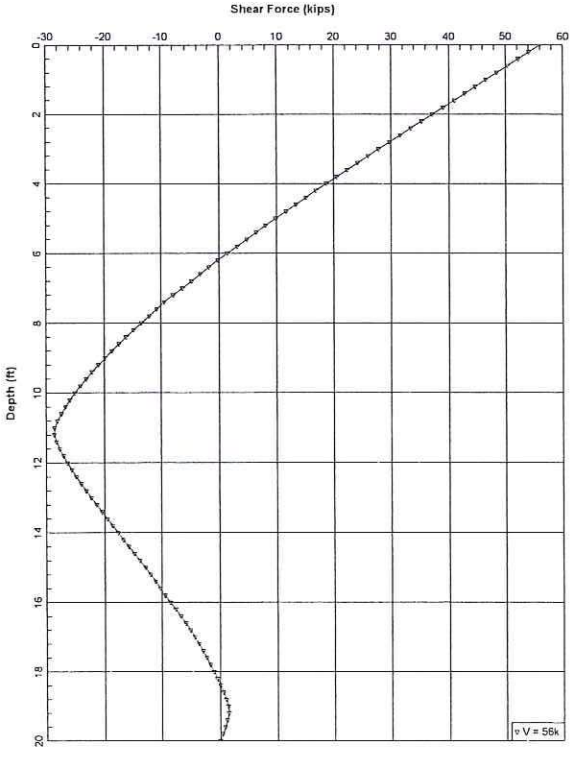
FOR SIZING REINFORCEMENT



I880 - SW 232 on Type 7SWBP (Utility Corridor)



I880 - SW 232 on Type 7SWBP (Utility Corridor)



I880 - SW 232 on Type 7SWBP (Utility Corridor)

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================================================================================

                LPile Plus for Windows, Version 6.0 (6.0.09)

              Analysis of Individual Piles and Drilled Shafts
            Subjected to Lateral Loading Using the p-y Method

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================================================================================

This program is licensed to:


--------------------------------------------------------------------------------
                            Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880 North Safety & Operational Improvements at 23rd & 29th Ave\Report\FR\RW\Analyses\LPILE\7SWP\Utility Corridor\For Reinforcement\
Name of input data file:     24-in CIDH at RW 232.lp6d
Name of output file:         24-in CIDH at RW 232.lp6o
Name of plot output file:    24-in CIDH at RW 232.lp6p
Name of runtime file:        24-in CIDH at RW 232.lp6r

--------------------------------------------------------------------------------
                          Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  June 21, 2012     Time:  13:07:56

--------------------------------------------------------------------------------
                               Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - RW 232

Job Number: 10-133

Client: RBF

Engineer: GJG

Description: 24-in CIDH piles at RW 232


--------------------------------------------------------------------------------
                               Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =         100
- Maximum number of iterations allowed               =         300
- Deflection tolerance for convergence               =  1.0000E-05  in
- Maximum allowable deflection                       =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1

--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
```

Total Number of Sections = 1

Total Pile Length = 20.00 ft

Depth of ground surface below top of pile = -5.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	20.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	20.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 in^4
Moment of Inertia at Bottom	=	1.629E+04 in^4
Elastic Modulus	=	1800000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -5.000 ft
Distance from top of pile to bottom of layer = 19.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 19.000 ft
Distance from top of pile to bottom of layer = 34.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 34.000 ft
Distance from top of pile to bottom of layer = 44.000 ft

(Depth of lowest layer extends 24.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf

1	-5.00	152.00000
2	19.00	52.00000
3	19.00	52.00000
4	34.00	52.00000
5	34.00	52.00000
6	44.00	52.00000

**** Warning - POSSIBLE INPUT DATA ERROR ****

Values entered for effective unit weights of soil were outside
the limits of 0.011574 pci (20 pcf) or 0.0810019 pci (140 pcf)
This data may be erroneous. Please check your data.

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-5.000	152.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		19.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	19.000	52.000	1750.000	--	--	--	0.00500	--	--	--	--	--	--
		34.000	52.000	1750.000	--	--	--	0.00500	--	--	--	--	--	--
3	Soft Clay	34.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		44.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-5.000	0.7700	1.0000
2	34.000	0.7700	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 56000.000 lbs	M = 0.000 in-lbs	280000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 56000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 280000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.6704	-1.582E-05	56000.	-0.008309	618.9359	2.931E+10	-772.4654	1382.6867	0.000
2.400	0.6505	137759.	54143.	-0.008303	720.4405	2.931E+10	-775.2063	2860.2637	0.000
4.800	0.6305	271045.	52279.	-0.008286	818.6494	2.931E+10	-777.5684	2959.5875	0.000
7.200	0.6107	399837.	50411.	-0.008259	913.5473	2.931E+10	-779.5492	3063.6236	0.000
9.600	0.5909	524117.	48538.	-0.008221	1005.1204	2.931E+10	-781.1460	3172.6725	0.000
12.000	0.5712	643869.	46662.	-0.008173	1093.3570	2.931E+10	-782.3564	3287.0589	0.000
14.400	0.5517	759079.	44783.	-0.008116	1178.2471	2.931E+10	-783.1778	3407.1342	0.000
16.800	0.5323	869737.	42903.	-0.008049	1259.7825	2.931E+10	-783.6079	3533.2785	0.000
19.200	0.5130	975832.	41022.	-0.007974	1337.9569	2.931E+10	-783.6444	3665.9044	0.000
21.600	0.4940	1077361.	39142.	-0.007890	1412.7659	2.931E+10	-783.2851	3805.4596	0.000
24.000	0.4752	1174318.	37263.	-0.007797	1484.2068	2.931E+10	-782.5277	3952.4313	0.000
26.400	0.4566	1266703.	35386.	-0.007698	1552.2790	2.931E+10	-781.3700	4107.3497	0.000
28.800	0.4382	1354518.	33513.	-0.007590	1616.9835	2.931E+10	-779.8100	4270.7936	0.000
31.200	0.4201	1437767.	31644.	-0.007476	1678.3236	2.931E+10	-777.8455	4443.3951	0.000
33.600	0.4023	1516456.	29780.	-0.007355	1736.3041	2.931E+10	-775.4745	4625.8459	0.000
36.000	0.3848	1590595.	27922.	-0.007228	1790.9319	2.931E+10	-772.6950	4818.9048	0.000
38.400	0.3676	1660196.	26071.	-0.007095	1842.2158	2.931E+10	-769.5047	5023.4049	0.000
40.800	0.3508	1725274.	24229.	-0.006956	1890.1665	2.931E+10	-765.9018	5240.2633	0.000
43.200	0.3343	1785844.	22396.	-0.006812	1934.7967	2.931E+10	-761.8840	5470.4913	0.000
45.600	0.3181	1841928.	20572.	-0.006664	1976.1209	2.931E+10	-757.4493	5715.2066	0.000
48.000	0.3023	1893548.	18760.	-0.006511	2014.1558	2.931E+10	-752.5954	5975.6474	0.000
50.400	0.2868	1940728.	16960.	-0.006354	2048.9198	2.931E+10	-747.3201	6253.1884	0.000
52.800	0.2718	1983498.	15174.	-0.006193	2080.4334	2.931E+10	-741.6210	6549.3598	0.000
55.200	0.2571	2021886.	13401.	-0.006029	2108.7191	2.931E+10	-735.4954	6865.8695	0.000
57.600	0.2428	2055927.	11644.	-0.005863	2133.8013	2.931E+10	-728.9408	7204.6290	0.000
60.000	0.2290	2085656.	9902.7521	-0.005693	2155.7064	2.931E+10	-721.9542	7567.7843	0.000
62.400	0.2155	2111111.	8178.9683	-0.005521	2174.4628	2.931E+10	-714.5324	7957.7518	0.000
64.800	0.2025	2132335.	6473.5231	-0.005347	2190.1012	2.931E+10	-706.6719	8377.2623	0.000
67.200	0.1898	2149371.	4787.4741	-0.005172	2202.6539	2.931E+10	-698.3689	8829.4129	0.000
69.600	0.1776	2162267.	3121.8885	-0.004996	2212.1554	2.931E+10	-689.6191	9317.7294	0.000
72.000	0.1659	2171071.	1477.8445	-0.004818	2218.6425	2.931E+10	-680.4176	9846.2433	0.000
74.400	0.1545	2175836.	-143.5671	-0.004640	2222.1538	2.931E+10	-670.7587	10420.	0.000
76.800	0.1436	2176618.	-1741.2412	-0.004462	2222.7302	2.931E+10	-660.6363	11043.	0.000
79.200	0.1331	2173475.	-3314.0564	-0.004284	2220.4144	2.931E+10	-650.0430	11723.	0.000
81.600	0.1230	2166469.	-4860.8725	-0.004107	2215.2517	2.931E+10	-638.9704	12466.	0.000
84.000	0.1134	2155662.	-6380.5270	-0.003930	2207.2893	2.931E+10	-627.4084	13282.	0.000
86.400	0.1042	2141124.	-7871.8318	-0.003754	2196.5766	2.931E+10	-615.3456	14180.	0.000
88.800	0.0954	2122923.	-9333.5681	-0.003579	2183.1656	2.931E+10	-602.7681	15172.	0.000
91.200	0.0870	2101133.	-10764.	-0.003406	2167.1103	2.931E+10	-589.6595	16272.	0.000
93.600	0.0790	2075831.	-12163.	-0.003235	2148.4672	2.931E+10	-576.0002	17498.	0.000
96.000	0.0714	2047097.	-13529.	-0.003066	2127.2954	2.931E+10	-561.7663	18872.	0.000
98.400	0.0643	2015015.	-14859.	-0.002900	2103.6564	2.931E+10	-546.9288	20420.	0.000
100.800	0.0575	1979672.	-16153.	-0.002737	2077.6144	2.931E+10	-531.4519	22175.	0.000
103.200	0.0511	1941158.	-17409.	-0.002576	2049.2366	2.931E+10	-515.2912	24179.	0.000
105.600	0.0452	1899570.	-18626.	-0.002419	2018.5932	2.931E+10	-498.3906	26490.	0.000
108.000	0.0395	1855007.	-19800.	-0.002265	1985.7576	2.931E+10	-480.6786	29179.	0.000
110.400	0.0343	1807572.	-20932.	-0.002115	1950.8067	2.931E+10	-462.0622	32349.	0.000
112.800	0.0294	1757377.	-22017.	-0.001969	1913.8214	2.931E+10	-442.4186	36138.	0.000
115.200	0.0248	1704537.	-23054.	-0.001828	1874.8872	2.931E+10	-421.5809	40752.	0.000
117.600	0.0206	1649175.	-24039.	-0.001690	1834.0947	2.931E+10	-399.3156	46502.	0.000
120.000	0.0167	1591422.	-24969.	-0.001558	1791.5406	2.931E+10	-375.2835	53887.	0.000
122.400	0.0131	1531419.	-25838.	-0.001430	1747.3292	2.931E+10	-348.9649	63777.	0.000
124.800	0.009851	1469323.	-26640.	-0.001307	1701.5747	2.931E+10	-319.5047	77844.	0.000
127.200	0.006858	1405305.	-27366.	-0.001189	1654.4046	2.931E+10	-285.3358	99856.	0.000
129.600	0.004141	1339566.	-28000.	-0.001077	1605.9666	2.931E+10	-243.0252	140837.	0.000
132.000	0.001688	1272354.	-28509.	-0.000970	1556.4428	2.931E+10	-181.6353	258241.	0.000
134.400	-0.000515	1204026.	-28580.	-0.000869	1506.0965	2.931E+10	122.6756	571394.	0.000
136.800	-0.002482	1136338.	-28182.	-0.000773	1456.2221	2.931E+10	209.2291	202315.	0.000
139.200	-0.004225	1069793.	-27629.	-0.000683	1407.1896	2.931E+10	251.7079	142965.	0.000
141.600	-0.005759	1004638.	-26989.	-0.000598	1359.1820	2.931E+10	281.1013	117151.	0.000
144.000	-0.007095	941048.	-26288.	-0.000518	1312.3268	2.931E+10	303.5033	102670.	0.000
146.400	-0.008246	879154.	-25538.	-0.000444	1266.7215	2.931E+10	321.3604	93537.	0.000
148.800	-0.009224	819062.	-24749.	-0.000374	1222.4444	2.931E+10	335.9358	87409.	0.000
151.200	-0.0100	760861.	-23928.	-0.000309	1179.5599	2.931E+10	347.9789	83173.	0.000
153.600	-0.0107	704622.	-23081.	-0.000249	1138.1214	2.931E+10	357.9757	80227.	0.000
156.000	-0.0112	650406.	-22212.	-0.000194	1098.1737	2.931E+10	366.2621	78218.	0.000
158.400	-0.0116	598264.	-21325.	-0.000143	1059.7541	2.931E+10	373.0809	76925.	0.000
160.800	-0.0119	548238.	-20423.	-9.589E-05	1022.8936	2.931E+10	378.6145	76207.	0.000
163.200	-0.0121	500363.	-19509.	-5.296E-05	987.6177	2.931E+10	383.0030	75967.	0.000
165.600	-0.0122	454667.	-18586.	-1.387E-05	953.9472	2.931E+10	386.3572	76142.	0.000
168.000	-0.0122	411170.	-17656.	2.157E-05	921.8979	2.931E+10	388.7655	76688.	0.000
170.400	-0.0121	369891.	-16721.	5.355E-05	891.4819	2.931E+10	390.2997	77579.	0.000
172.800	-0.0119	330839.	-15783.	8.223E-05	862.7074	2.931E+10	391.0185	78797.	0.000
175.200	-0.0117	294021.	-14845.	0.000108	835.5791	2.931E+10	390.9697	80338.	0.000
177.600	-0.0114	259439.	-13910.	0.000130	810.0981	2.931E+10	388.1901	81781.	0.000
180.000	-0.0111	227079.	-12983.	0.000150	786.2542	2.931E+10	384.3060	83443.	0.000
182.400	-0.0107	196920.	-12066.	0.000168	764.0321	2.931E+10	379.8129	85429.	0.000
184.800	-0.0102	168938.	-11160.	0.000183	743.4140	2.931E+10	374.7398	87758.	0.000

187.200	-0.009793	143105.	-10268.	0.000195	724.3795	2.931E+10	369.1089	90456.	0.000
189.600	-0.009310	119390.	-9389.2792	0.000206	706.9057	2.931E+10	362.9356	93560.	0.000
192.000	-0.008803	97759.	-8526.2823	0.000215	690.9675	2.931E+10	356.2286	97116.	0.000
194.400	-0.008277	78175.	-7680.0209	0.000222	676.5371	2.931E+10	348.9892	101188.	0.000
196.800	-0.007736	60596.	-6851.7810	0.000228	663.5848	2.931E+10	341.2107	105854.	0.000
199.200	-0.007183	44980.	-6042.8765	0.000232	652.0781	2.931E+10	332.8764	111221.	0.000
201.600	-0.006621	31278.	-5254.6746	0.000235	641.9824	2.931E+10	323.9585	117429.	0.000
204.000	-0.006053	19441.	-4488.6276	0.000238	633.2604	2.931E+10	314.4140	124667.	0.000
206.400	-0.005481	9413.3618	-3746.3132	0.000239	625.8719	2.931E+10	304.1814	133196.	0.000
208.800	-0.004907	1137.5843	-3029.4882	0.000239	619.7741	2.931E+10	293.1728	143387.	0.000
211.200	-0.004333	-5449.5807	-2340.1642	0.000239	622.9513	2.931E+10	281.2640	155787.	0.000
213.600	-0.003760	-10416.	-1680.7156	0.000238	626.6110	2.931E+10	268.2765	171236.	0.000
216.000	-0.003189	-13837.	-1054.0472	0.000237	629.1316	2.931E+10	253.9471	191107.	0.000
218.400	-0.002621	-15795.	-463.8669	0.000236	630.5739	2.931E+10	237.8698	217816.	0.000
220.800	-0.002056	-16381.	84.8260	0.000235	631.0060	2.931E+10	219.3743	256096.	0.000
223.200	-0.001494	-15703.	584.7514	0.000233	630.5064	2.931E+10	197.2302	316839.	0.000
225.600	-0.000935	-13888.	1023.8913	0.000232	629.1691	2.931E+10	168.7198	432989.	0.000
228.000	-0.000379	-11101.	1382.2473	0.000231	627.1151	2.931E+10	129.9102	822380.	0.000
230.400	0.000175	-7564.1709	1471.0707	0.000230	624.5094	2.931E+10	-55.8908	767555.	0.000
232.800	0.000727	-4349.2380	1241.1164	0.000230	622.1405	2.931E+10	-135.7378	448005.	0.000
235.200	0.001279	-1915.9157	881.6202	0.000230	620.3476	2.931E+10	-163.8424	307516.	0.000
237.600	0.001830	-426.2201	463.4471	0.000230	619.2499	2.931E+10	-184.6352	242162.	0.000
240.000	0.002381	0.000	0.000	0.000230	618.9359	2.931E+10	-201.5707	101592.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =      0.6704039 inches
Computed slope at pile head       =     -0.0083088 radians
Maximum bending moment            =      2176618. inch-lbs
Maximum shear force               =        56000. lbs
Depth of maximum bending moment   =     76.8000000 inches below pile head
Depth of maximum shear force      =      0.000000 inches below pile head
Number of iterations              =             26
Number of zero deflection points  =              2
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

```
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians
```

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 56000.	M = 0.000	280000.	0.67040386	2176618.	56000.	0.00000000

Summary of Warning Messages

The following warning was reported 2500 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68
psi (1,250 psf). You should check your input data for correctness.

WICK DRAIN DESIGN CALCULATION AND MEMORANDUM

PREPARED BY HAYWARD BAKER, INC.

Hayward Baker, Inc.
by R. Robert Goughnour
6/19/2012
Summary of analysis of consolidation using PV drains at 29th Street Off-ramp:

Design Goal

A 30-day construction period was anticipated, and it was required that primary settlement after surcharge removal be 1 inch or less.

Design Methodology

There are, of course, many combinations of design parameters (drain spacing, surcharge loading, construction and application times, etc.) that could be considered for design. Based on experience, initial trial drain spacing was taken as 3-foot triangular. For analysis, this 300-foot long embankment was divided into 10 segments of 30 feet length each. Loading on each of these segments was considered to be uniform but time dependent, with abrupt change in magnitude at adjacent segments. Unit weight of the embankment material was taken 0.125 kips/ft^3. The design or final height of the lowest section was taken as 1.5 ft and the highest section was 15 feet. The initial trial included the following surcharge (in addition to the final embankment height):

Embankment section	Surcharge height	
Hi end to 0.9	5.0 feet	No drains required under this section
0.9 to 0.8	5.0 feet	No drains required under this section
0.8 to 0.7	4.5 feet	
0.7 to 0.6	4.0 feet	
0.6 to 0.5	3.5 feet	
0.5 to 0.4	3.0 feet	
0.4 to 0.3	2.5 feet	
0.3 to 0.2	2.0 feet	
0.2 to 0.1	1.5 feet	
0.1 to low end	1.0 feet	

Calculations were accomplished by means of the computer program PVDrain. This program was originally written about 15 years ago, and has undergone several updates and modifications. It has been applied on many and varied PV Drain projects, with excellent results.

Sample Computer Program Output

Sample output for the "0.9" point - i.e. the center of the embankment at 30 feet from the high end, is attached. In general, the output contains a problem summary as well as calculation results. A brief explanation of the output is included at the beginning of the attachment.

Results and Recommendations

The initial series of computer runs produced the following:

Point along embankment centerline	Long-term settlement	Settlement remaining for 30 day removal	
Low end	0.7 inches	0.2 inches	
0.1 point	1.6	0.6	Settlement remaining
0.2 point	2.4	1.0	for 45 day removal
0.3 point	3.0	1.2	1.0
0.4 point	3.6	1.1	1.0
0.5 point	4.5	1.1	0.9
0.6 point	5.4	0.9	
0.7 point	6.2	0.9	
0.8 point	6.9	0.8	Settlement remaining
0.9 point	7.5	0.9	for 60 day removal
High end	4.0	1.4	1.0

Sections 0.3, 0.4, 0.5 and High end require additional surcharge time to reduce remaining settlement to 1 inch or less. The 30-day requirement can be preserved by increasing the surcharge height to:

0.2 to 0.3	2.5 feet
0.3 to 0.4	3.0 feet
0.4 to 0.5	3.5 feet

Settlements remaining then change to:

Point along embankment centerline	Settlement remaining (30 days)
0.3 point	0.9 inches
0.4 point	0.9
0.5 point	0.8

To meet the settlement requirement at the high end of the embankment, the surcharge on the 0.9 to high end section would have to be increased to 8 feet (3 feet additional). Alternatively, adding 3 feet of surcharge outside of the wall footprint beyond the high end (i.e. 30 feet X 50 feet) would produce the required 1.0 inch of settlement remaining.

Vertical drain treatment is usually installed for some distance outside the wall footprint. An old rule-of-thumb is to carry treatment outside the footprint a distance equal to 1/2 of the depth of compressible soil. This would amount to 15 to 17.5 feet. Another rule-of-thumb for footings is to include the 0.2q stress bulb. This would be about 1/2 the embankment width or 17.5 feet. These rules were intended for rigid structures. Actually MSE walls are very tolerant to differential settlement. Also settlements indicated above were considered along the embankment centerline and settlements along the face of

the wall will be significantly less. It is the writers opinion that 10 to 12 feet outside the wall footprint would be sufficient.

This analysis has established a set of design parameters to meet the given construction and performance requirements. Computer output covering each situation has been preserved and is available.

ATTACHMENT

Sample Output from Computer Program, PV Drain

Explanation of Computer Output:

1. "Program provided by Hayward Baker, Version 1.05.01, August31, 2010," this is the most recent version.

2. Title to indicate project, date, and time of computer run. Units are feet, kips, and days. Unit weight of water was taken as .0624 kips/ft^3. Equivalent drain diameter taken as 0.23 ft, and spacing was 3-foot, triangular. N = equivalent spacing/equivalent drain diameter = 13.70.

3. Surcharge loading (considered in10 time-dependent segments) follows. A = length (30 ft) of segment, B = width (50 ft) of segment. A1 and B1 define the location of the point considered for analysis, relative to this loaded area or segment. A1 = location relative to A-dimension, zero indicates that point is on this boundary. B1 = location relative to B-dimension, 25 feet indicates center of 50-foot wide embankment. Final loading under surcharge conditions for this segment is 2.5 kips/ft^2, (15 ft final height + 5 ft surcharge = 20 ft high. 20 X 0.125 = 2.5 ksf).This load is applied linearly with respect to time over 30 days. A negative number for A1 or B1 indicates that point considered lies outside of the segment area.

Loading number 2 is also 30 feet long and 50 feet wide (as are all segments). The location being considered is at the "0.9" point or 30 feet from the high end of embankment, i.e. between segments 1 and 2. Therefore, relative to area 2, the point is centered on the embankment, and on the boundary with area 1. The final surcharge loading is 2.313 kips/ft^2, also linearly applied but completed in 27 days.

Loading number 3, same outside dimensions, but located one segment away from the location under consideration. Therefore, A1 = 25 ft, and B1 = -30 ft (i.e. 30 feet outside of section 3). Final surcharge loading is 2.063 kips/ft^2, applied linearly over 24 days. Etc. for remaining areas.

4. Final loading is also considered in 10 segments. Area dimensions and point location are identical to that for surcharge loading. For area 1 the final loading magnitude is 1.875 kips/ft^2. That is at the end of the surcharge period the 5-foot surcharge is removed leaving 15 feet, or 15 X 0.125 = 1.875 ksf. The remaining 9 sections follow.

5. Westergaard stress distribution used,
   water table 10 feet deep,
   Delta H for calculations = 4 ft,
   soil compression considered from ground surface to bottom of soil profile, 37.5 feet,
   outfall for drains is 10 feet above static GWT, i.e. a back pressure head of 10 feet of water applied to drains,
   no horizontal drainage was considered.

6. Summary of soil profile and parameters, and secondary settlement parameters.

7. Long-term settlement results; long-term settlement under surcharge conditions (0.784 ft) and under final loading conditions (0.621 ft).

8. Buoyancy effect of soil as it settles below water not considered,
equivalent radius of drain = 0.115 ft,
Delta t for computations = 2.0 days.

9. The following items concern the effect of drain flow capacity, which is considered to change with compression. The important item here is the R-value = 174.01. An R-value of 2 or 3 or less indicates that drain flow capacity will have virtually no effect on results, so expect no effect here.

10. Division of number of vertical increments for each soil for numerical calculation of consolidation with vertical drainage,
calculations terminated after 28 days - results will extend to 30 days,
convergence requirements,
both vertical and horizontal drainage considered,
small strain definition,
m_v changes with compression considered.

11. Table showing degree of consolidation based on surcharge load as a function of time.

12. Total flow rate from drain as a function of time.

13. Table showing primary settlement under surcharge load as a function of time.

14. Table showing degree of consolidation based on design loading as a function of time. Note that a degree of consolidation of 1 or greater here indicates that no settlement will occur at that element after surcharge removal.

15. Table showing primary settlement remaining under design load when surcharge is removed at times indicated up to 30 days. Indicates that total settlement remaining for surcharge removal at 30 days is 0.072 ft (0.86 inches).

16. Table showing expected secondary settlement as a function of time. Indicates that the expected 100-year secondary settlement would be about 0.03 ft.

17. Remainder of output assumes that surcharge load is applied instantaneously and that drainage elements have unlimited flow capacity.

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*************************************************
*                                               *
*       TIME-SETTLEMENT ANALYSIS OF SOIL        *
*          CONTAINING VERTICAL DRAINS           *
*                   COURTESY                    *
*                HB WICK DRAINS                 *
*   VERSION 1.05.1          AUGUST 31, 2010     *
*                                               *
*************************************************

Off ramp - 0.9 point - 3 ft spacing - variable surcharge

DATE: 12-25-2011
TIME: 16:33

UNITS: FEET-KIPS-DAYS
UNIT WEIGHT OF WATER =0.0624 KIPS/FT CUBED

VERTICAL DRAIN COMPUTATIONS:
(SMALL STRAIN OPTION)

 VERTICAL DRAIN DIAMETER = 0.2300 FEET/METERS.
 VERTICAL DRAIN SPACING (TRIANGULAR) =  3.0000 FEET/METERS.
 N = 13.70.

 SURCHARGE LOADING NUMBER  1:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =    0.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
           0.0                 0.000
          30.0                 2.500

 SURCHARGE LOADING NUMBER  2:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =    0.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
           0.0                 0.000
          27.0                 2.313

 SURCHARGE LOADING NUMBER  3:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =  -30.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
           0.0                 0.000
          24.0                 2.063

 SURCHARGE LOADING NUMBER  4:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =  -60.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
           0.0                 0.000
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         21.0                1.813

SURCHARGE LOADING NUMBER  5:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =    30.00 FEET/METERS, B =    50.00 FEET/METERS,
A1 =  -90.00 FEET/METERS, AND B1 =    25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
         18.0                 1.563

SURCHARGE LOADING NUMBER  6:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =    30.00 FEET/METERS, B =    50.00 FEET/METERS,
A1 = -120.00 FEET/METERS, AND B1 =    25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
         15.0                 1.313

SURCHARGE LOADING NUMBER  7:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =    30.00 FEET/METERS, B =    50.00 FEET/METERS,
A1 = -150.00 FEET/METERS, AND B1 =    25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
         12.0                 1.063

SURCHARGE LOADING NUMBER  8:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =    30.00 FEET/METERS, B =    50.00 FEET/METERS,
A1 = -180.00 FEET/METERS, AND B1 =    25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
          9.0                 0.813

SURCHARGE LOADING NUMBER  9:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =    30.00 FEET/METERS, B =    50.00 FEET/METERS,
A1 = -210.00 FEET/METERS, AND B1 =    25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
          6.0                 0.563

SURCHARGE LOADING NUMBER 10:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =    30.00 FEET/METERS, B =    50.00 FEET/METERS,
A1 = -240.00 FEET/METERS, AND B1 =    25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
          3.0                 0.313

FINAL LOADING NUMBER  1 =  1.875 KIPS/FT2 OR Mg/m2
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APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = 0.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 2 = 1.688 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = 0.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 3 = 1.500 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -30.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 4 = 1.313 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -60.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 5 = 1.125 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -90.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 6 = 0.938 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -120.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 7 = 0.750 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -150.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 8 = 0.563 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -180.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 9 = 0.375 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -210.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

FINAL LOADING NUMBER 10 = 0.188 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF 0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A = 30.00 FEET/METERS, B = 50.00 FEET/METERS,
A1 = -240.00 FEET/METERS, AND B1 = 25.00 FEET/METERS.

WESTERGAARD STRESS DISTRIBUTION WILL BE USED.

DEPTH TO WATER TABLE = 10.000 FEET/METERS.
DELTA H = 4.0 FEET/METERS.

COMPRESSION WILL BE COMPUTED BETWEEN A DEPTH OF 0.000 FEET/METERS
AND THE BOTTOM OF THE DESCRIBED SOIL PROFILE.

HEIGHT OUTFALL ABOVE STATIC GWT = 10.00 FT OR m

NO WICK EXTENSION OR HORIZONTAL DRAINAGE CONSIDERED.

SOIL INFORMATION:

SOIL NO.	THICKNESS FT	GAMMA TOTAL	CR	RR	OCR	Ch SF/DAY	DIA SMEAR	k(und)/k(rem)	Cv SF/DAY
1	7.50	0.1150	0.190	0.040	5.000	1.80000	1.000	1.000	1.20000
2	5.00	0.1150	0.190	0.040	4.000	1.80000	1.000	1.000	1.20000
3	5.00	0.1150	0.190	0.040	3.000	1.80000	1.000	1.000	1.20000
4	5.00	0.1150	0.190	0.040	2.000	1.80000	1.000	1.000	1.20000
5	5.00	0.1150	0.190	0.040	1.800	1.80000	1.000	1.000	1.20000
6	5.00	0.1150	0.190	0.040	1.600	1.80000	1.000	1.000	1.20000
7	5.00	0.1150	0.190	0.040	1.500	1.80000	1.000	1.000	1.20000

SECONDARY SETTLEMENT STARTS AT 28. DAYS (SURCHARGE REMOVED):

SOIL NO.	C(ALPHA-EPSILON)	A.O.S. MOD.
1	0.001	AVERAGE
2	0.005	AVERAGE
3	0.001	AVERAGE
4	0.001	AVERAGE
5	0.005	AVERAGE
6	0.001	AVERAGE
7	0.001	AVERAGE

LONG TERM RESULTS (EFF STRESSES)					SURCHARGE		DESIGN	
SOIL NO	DEL H FT.	DEPTH FT.	Po KSF	Pm KSF	Pf KSF	DEL S FT.	Pf KSF	DEL S FT.
1	3.75	1.88	0.216	1.078	2.526	0.368	1.926	0.284
1	3.75	5.63	0.647	3.234	2.768	0.095	2.216	0.080
2	2.50	8.75	1.006	4.025	2.974	0.047	2.462	0.039
2	2.50	11.25	1.216	4.863	3.065	0.040	2.584	0.033
3	2.50	13.75	1.347	4.042	3.083	0.036	2.632	0.029
3	2.50	16.25	1.479	4.436	3.107	0.032	2.683	0.026
4	2.50	18.75	1.610	3.220	3.137	0.029	2.739	0.023
4	2.50	21.25	1.742	3.484	3.173	0.026	2.800	0.021
5	2.50	23.75	1.873	3.372	3.216	0.023	2.866	0.018
5	2.50	26.25	2.005	3.609	3.264	0.021	2.935	0.017
6	2.50	28.75	2.136	3.418	3.318	0.019	3.010	0.015
6	2.50	31.25	2.268	3.628	3.378	0.017	3.088	0.013
7	2.50	33.75	2.399	3.599	3.444	0.016	3.171	0.012
7	2.50	36.25	2.531	3.796	3.514	0.014	3.257	0.011
			TOTAL SETTLEMENT =			0.784		0.621

BUOYANCY OF SUBMERGING SOIL NOT CONSIDERED

EQUIVALENT RADIUS OF DRAIN = 0.1150 FEET/METERS.

DELTA T = 2.0 DAYS.

AVERAGE QW (EPSILON=0) = 0.31000E+03 FT3/DAY OR m3/DAY.
QW(TOP)/QW(BOTTOM = 1.0.
QW CUTS OFF AT 25.00 PERCENT.
QMIN = 0.50000E+01 FT3/DAY OR m3/DAY.

DEPTH	WELL RESIS(QW) AT ULT STRAIN	PERM	M SUB V
1.875	0.18822E+03	0.47747E-02	0.42510E-01

5.625	0.27869E+03	0.13374E-02	0.11907E-01
8.750	0.28666E+03	0.10746E-02	0.95677E-02
11.250	0.29008E+03	0.97565E-03	0.86864E-02
13.750	0.29216E+03	0.93052E-03	0.82845E-02
16.250	0.29400E+03	0.88965E-03	0.79207E-02
18.750	0.29563E+03	0.85222E-03	0.75875E-02
21.250	0.29708E+03	0.81762E-03	0.72794E-02
23.750	0.29836E+03	0.78540E-03	0.69925E-02
26.250	0.29950E+03	0.75526E-03	0.67242E-02
28.750	0.30051E+03	0.72695E-03	0.64721E-02
31.250	0.30141E+03	0.70028E-03	0.62347E-02
33.750	0.30221E+03	0.67513E-03	0.60108E-02
36.250	0.30293E+03	0.65136E-03	0.57992E-02

AVERAGE PERMEABILITY = 0.12669E-02 FT/DAY OR m/DAY.
R = 174.01 BASED ON THE AVERAGE VALUES OF
PERMEABILITY AND QW. ALSO BASED ON
THE TOTAL DESCRIBED SOIL DEPTH.
R = QW/(PERM*DEPTH SQUARED.)

FOR VERTICAL CONSOLIDATION:
SOIL NUMBER 1 IS DIVIDED INTO 6 INCREMENTS - 7 NODES.
M(1)= 0.15360
SOIL NUMBER 2 IS DIVIDED INTO 4 INCREMENTS - 5 NODES.
M(2)= 0.15360
SOIL NUMBER 3 IS DIVIDED INTO 4 INCREMENTS - 5 NODES.
M(3)= 0.15360
SOIL NUMBER 4 IS DIVIDED INTO 4 INCREMENTS - 5 NODES.
M(4)= 0.15360
SOIL NUMBER 5 IS DIVIDED INTO 4 INCREMENTS - 5 NODES.
M(5)= 0.15360
SOIL NUMBER 6 IS DIVIDED INTO 4 INCREMENTS - 5 NODES.
M(6)= 0.15360
SOIL NUMBER 7 IS DIVIDED INTO 4 INCREMENTS - 5 NODES.
M(7)= 0.15360

CALCULATIONS WILL BE TERMINATED AT 28. DAYS

REQUIRED CONVERGENCE TO PRODUCE MAX Q OF0.000100
FT3/DAY OR m3/DAY AT BOTTOM OF DRAIN

****
COMBINED RADIAL AND VERTICAL DRAINAGE - SMALL STRAIN
****

****
TOP DRAINED
****

****
Mv CORRECTION APPLIED
****

DEGREE CONSOLIDATION AT ELEMENTS:
(BASED ON SURCHARGE LOAD)

AVG	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	0.774
DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.137	0.253	0.380	0.505	0.626	0.741	0.852	0.000	0.000	0.930
5.625	0.225	0.368	0.464	0.543	0.617	0.691	0.763	0.000	0.000	0.821
8.750	0.095	0.236	0.336	0.424	0.509	0.595	0.684	0.000	0.000	0.751
11.250	0.042	0.169	0.266	0.356	0.443	0.533	0.629	0.000	0.000	0.701
13.750	0.018	0.129	0.220	0.307	0.393	0.484	0.581	0.000	0.000	0.656

16.250	0.003	0.097	0.184	0.267	0.350	0.441	0.539	0.000	0.000	0.614
18.750	0.000	0.066	0.152	0.235	0.318	0.406	0.501	0.000	0.000	0.576
21.250	0.000	0.037	0.118	0.202	0.286	0.376	0.472	0.000	0.000	0.543
23.750	0.000	0.013	0.085	0.168	0.253	0.344	0.441	0.000	0.000	0.514
26.250	0.000	0.002	0.053	0.133	0.219	0.311	0.409	0.000	0.000	0.483
28.750	0.000	0.000	0.024	0.098	0.183	0.277	0.376	0.000	0.000	0.451
31.250	0.000	0.000	0.010	0.064	0.147	0.241	0.342	0.000	0.000	0.417
33.750	0.000	0.000	0.000	0.033	0.110	0.205	0.306	0.000	0.000	0.381
36.250	0.000	0.000	0.000	0.011	0.073	0.167	0.268	0.000	0.000	0.344
FLOW	0.062	0.202	0.218	0.230	0.217	0.196	0.173	0.000	0.000	0.095

INITIAL FLOW = 0.000 FT3/DAY OR m3/DAY TOTAL FLOW = 3.931 FT3 OR m3.

PRIMARY SETTLEMENT AT ELEMENTS UNDER SURCHARGE LOAD:

DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.050	0.093	0.140	0.186	0.231	0.273	0.314	0.000	0.000	0.342
5.625	0.021	0.035	0.044	0.051	0.058	0.065	0.072	0.000	0.000	0.078
8.750	0.004	0.011	0.016	0.020	0.024	0.028	0.032	0.000	0.000	0.035
11.250	0.002	0.007	0.011	0.014	0.018	0.021	0.025	0.000	0.000	0.028
13.750	0.001	0.005	0.008	0.011	0.014	0.017	0.021	0.000	0.000	0.024
16.250	0.000	0.003	0.006	0.009	0.011	0.014	0.017	0.000	0.000	0.020
18.750	0.000	0.002	0.004	0.007	0.009	0.012	0.015	0.000	0.000	0.017
21.250	0.000	0.001	0.003	0.005	0.007	0.010	0.012	0.000	0.000	0.014
23.750	0.000	0.000	0.002	0.004	0.006	0.008	0.010	0.000	0.000	0.012
26.250	0.000	0.000	0.001	0.003	0.005	0.007	0.009	0.000	0.000	0.010
28.750	0.000	0.000	0.000	0.002	0.004	0.005	0.007	0.000	0.000	0.009
31.250	0.000	0.000	0.000	0.001	0.003	0.004	0.006	0.000	0.000	0.007
33.750	0.000	0.000	0.000	0.001	0.002	0.003	0.005	0.000	0.000	0.006
36.250	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.000	0.000	0.005
TOTAL	0.078	0.157	0.235	0.314	0.392	0.471	0.549	0.000	0.000	0.607

DEGREE CONSOLIDATION AT ELEMENTS:
(BASED ON DESIGN LOAD)

DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.177	0.328	0.492	0.654	0.811	0.960	1.103	0.000	0.000	1.204
5.625	0.266	0.434	0.547	0.641	0.728	0.815	0.900	0.000	0.000	0.969
8.750	0.115	0.285	0.407	0.514	0.616	0.721	0.829	0.000	0.000	0.910
11.250	0.051	0.207	0.327	0.436	0.543	0.654	0.771	0.000	0.000	0.860
13.750	0.023	0.159	0.272	0.380	0.487	0.599	0.719	0.000	0.000	0.811
16.250	0.003	0.120	0.230	0.333	0.437	0.550	0.672	0.000	0.000	0.765
18.750	0.000	0.082	0.190	0.295	0.399	0.510	0.629	0.000	0.000	0.723
21.250	0.000	0.046	0.149	0.255	0.361	0.475	0.596	0.000	0.000	0.687
23.750	0.000	0.017	0.108	0.213	0.321	0.437	0.561	0.000	0.000	0.654
26.250	0.000	0.003	0.068	0.170	0.279	0.397	0.523	0.000	0.000	0.618
28.750	0.000	0.000	0.031	0.126	0.235	0.356	0.484	0.000	0.000	0.579
31.250	0.000	0.000	0.013	0.083	0.190	0.311	0.441	0.000	0.000	0.538
33.750	0.000	0.000	0.000	0.043	0.143	0.265	0.396	0.000	0.000	0.494
36.250	0.000	0.000	0.000	0.014	0.095	0.217	0.349	0.000	0.000	0.447

PRIMARY SETTLEMENT REMAINING FOR DESIGN LOAD:

DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.234	0.191	0.144	0.098	0.054	0.011	0.000	0.000	0.000	0.000
5.625	0.059	0.045	0.036	0.029	0.022	0.015	0.008	0.000	0.000	0.002
8.750	0.034	0.028	0.023	0.019	0.015	0.011	0.007	0.000	0.000	0.003
11.250	0.031	0.026	0.022	0.018	0.015	0.011	0.007	0.000	0.000	0.005
13.750	0.028	0.024	0.021	0.018	0.015	0.012	0.008	0.000	0.000	0.005
16.250	0.026	0.023	0.020	0.017	0.015	0.012	0.008	0.000	0.000	0.006
18.750	0.023	0.021	0.019	0.016	0.014	0.011	0.009	0.000	0.000	0.006
21.250	0.021	0.020	0.018	0.015	0.013	0.011	0.008	0.000	0.000	0.006
23.750	0.018	0.018	0.016	0.015	0.013	0.010	0.008	0.000	0.000	0.006

26.250	0.017	0.017	0.015	0.014	0.012	0.010	0.008	0.000	0.000	0.006
28.750	0.015	0.015	0.014	0.013	0.011	0.010	0.008	0.000	0.000	0.006
31.250	0.013	0.013	0.013	0.012	0.011	0.009	0.007	0.000	0.000	0.006
33.750	0.012	0.012	0.012	0.012	0.010	0.009	0.007	0.000	0.000	0.006
36.250	0.011	0.011	0.011	0.011	0.010	0.009	0.007	0.000	0.000	0.006
TOTAL	0.543	0.464	0.386	0.307	0.229	0.151	0.101	0.000	0.000	0.072

SECONDARY SETTLEMENT:

DEPTH	To	Tp	SEC COMP RATIO	BEFORE SUR REM	1 YR	5 YR	10 YR	25 YR	50 YR	100 YR
1.88	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.63	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.75	14.	0.	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.01
26.25	14.	0.	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.01
28.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			TOTAL	0.00	0.01	0.02	0.02	0.02	0.03	0.03

NOTE:
END OF PRIMARY WAS DETERMINED BY THE SLOPE MATCHING METHOD.
SURCHARGE REMOVED AT 28. DAYS.
Tp EQUALS ZERO ABOVE INDICATES THAT THAT INCREMENT DID NOT REACH END OF PRIMARY BEFORE SURCHARGE REMOVAL. SETTLEMENT FOR THAT INCREMENT WAS COMPUTED USING SURCHARGE REMOVAL AS END OF PRIMARY.

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**************************************************
*  THE FOLLOWING ASSUMES THAT THE TOTAL SURCHARGE  *
*  LOAD IS APPLIED INSTANTANEOUSLY, AND THAT BOTH  *
*  VERTICAL AND HORIZONTAL DRAINAGE ELEMENTS HAVE  *
*  UNLIMITED FLOW CAPACITY - SMALL STRAIN -        *
**************************************************
```

TIME TO CONSOLIDATION, QW = INFINITY:
(LOAD APPLIED IMMEDIATELY)

PERC	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
DAYS	0.14	0.29	0.47	0.67	0.90	1.19	1.56	2.09	2.99	30.00

TIME-SETTLEMENT RESULTS (RADIAL DRAINAGE FOR QW = INFINITY):

SOIL NO.	ULT.	3 DAYS	7 DAYS	15 DAYS	30 DAYS	60 DAYS	120 DAYS	240 DAYS	480 DAYS	960 DAYS	1920 DAYS
1	0.463	0.417	0.461	0.463	0.463	0.463	0.463	0.463	0.463	0.463	0.463
2	0.087	0.079	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087
3	0.068	0.061	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
4	0.055	0.050	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
5	0.045	0.040	0.044	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
6	0.036	0.033	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036
7	0.030	0.027	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
TOT	0.784	0.707	0.781	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784

CALCULATIONS HAVE BEEN COMPLETED.

Appendix D

CALTRANS REVIEW COMMENTS AND EMI RESPONSES

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer to complete)
Dist: 04 EA: 0A7101 Project Name: I-880 Operational and Safety Improvement Project OSFP Liaison: Paul Cotter Phone: (916)227-5671 e-mail: paul.cotter@dot.ca.gov	__ PSR/PDS (Review No.___ __ APS/PSR (Review No.___) __ APS/PR (Review No.___) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.___) __ Construction X Other: FOUNDATION REPORT	Reviewer Name: Caroline Chen/(Betty Lee) Functional Unit: GDW Cost Center: 3660 Phone Number: (916)227-5386 e-mail: caroline_chen@dot.ca.gov Date of Review: 05/09/2012 Structure Name*: Retaining Walls and Soundwall Br No*: _____ (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Lead (First and Last Name)	Consultant Firm	Phone Number	e-mail	Response Date
Lino Cheang	Earth Mechanics, Inc.	714-751-3826	l.cheang@earthmech.com	6-25-2012

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	Page, Section	✓
1	FR, P		The comments are made based on the review of FR prepared by EMI dated 3/30/2012, responses to Caltrans last review comments dated 2/15/2012, and Plans prepared by URS dated 3/30/2012.			
2	FR	Pg 26, 27,28 Section 5.5.2	1. It looks 3 ft overexcavation only slightly reduces settlement. The cost associated with excavating 3 ft and disposal could be costly since the soil at that zone is contaminated. Does it make sense to make such recommendation? 2. What is the existing soil in the recommended overexcavation zone? Please examine this soil layer and groundwater condition to justify whether it will	1. Based on the settlement estimates shown on Table 5-4, a 3-foot deep overexcavation will lower the settlement estimates by up to 1 inch (i.e., lower by up to 25%). Overexcavation is a relatively conventional method to reduce settlement to within tolerable limits. Further, we recommend re-using the overexcavated soil as backfill (in the overexcavated zone only) to minimize the cost for exporting the lead contaminated soils.	Section 5.5.2, Page 27	

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			contribute the amount of settlement as calculated or not. In the appended settlement calculation, please also present the preconsolidation pressure on the soil profiles. Some soil layers in the calculation are too thick considering the nonlinearity between settlement and vertical pressure. 3. Please specify limiting differential settlement, which is more critical than settlement for the RTWs. 4. What is the relationship between the allowable settlement and the remaining settlement? If 3 inch settlement is permitted for the RTWs, why is it needed to have the settlement period which is associated with a remaining settlement much less than 3 inch?	2. The overexcavated materials are likely to be fine-grained soils. The backfill will be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. We limited the overexcavation depth to 3 feet to create about 3 feet of separation between the excavation bottom and measured groundwater depth. For the above reasons, we expect that soils in the overexcavation zone will not undergo any significant settlement under embankment loading. We will present the preconsolidation pressures on the soil profiles included in the settlement calculations. We will also divide the layers that are thicker than 15 feet, except the very deep soil layer. For the very deep soil layer, the settlement magnitude is very small and reducing the layer thickness will not affect the total settlement. 3. Will Comply. AASHTO (2007) allows a distortion of 1/100 for a Caltrans MSE wall. Since we recommend using "slip joints" for this wall type, the allowable distortion can be larger than 1/100. 4. Berg et al. (2009) and AASHTO (2007) allows a distortion of 1/50 for geosynthetic wrap-around MSE wall. The above limiting differential settlement (distortion) was used to compare with the	Appendix C, Pages C-9 to C-55 Section 5.4, Page 23 and Section 5.5.2, Page 27 Section 5.4, Page 23 and Section 5.5.2, Page 27 Section 5.5.2, Page 28	

				calculated differential settlement for each wall. The comparison show the calculated distortions are all within the tolerable limits. 5. According to the MSE wall vendors and for site underlain by compressible soils, the MSE coping and the top-most MSE wall panel of the Caltrans MSE walls should be placed after a specified settlement period. This will minimize any unevenness of the MSE coping and adjacent surficial hardscape (if any), and the final product will be more aesthetically pleasing. For the geosynthetic wrap-around MSE wall, a settlement period is required because the final wall facing is placed after the end of the specified settlement period.		
3	FR	Pg 28 Section 5.5.3	Wick drains are recommended for the soil zone consisting predominately of stiff to very stiff clay. Please check the feasibility.	Wick drain design is being performed by URS. Per URS, the feasibility and effectiveness of using wick drains in the soil conditions present at this site was confirmed with a specialty wick drain installation contractor. The wick drain design calculation and memorandum included in Appendix C were prepared by Mr. Robert Goughnour, a specialist in wick drain design and construction. Mr. Goughnour is a consultant for Hayward-Baker and the author of the computer program PVDRAIN, which was used for the wick drain design on this project.	Appendix C, Pages C-125 to C-138	
4	FR	Section 5.6.1	Tables 5-8, 5-9, 5-12, and 5-13: Please include responses in the report for Note 2 under each table.	Will Comply.	Section 5.6.1, Page 33 and Section 5.6.2, Page 35	

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer:_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*._____ *=if applicable

5	FR,P	LOTBs	Please include LOTBs originally intended for other structures, including those done by different geotechnical consultant, into the plans for each structure if the borings are close enough and are being referenced/ used for the analysis for that particular structure. It is noted that several structures significantly rely on the borings conducted for adjacent structures for the GW information, or the borings intended for adjacent structure show much higher GWT than those intended for this particular one.	Will Comply.	Appendix A	
6	P	LOTBs	The legend sheets do not need to be included if they are part of Caltrans Standard Plans. If included, they have to show the project information in the tile blocks and to be numbered accordingly.	Will Comply. The wall designer indicates that this project must follow 2006 Standard Plan, so we will include the Legend Sheets in this Foundation Report. The Legend Sheets will show the project information in the title block and will be numbered accordingly in the Project Plans.	Appendix A	
7	FR		Consolidation test results are still in question. – Betty Lee	We deleted all the previous consolidation test results and settlement calculations from the foundation report. We added eleven (11) consolidation tests following ASTM procedure of not allowing soil specimen to expand during inundation. These eleven (11) test results and the five (5) consolidation tests performed by URS (See Appendix B) were used in a new set of settlement calculations. These revised calculations and the updated consolidation test results are included in the foundation report.	Appendix C, Pages C-9 to C-55	

OSFP Review Comment & Response Form

General Project Information	Review Phase	Reviewer Information
Dist: 04 EA: 0A7101 Project Name: I-880, 23&29 St. OC OSFP Liaison: Yiwei Hu Phone: 916-227-8917 e-mail:_____	☐ PSR/PDS (Review No. _) ☐ APS/PSR (Review No. _) ☐ APS/PR (Review No. _) ☐ Type Selection ☐ 65% PS&E Unchecked Details ☐ PS&E (Review No. _) ☐ Construction Support ☒ Other: Foundation Report--RW-2nd Review **Structure Information** (Use when necessary to document comments by individual structure) Structure Name: Retaining walls Br No: _____	Reviewer Name: Betty Lee/ (Caroline Chen) /Mahmood Momenzadeh Functional Unit: GS Phone Number: 510-286-4825 e-mail: betty_lee@dot.ca.gov Date of Review: 2/15/2012

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date
Lino Cheang (Geotech)	Earth Mechanics, Inc.	714-751-3826	l.cheang@earthmech.com	3/16/2012

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	
1	FR, P		The comments are made based on the review of FR prepared by EMI dated 1/10/2012 and Plans prepared by RBF dated 1/11/2012. **These comments are for Betty Lee's items only. Caroline Chen's responses will be sent separately.**		
2	Plans, FR		Missing some retaining walls. Where is Wall #20 and #224? Inconsistency between Plans and FR.	Wall #20 has been removed. Wall #224 became a stand-alone Standard Type-I wall; design and construction recommendations of this Type-1 wall are addressed in the Geotechnical Design Report.	
3	FR	P. 18	SPT counts are averaged over too thick layers still. This obscures the weak layers.	We will further divide the soil layers to capture any weak layers encountered and recalculate the average SPT blowcounts for these subdivided layers.	
5	FR	P. 21	Liquefaction: Please provide the NCEER (1997) made reference to. Please attach document in its entirety.	A PDF copy of the entire NCEER (1997) document will be included in the foundation report.	

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✓= Comment Resolved
(for Reviewer's use)

6	FR	P.22, Section 5.4	a) What is Prime Civil Engineer's reason for the 6 month construction restriction? b) Consolidation test results are still in question. c) MSE walls can tolerate large movements, but serviceability may not.	a) According to the Prime Civil Engineer, "Given the linear nature of the project, if the approach embankment takes more than 6-months to construct, it becomes the controlling item of work. Typically, the traffic constraints on this project restrict the Contractor from moving to another location within the project". b) We reviewed Figure 5, Note 12 and Section 11.3 of the ASTM guideline, our consolidation test specimen was inundated at the approximate field overburden in order to simulate specific site condition which is allowed per Section 11.3 of the ASTM standard. However, Section 11.3 of the ASTM states that the inundation pressure used to simulate specific site condition must be large enough to prevent swelling. Yet, the ASTM also states (last sentence in Section 11.3) that inundation pressure and change in height must be recorded. So, the ASTM is contracting itself because if swelling is not allowed, there cannot be any change in height. As part of this project, EMI performed a total of 15 consolidation tests on site-specific soil boring samples. Based on the test results, three consolidation test results (Boring R-2 Sample D8, Boring R-6 Sample D7 and Boring R-10 Sample D-4) show a significant swelling. We will not use these test results in our analyses and not include them in our report as well. In addition, five consolidation tests were also performed by URS on similar soils obtained from nearby soil borings. Using the consolidation properties obtained from the remaining EMI consolidation tests plus the URS consolidation tests, we re-evaluated our settlement calculations. The resulting settlement values are less than those reported in the foundation report. We will include these revised settlement calculations in the foundation report. c) Long-term serviceability should not be a problem because there is a required waiting (settlement) period with settlement monitoring before the upper-most panel	

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				and coping of the MSE wall are allowed to be installed. After the waiting period, remaining settlement is calculated to be ½" or less (Table 5-5).	
7	FR	P.23, Section 5.5	Make sure that MSE backfill requirements are suitable for the reinforcement type. These requirements need to be in the Specifications.	We will make sure that these requirements will be in the Specifications.	
8	FR	P. 25, Paragraph 1	b) Do you mean the compaction of the backfill material under its self-weight? Please rewrite the paragraph with more clarity.	We recommend using MSE backfill materials for the entire new fill embankment (Figure 5-1A) so that the new embankment will behave as one unit or block. The backfill material should be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. We will clarify this in the foundation report.	
10	FR	P. 26	This may depend on Item #11.		
11	FR	P. 26, Paragraph 4	Not good reasoning. Please discuss the consequences of not doing a deeper excavation. Last sentence: What is a "considerable amount" of settlement? Must quantify. This sentence is a contradiction.	Based on our experience, contract change orders are common when excavating and compacting wet soils. So, we believe it is appropriate to limit the overexcavation depth to minimize the potential of encountering wet or saturated soil. The consequence of not doing a deeper excavation will be the MSE soil mass and wall panel will settle the amount indicated in our foundation report (Table 5-4). If a deeper excavation is performed and assuming contractor can handle and compact wet or saturated soils, the settlement of the MSE soil mass and wall panel will be less than the amount indicated in our foundation report. However, we do not anticipate a significant reduction in settlement for deep overexcavation; this is because the settlement influence zone extends well below the near-surface soils. For example, if we do a 3-foot deep overexcavation for Walls 18 and 19, the calculated settlement would be about 6.3 inches (currently used and shown in foundation report); a 5-foot deep overexcavation would result in a settlement estimate of about 5.4 inches; a 7.5-foot deep overexcavation would result in a settlement estimate of 4.4 inches. Therefore, a deeper overexcavation depth (up	

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				to 7.5 feet) will lower the settlement estimate by less than 2 inches. Please note that the overexcavation depth is measured from the MSE wall base, which is already lowered a minimum of 2 feet below the adjacent lowest finished grade or 0.1 times the wall height. So, a 3-foot overexcavation is actually 5 feet below grade, a 5-foot overexcavation is actually 7 feet below grade and so on.	
12	FR	P. 26	What are the lateral limits of soil removal? Limits and depths must be shown on Plans.	The horizontal limit of the overexcavation is provided in Page 35 Section 5.7. We will make sure RBF shows this overexcavation limits on their Plans.	
13	FR	P. Paragraph 3	Settlement of 3 inches is too high for serviceability. This would need subsequent maintenance and repair which will increase future cost.	Long-term serviceability should not be a problem because there is a required waiting (settlement) period with settlement monitoring before the upper-most panel and coping of the MSE wall are allowed to be installed (Table 5-5). After the waiting period, remaining settlement is calculated to be ½" or less.	
14	FR	Appendix	Consolidation lab testing looks faulty. Please provide reference to test used. Please attach the full procedure and description in original form. (Xerox test in its entirety from procedure manual used.)	Please refer to Item (6). A full Xerox copy of the ASTM procedure has already been provided in our last response.	
15	FR		Same as #14 above.	Please refer to Item (6)	
17	FR	P. 29, Section 5.5.4	Is Drainage actually shown on the Plans?	Yes, drainage is shown on plans.	
18	FR	P. 31, Paragraph 2	Reusing onsite soil: Contamination issues must be reviewed by the Environmental Engineering Branch. Geotechnical Branch is concerned with the mechanical aspects of the onsite soil—gradation, etc. This must be in the Specifications.	We will await review comments from Caltrans Environmental Engineering Branch. Onsite soils will only be reused as backfill below the MSE wall base. It is not allowed to be re-use as the MSE soil mass and retaining wall backfill (per GDR) and must be lime-treated, if re-use as pavement subgrade (per Materials Report).	
Items (19) to (32) below were reproduced from a previous Caltrans review, which we had already provided responses and incorporated in our 1/10/2012 foundation report submittal. We will repeat those same responses below.					
19	FR	Page 23 Section 5.5.1	Minimum soil reinforcement length shall be 70 percent of the wall height, and not less than 8 ft.	Will Comply.	

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			Please revise all related analyses and recommendations accordingly. (CChen)		
20	FR	Page 26 Section 5.5.2	Instead of referring to Appendix C, please provide summary of bearing capacities. (CC)	Will Comply.	
21	FR	Pages 26, 27	1) Report recommends minimum 3 ft over-excavation immediately below the MSE wall. Please provide estimated settlement without the recommended over-excation and re-compaction. How much is the consolidation settlement estimated to be contributed by this replaced zone? 2) Is the replaced zone found contaminated or not? (CC)	1) We will include two columns in Table 5-3 showing "Calculated Total Settlement Without Overexcavation" and "Calculated Settlement With Overexcavation". 2) Yes, it is contaminated by aerially deposited lead.	
22	FR	Page 30 Section 5.6	Instead of referring to Appendix C, please provide summary of bearing capacities. (CC)	Will Comply.	
23	FR	Page 33 Section 5.7.1	Table 5-10: 1) The nominal compression resistance values are not consistent with the values presented in Table 5-9. 2) Why are there no design tip elevations for tolerable settlement? (CC)	1) The nominal compression resistance in Table 5-10 is obtained using all three limits: Service-I, Strength, and Extreme Event limits. In this case, Service-I limit state load controls (FOS = 2). 2) The estimated settlement is less than 1 inch for a minimum pile length of 12 feet. Therefore, there are no design pile tip elevations for tolerable settlements.	
24	FR	Page 35 Section 5.7.2	1) Table 5-14: The nominal compression resistance values are not consistent with the values presented in Table 5-13. 2) Why are there no design tip elevations for tolerable settlement? (CC)	1) The nominal compression resistance in Table 5-14 is obtained using all three limits: Service-I, Strength, and Extreme Event limits. In this case, Service-I limit state load controls (FOS = 2). 2) The estimated settlement is less than 1 inch for a minimum pile length of 12 feet. Therefore, there are no design pile tip elevations for tolerable settlements.	
25	LOTBs	Every LOTB sheet	There is a note about the conversion factor for Modified California Sampler on every LOTB sheet. Please remove this note. All the blowcounts shown on the LOTBs shall be the raw data without any conversion. (CC)	Will comply.	
26	LOTBs		Legend sheets should be included in each set of LOTBs and counted together with the other boring logs. (CC)	Since the legend sheets are part of the 2010 Caltrans Standard Plans (Sheet Nos. A10F and A10G), we did not include them in our reports.	

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(for Reviewer's use)

27	P		Base width is not presented/defined consistently on different plan sheets, and none of the presentation follows the convention, i.e., base width shown on Sheet GP No. 2 and Details No. 4 for RTW No. 17. (CC)	The base width convention has been revised on the plans	
28	P	RTW 17 Details No. 6 and all similar sheets	Refer to comment No. 2. Please revise base width accordingly. (CC)	The base width convention has been revised on the plans	
29	P		Recommended over-excavations is not reflected on the Plans. (CC)	Over-excavation limits have been added to the plans	
30	P	RTW232	Pile Data Table is not presented. (CC)	Pile Data Table can be found on RW 232 Foundation Plan No. 1	
31	P	RTW232 RTW Type 7SWBP Details No. 1	Does note 1 apply? (CC)	Note Will be removed	
32	FR		Groundwater conditions: Were the borings left open for a period of at least 24 hours before groundwater was measured? If the borings were not left open for a period of at least 24 hours, conclusions concerning groundwater are inconclusive. (RKarpowicz)	In other projects, we have measured groundwater depth using the procedure described by Reviewer. However at this site, we were unable to secure the boreholes and we were concerned with local residents tampering which could result in injuries and subsequent liabilities. So, the top 10 to 15 feet of borings was drilled with a dry auger (see Section 2.2.1) and then drilling is continued using mud-rotary circulation system. Groundwater depths were measured immediately after the dry auger drilling and again after the driller finish setting up the mud-rotary system which would allow a groundwater stabilization period of 15 to 30 minutes (sometime longer). Therefore, our groundwater measurement is expected to be less influenced by the drilling method and should be a fairly accurate representation of the groundwater condition on the date of drilling.	

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OSFP Review Comment & Response Form

General Project Information	Review Phase	Reviewer Information
Dist: 04 EA: 0A7101 Project Name: I-880, 23&29 St. OC OSFP Liaison: Yiwei Hu Phone: 916-227-8917 e-mail:_____	☐ PSR/PDS (Review No. _) ☐ APS/PSR (Review No. _) ☐ APS/PR (Review No. _) ☐ Type Selection ☐ 65% PS&E Unchecked Details ☐ PS&E (Review No. _) ☐ Construction Support ☒ Other:Foundation Report--RW **Structure Information** (Use when necessary to document comments by individual structure) Structure Name: Retaining walls Br No: _____	Reviewer Name:Betty Lee/ (Caroline Chen) /Mahmood Momenzadeh Functional Unit:GS Phone Number: 510-286-4825 e-mail: betty_lee@dot.ca.gov Date of Review: 10/28/2011

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date
RBF Consulting	Earth Mechanics, Inc.	_____	_____	_____

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	
1	FR, P		The comments are made based on the review of FR prepared by EMI dated 9/6/2011 and Plans prepared by URS dated 9/6/2011.		
2	Plans		Missing some retaining walls.		
3	FR	P. 18	SPT counts are averaged over too thick layers.	We will further divide the layers that are thicker than 25 feet and recalculate the average SPT blowcounts for these subdivided layers.	
4	FR	Appdx C	RWs 224&228: How is consolidation data determined from CPT?	Consolidation parameters were determined using laboratory consolidation test results. CPT soundings were only used to obtain the maximum drainage path distance for settlement time calculations.	
5	FR	P. 21	Liquefaction: What is the factor of safety?	According to NCEER (1997), if the corrected blowcount is greater than 30 bpf, soil is non-liquefiable and a factor of safety cannot be computed for this case. Our analysis shows that the corrected blowcounts for the potentially liquefiable soil layers are greater than 35 bpf. So, we will not be able to provide a factor of safety.	

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6	FR	P.22, Section 5.4	a) Why 6 month construction window? b) How to address consolidation issue within the above time frame? c) What are the mitigation measures for settlement and differential settlement (esp. between MSE wall and bridge approaches).	a) The 6-month duration is dictated by the Prime Civil Designer. b) Table 5-4 provides maximum settlement estimates and minimum settlement period to reduce remaining settlement within acceptable limits (i.e., ½-inch or less) within the 6-month period. c) Mitigation measures include overexcavation and recompaction, settlement period, surcharge, and use of MSE walls which can tolerate relatively large movements as compared to cantilevered walls. Bridge foundation and approach construction will not begin until the remaining settlement of MSE is reduced to within acceptable limits (i.e., ½-inch or less). Therefore, settlement and differential settlement between MSE wall and bridge approaches are not considered to be a design issue.	
7	FR	P.23, Section 5.5	Make sure that MSE backfill requirements are suitable for the reinforcement type.	Yes, we will make sure.	
8	FR	P. 25, Paragraph 1	"...we recommend using the same backfill materials as the MSE wall...": a) What is the cost comparison? b) "...reduce differential settlement...": Please justify this.	a) Paragraph 1 only applies to about 55-foot long portion of Walls 18 and 19. The added cost is insignificant due to the very small area. b) Using same material (MSE wall backfill) for the entire new fill embankment (Figure 5-1A) will minimize the differential settlement across the embankment because the backfill will behave the same under external loading.	
9	FR	P. 37, Fig. 5-2	What is the magnitude of "d"?	"d" is the Recommended Minimum Overexcavation Depths below MSE base and it is summarized in Table 5-3.	
10	FR	P. 26	How is the over-excavation of 3 ft. determined?	The overexcavation depth is selected in order to maintain at least a 2-foot separation from the groundwater elevation.	
11	FR	P. 26, Paragraph 4	Not good reasoning.	A deeper overexcavation depth has two issues: (1) based on our experience, contractors are keen on filing claims when handling and compacting wet soils, and (2) soil settlement influence zone is deep due to the large footprint of the embankment, and a deeper overexcavation depth will not lower the settlement estimate by a considerable amount. We can modify this paragraph based on Items (1) and (2) above.	
12	FR	P. 26	What are the limits and depths of soil removal?	Limits are shown in Figure 5-2 and depths are presented in Table 5-3.	
13	FR	P. Paragraph 3	How is the "allowable settlement of 3 inches" determined? Does this meet serviceability requirements?	There are no published guidelines for allowable settlement for Caltrans MSE walls. AASHTO (2007) provides a 2-inch allowable settlement for MSE wall constructed with full-high precast panels. So, the Caltrans MSE walls can be designed for settlements larger	

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				than 2 inches because the Caltrans MSE walls use segmental rather than full-high panels, and we also recommend the use of a "slip joint". Based on the above information, we settled on using an allowable settlement of 3 inches.	
14	FR	Appendix	Consolidation lab testing looks faulty. Please re-evaluate. May need to re-do lab testing with new undisturbed samples.	The "undisturbed" consolidation test specimen is inserted into the air-tight consolidometer at field moisture. After the seating load is applied and as the vertical load increment reaches the approximate field overburden, the test specimen is inundated for 24 hours before the last sets of load increments are applied to complete the test. During the 24-hour inundation period, the dial gage is monitored to determine the vertical strain. This is a local southern California practice, and it is likely that the same inundation procedure is used by a majority of the local firms. We understand this process deviates slightly from the ASTM protocol, but the measured vertical strain data add more "value" to a consolidation test because: (1) The modified method determines "soil collapse" potential and magnitude of collapse. For example, if the collapsible soil layer is identified to be 10-foot thick and the measured vertical strain during inundation is 10%, then the compression (settlement) of the 10-foot thick collapsible soil layer is 0.1', and (2) For "expansive soils", the measured vertical strain provides a good qualitative indicator of the potential volume change characteristic of the tested soils when subjected to prolonged wetting at the overburden pressure. For example, if a soil specimen shows a significant swelling at the overburden pressure, then mitigations (such as increasing the footing pressure, removal of expansive soils and replacement with non-expansive soils, and designing an anchoring system) can be evaluated to minimize uplift movements. More importantly, we do not believe that the above inundation process will alter the characteristics of the axial strain versus log of vertical pressure curve, it merely shifts a portion of the curve upward (if soil is expanding) or downward (if soil is collapsing). As a result, the impact on the Compression Index value used in settlement calculations is minimal.	
15	FR		As a result of #13 above, calculated settlement magnitudes and settlement period will have to re-calculated.	Please see the response for the Comment # 14.	

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16	FR	P. 29,Table 5-5	Please clarify "spacing of settlement monuments". Is that vertical or horizontal spacing?	Spacing of settlement monuments provided in Table 5-5 is horizontal spacing. We will replace the column heading as "Horizontal Spacing of Settlement Monuments" in Table 5-5 of the Final Report.	
17	FR	P. 29, Section 5.5.4	Drainage must be shown on plans.	We will include a sentence saying "Drainage must be shown on plans".	
18	FR	P. 31, Paragraph 2	Onsite soil may or may not be used as fill below footings. It must meet standard specifications.	The excavated on-site material contains aerially deposited lead (Ninyo and Moore, 2009) and must be either capped or transport to a Class-I landfill. Exporting the soils to a Class-I landfill will be cost prohibited. Therefore, we recommended re-using the overexcavated soil as backfill below the retaining wall footing.	
19	FR	Page 23 Section 5.5.1	Minimum soil reinforcement length shall be 70 percent of the wall height, and not less than 8 ft. Please revise all related analyses and recommendations accordingly. (CChen)	Will Comply.	
20	FR	Page 26 Section 5.5.2	Instead of referring to Appendix C, please provide summary of bearing capacities. (CC)	Will Comply.	
21	FR	Pages 26, 27	1) Report recommends minimum 3 ft over-excavation immediately below the MSE wall. Please provide estimated settlement without the recommended over-excation and re-compaction. How much is the consolidation settlement estimated to be contributed by this replaced zone? 2) Is the replaced zone found contaminated or not? (CC)	1) We will include two columns in Table 5-3 showing "Calculated Total Settlement Without Overexcavation" and "Calculated Settlement With Overexcavation". 2) Yes, it is contaminated by aerially deposited lead.	
22	FR	Page 30 Section 5.6	Instead of referring to Appendix C, please provide summary of bearing capacities. (CC)	Will Comply.	
23	FR	Page 33 Section 5.7.1	Table 5-10: 1) The nominal compression resistance values are not consistent with the values presented in Table 5-9. 2) Why are there no design tip elevations	1) The nominal compression resistance in Table 5-10 is obtained using all three limits: Service-I, Strength, and Extreme Event limits. In this case, Service-I limit state load controls (FOS = 2). 2) The estimated settlement is less than 1 inch for a minimum pile length of 12 feet. Therefore, there are no design pile tip elevations	

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			for tolerable settlement? (CC)	for tolerable settlements.	
24	FR	Page 35 Section 5.7.2	1) Table 5-14: The nominal compression resistance values are not consistent with the values presented in Table 5-13. 2) Why are there no design tip elevations for tolerable settlement? (CC)	1) The nominal compression resistance in Table 5-14 is obtained using all three limits: Service-I, Strength, and Extreme Event limits. In this case, Service-I limit state load controls (FOS = 2). 2) The estimated settlement is less than 1 inch for a minimum pile length of 12 feet. Therefore, there are no design pile tip elevations for tolerable settlements.	
25	LOTBs	Every LOTB sheet	There is a note about the conversion factor for Modified California Sampler on every LOTB sheet. Please remove this note. All the blowcounts shown on the LOTBs shall be the raw data without any conversion. (CC)	Will comply.	
26	LOTBs		Legend sheets should be included in each set of LOTBs and counted together with the other boring logs. (CC)	Since the legend sheets are part of the 2010 Caltrans Standard Plans (Sheet Nos. A10F and A10G), we did not include them in our reports.	
27	P		Base width is not presented/defined consistently on different plan sheets, and none of the presentation follows the convention, i.e., base width shown on Sheet GP No. 2 and Details No. 4 for RTW No. 17. (CC)		
28	P	RTW 17 Details No. 6 and all similar sheets	Refer to comment No. 2. Please revise base width accordingly. (CC)		
29	P		Recommended over-excavations is not reflected on the Plans. (CC)		
30	P	RTW232	Pile Data Table is not presented. (CC)		
31	P	RTW232 RTW Type 7SWBP Details No. 1	Does note 1 apply? (CC)		
32	FR		Groundwater conditions: Were the borings	In other projects, we have measured groundwater depth using the	

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			left open for a period of at least 24 hours before groundwater was measured? If the borings were not left open for a period of at least 24 hours, conclusions concerning groundwater are inconclusive. (RKarpowicz)	procedure described by Reviewer. However at this site, we were unable to secure the boreholes and we were concerned with local residents tampering which could result in injuries and subsequent liabilities. So, the top 10 to 15 feet of borings was drilled with a dry auger (see Section 2.2.1) and then drilling is continued using mud-rotary circulation system. Groundwater depths were measured immediately after the dry auger drilling and again after the driller finish setting up the mud-rotary system which would allow a groundwater stabilization period of 15 to 30 minutes (sometime longer). Therefore, our groundwater measurement is expected to be less influenced by the drilling method and should be a fairly accurate representation of the groundwater condition on the date of drilling.	

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Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

July 10, 2012

EMI Project No. 10-133

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

ATTENTION: Ms. Jennifer Harmon, P.E.

SUBJECT: Addendum No. 1 to "Final Foundation Report for Non-Standard Retaining Walls and Soundwall, I-880 Operational and Safety Improvements, Dated June 25, 2012", Alameda County, California,
04-Ala-880, PM 28.4/29.2,
Caltrans Project No. 04000001601 (EA 04-0A7100)

Dear Ms. Harmon:

Earth Mechanics, Inc. (EMI) submitted the Final Foundation Report for Non-Standard Retaining Walls and Soundwall for the I-880 Operational and Safety Improvements project, dated June 25, 2012 (EMI, 2012a). We understand that Wall 224 is a non-standard retaining wall. Therefore, the Wall 224 foundation recommendations, which were included in the Final Geotechnical Design Report (EMI, 2012b) have been retrieved and provided in this addendum. The LOTB sheets for Wall 224 have already been included in the RBF plan set.

At the same time, Caltrans reviewed the Final Foundation Report and provided their comments in an Office of Special Funded Projects (OSFP) matrix form on July 9, 2012. EMI developed the responses to Caltrans comments and included them in this addendum report (Attachment 1).

Based on the information provided by the structural designers, we revised Table 5-2 (Summary of Maximum Bearing Pressures for MSE Walls) and Table 5-3 (Foundation Design Recommendations for MSE Walls) to show the updated base widths for the MSE walls. These revised tables are included in Attachment 2.

Type 1 Retaining Wall 224

The pertinent Type 1 Retaining Wall 224 information is summarized in Table 1.

TABLE 1. TYPE 1 RETAINING WALL 224 PERTINENT DATA

Wall Location	Approx. Length (feet)	Retaining Wall Height (feet)	Approx. Bottom of Footing Elevation (feet)	Backfill Slope Condition
North side of approach embankment at 29th Ave. off-ramp	218.2	6 to 12	+23.08 to +24.00	Level

Sign Structure "A" is situated at the beginning of Wall 224. In order to support the sign post, the footprint of Wall 224 is enlarged to 10.0 feet by 17.6 feet in the Plan View. The sign and enlarged retaining wall are supported on five 24-inch diameter Cast-in-Drilled-Hole (CIDH) piles connected to a pile cap. Foundation design of Sign Structure "A" is addressed in the Foundation Report for Sign Structures (EMI, 2012c).

Recent field investigation indicates that the subsurface materials at the project site consist predominately of medium stiff to hard layers of lean clay and fat clay with varying amounts of sand and few interbedded layers of medium dense to very dense clayey sand, silty sand, and sand with silt down to the exploration termination depth. The idealized soil profile and design strength parameters for foundation design of the wall are presented in Table 2.

TABLE 2. IDEALIZED SOIL PROFILE AND STRENGTH PARAMETERS

Approximate Elevation (feet)	Predominant Soil Type	Equivalent SPT Blowcount* (blows/foot)	Friction Angle (degree)	Cohesion / Undrained Shear Strength (psf)
+27 to +14	Lean Clay and Lean Clay with Sand	(11) to 17 Average = 13	-	2,500
+14 to 0	Lean Clay and Lean Clay with Sand	(5) to 18 Average = 10	-	2,000
0 to -15	Lean Clay and Fat Clay	(9) to 34 Average = 16	-	3,000
-15 to -20	Clayey Sand and Silty Sand	22 to 35 Average = 29	34	100
-20 to -40	Lean Clay with Sand and Sandy Lean Clay	(13) to (22) Average = 18	-	4,000
-40 to -53	Silty Sand and Sand with Silt	(19) to 50 Average = 35	36	100
-53 to -80	Lean Clay with Sand and Sandy Lean Clay	(9) to (14) Average = 12	-	3,000

** Values in ( ) are converted SPT blowcounts corrected for sampler size; correction factor from Modified California Drive sampler blowcounts to SPT blowcounts is 0.5.*

In Table 2, the soil strength parameters for sandy soils are based on the correlations with SPT blowcounts (Lam and Martin, 1986) and laboratory direct shear test results; and soil strength parameters for clayey soils are based on CPT sounding data (Robertson and Campanella, 1989) and laboratory unconsolidated-undrained triaxial compression test results.

Bearing Capacity: Maximum bearing pressures for Type 1 retaining wall were computed by the structural designer and they are provided in Table 3.

TABLE 3. SUMMARY OF MAXIMUM BEARING PRESSURES

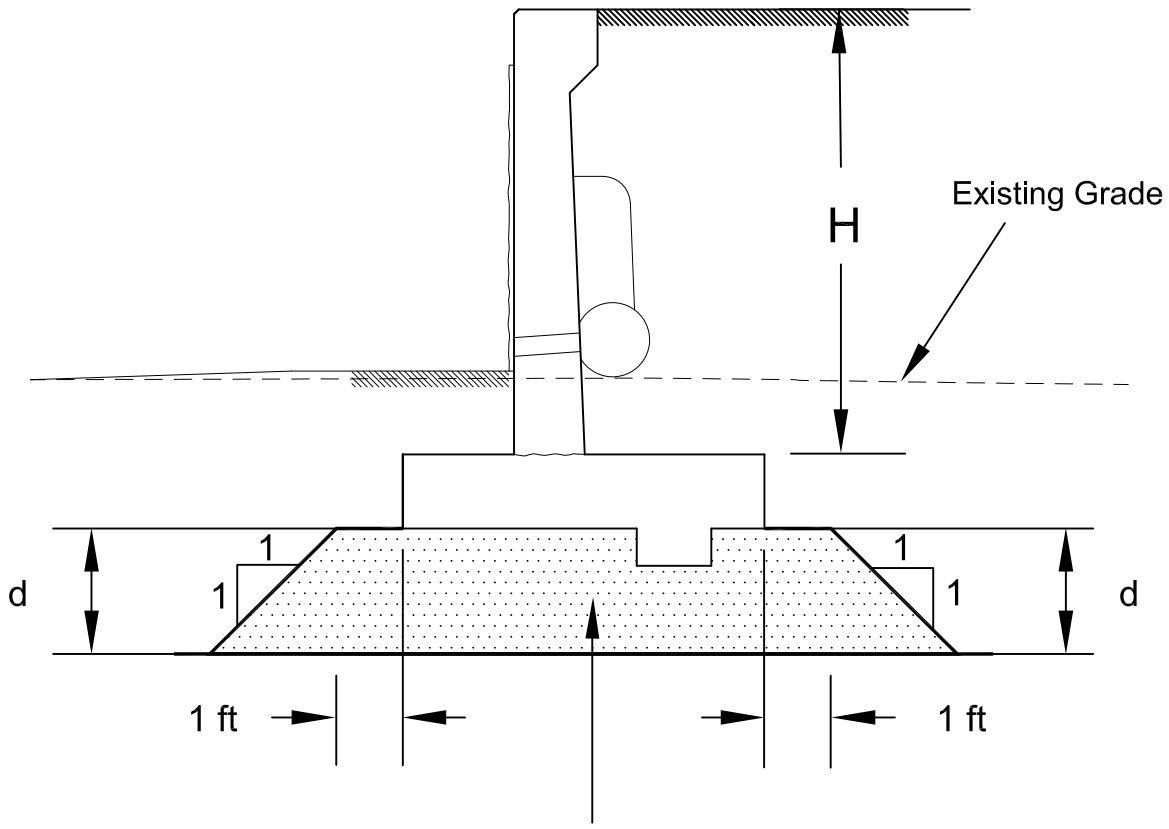
Wall Heights (feet)	Maximum Bearing Pressures (ksf)		
	Service-I Limit State	Strength Limit State	Extreme Event Limit State
6	1.5	2.0	3.3
8	1.9	2.6	5.2
10	2.8	3.9	6.7
12	2.8	3.8	6.6

Per Caltrans LRFD design guidelines provided in the latest Caltrans Memo To Designers (Caltrans, 2008), the Service-I Limit State bearing pressures must be less than the allowable bearing capacity of the foundation soils; the Service-I Limit State bearing pressures were also used to calculate the anticipated settlement. The Strength Limit State and Extreme Event Limit State bearing pressures were used to compare with the factored bearing capacity and ultimate bearing capacity of the foundation soils, respectively. Bearing capacity and settlement calculations are provided in Attachment 3. Minimum overexcavation depth and resulting settlement estimates are presented in Table 4. Minimum footing embedment should be based on Section 4.4.5.1 of Caltrans BDS (Caltrans, 2003).

TABLE 4. RECOMMENDED MINIMUM OVEREXCAVATION DEPTHS AND SETTLEMENT ESTIMATES

Approximate Wall 224 LOL Stations	Wall Height (feet)	Min. Overexcavation Depth Below Bottom of Wall Footing (feet)	Settlement Without Overexcavation (inch)	Settlement With Overexcavation (inch)
Begin Wall to 10+43	12	3.5	1.8	1.0
10+43 to 10+99	10	3.5	1.8	1.0
10+99 to 11+63	8	2.5	1.4	1.0
11+63 to End Wall	6	2.0	1.3	1.0

The horizontal limits of the overexcavation should begin one foot from each edge of the footing bottom and extending downward at a 45-degree imaginary plane until the plane intersects the recommended minimum excavation depth. In some areas, the 45-degree imaginary plane could intersect temporary shoring. In this case only, the horizontal limit of the overexcavation should begin from the edge of the footing bottom and extending out a minimum of 1 foot and down until the plane intersects the recommended excavation depths. A sketch showing the limits of the overexcavation is included in Figure 1. Caltrans Structure Backfill should be used for backfilling with a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. The overexcavation bottom should be proof rolled prior to backfilling. Further, the overexcavation bottom should be inspected by a qualified geotechnical engineer or technician to confirm the presence of an unyielding and competent surface. The excavated material contains aerially deposited lead (Ninyo and Moore, 2009) and must be either capped or transported to a Class-I landfill.



Note: The backfill material should be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216.

d = Minimum overexcavation depth below retaining wall footing
(See Table 4 for magnitudes of "d").

Earth Mechanics, Inc. Geotechnical & Earthquake Engineering		I-880 Operational and Safety Improvements
Project No. 10-133	Date: 01-05-12	Limits of Overexcavation — Figure 1

Slope Stability: Global stability analyses were performed for a cross section with a maximum wall height of 12 feet at approximate "05" Line Station 223+68 using the computer program SLIDE 5.0 (Rocscience, 2006) for both static and pseudostatic conditions, and the results are presented in Attachment 3.

The material used for the retaining wall backfill is assumed to have a friction angle of 32 degrees and a cohesion of 150 psf. Shear strengths of existing fill material and native soils are provided in Table 2.

Slope stability analyses conducted for the static condition include a 2 feet soil surcharge (i.e., 250 psf) to represent traffic loading. Results of the analyses indicate that the static global stability for the proposed Type 1 retaining wall meet the required minimum factor-of-safety of 1.5. Slope stability analysis under pseudo-static condition was performed using a seismic coefficient equal to 0.2g. Analysis indicates that the calculated factor of safety is greater than the required minimum of 1.1.

Retaining Wall Backfill: Onsite soils are predominantly clays with medium to high expansion potential. These materials are not suitable for use as wall backfill. Materials placed behind the retaining wall should be Structure Backfill per Section 19-3.06 (Caltrans, 2006b). The Structure Backfill requirement should be supplemental to the pervious backfill requirement as described in Caltrans Standard Plans (Caltrans, 2006a) and Caltrans Standard Specifications (Caltrans, 2006b) under Section 19-3.065. The horizontal limits of the Structure Backfill should begin one-foot from edge of the footing bottom and extending upward at a 45-degree imaginary plane until the plane intersects the ground surface. If the 45-degree imaginary plane intersects temporary shoring, then the horizontal limit can be altered to follow the vertical face of the shoring. Backfill should be placed in loose lifts not exceeding 8 inches in thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 % of maximum density as determined by California Test Method 216. Jetting or flooding to compact backfill is not recommended. Heavy compaction equipment, such as vibratory rollers, dozers, or loaders, should not be used adjacent to the retaining walls in order to avoid damaging the walls due to large lateral earth pressures.

Lateral Earth Pressure and Resistance: Using the backfill configuration described above, a static active lateral earth pressure of 36 psf per foot of depth is recommended for a free draining, level and compacted backfill. If applicable, a uniform lateral pressure of at least 72 psf due to vehicle loads, equivalent to a vertical pressure produced by at least 2 feet of earth, should be added to the above lateral earth pressure.

Resistance to lateral loads may be developed by a combination of friction acting at the base of the retaining wall footings and passive earth pressure. Since Caltrans Structure Backfill is used as compacted fill below the footing, a frictional coefficient of 0.45 is recommended. A maximum passive equivalent fluid pressure of 360 psf per foot can also be used for the design. We recommend 100% of the base friction only for static loading. For seismic loading, we recommend combining 100% of the passive resistance and 100% of the base friction.

We appreciate the opportunity to work with you on this project. If you have any questions, please do not hesitate to call us.

Sincerely,
EARTH MECHANICS, INC.

(Ranjan) G. J. Gunaranjan, PE 71758
Senior Staff Engineer

Lino Cheang, GE 2345
Project Manager

GJG/gjg,lcc

REFERENCES

California Department of Transportation (Caltrans), California Test Methods.

Caltrans, 2008, Memo to Designers 3-1, Supersedes Memo to Designers 3-1 Dated December 2000, July.

Caltrans, 2006a, Standard Plans.

Caltrans, 2006b, Standard Specifications.

Caltrans, 2003, BDS, Section 4, November.

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ATTACHMENTS

Attachment 1. Caltrans Review Comments and EMI Responses
Attachment 2. Updated Base Widths of MSE Walls
Attachment 3. Design Calculations for Wall 224

ATTACHMENT 1

CALTRANS REVIEW COMMENTS AND EMI RESPONSES

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer to complete)
Dist: 04 **EA:** 0A7101 **Project Name:** I-880 Operational and Safety Improvement Project **OSFP Liaison:** Paul Cotter **Phone:** (916)227-5671 **e-mail:** paul.cotter@dot.ca.gov	__ PSR/PDS (Review No.___ __ APS/PSR (Review No.___) __ APS/PR (Review No.___) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.___) __ Construction X Other: FOUNDATION REPORT	**Reviewer Name:** Caroline Chen **Functional Unit:** GDW **Cost Center:** 3660 **Phone Number:** (916)227-5386 **e-mail:** caroline_chen@dot.ca.gov **Date of Review:** 07/09/2012 **Structure Name*:** Retaining Walls and Soundwall **Br No*:** _____ (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Lead (First and Last Name)	Consultant Firm	Phone Number	e-mail	Response Date
Lino Cheang	Earth Mechanics, Inc.	714-751-3826	l.cheang@earthmech.com	7-10-2012

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by EMI dated 6/25/2012, responses to Caltrans last review comments dated 5/9/2012, and Plans prepared by URS dated 6/25/2012.		
2	P	LOTBs	1. The legend sheets have to show the project information in the title blocks and the total number of LOTBs should include the legend sheets. 2. The LOTB sheets from URS should retain the original information in the title blocks and be treated similar to as-built LOTBs. To avoid confusion, title block showing project information and signature block can be crossed out.	Will Comply. RBF will update the LOTB sheets in their plan set.	
3	P,FR		Base Width (BW): BW presented on Plans and FR (Table 5-3) does not appear to be consistent. Please check.	We will revise Tables 5-2 and 5-3 and include them in the Addendum Report.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved (for Reviewer's use)

ATTACHMENT 2

UPDATED BASE WIDTHS OF MSE WALLS

Table 5-2. Summary of Maximum Bearing Pressures for MSE Walls (REVISED)

Wall Height (feet)	Base Width (feet)	Maximum Bearing Pressures (ksf)		
		Service-I Limit State	Strength Limit State	Extreme Event Limit State
5	11	1.4	1.9	1.2
7.5	11.5	1.8	2.5	1.7
10	12.5	2.2	3.5	3.0
12.5	15	2.5	3.9	3.4
15	18	2.9	3.9	3.1
17.5	20.5	3.2	4.8	4.2
20	23.5	3.5	5.3	4.8
22.5	24	4.1	6.1	5.8

Table 5-3. Foundation Design Recommendations for MSE Walls (REVISED)

Wall No.	Maximum Wall Height (feet)	Maximum Base Width (feet)	Bottom of Footing El. (feet)	Min. Footing Embed. Depth (feet)	LRFD		
					Service	Strength	Extreme Event
					Permissible Net Contact Stress (ksf)	Factored Gross Nominal Bearing Resistance (ksf)	Factored Gross Nominal Bearing Resistance (ksf)
17	20	23.5	+12.91 to +15.41	2.50	4.2	5.7	12.6
18 & 19	17.5	20.5 and 29 [1]	+15.00 to +17.91	2.75	4.7	6.4	14.3
26	10	11	+19.54	2.50	3.3	4.4	9.8
28 & 29	12.5 and 15	15 and 18	+22.44 to +27.44	2.50	4.2	5.7	12.7
228 & 230	12.5 and 15	15 and 18	+20.70 to +23.50	2.50	3.8	5.2	11.5

[1] *Based on the plans, a 6.5-foot wide pedestrian ramp is proposed adjacent to Wall 19; thus the base width of Wall 19 is increased.*

Note: In addition to the base width, we also updated the maximum bearing pressures (provided by the structural designer) in Table 5-2. The maximum bearing pressure, which controls foundation design, is from the Service-I Limit State load case. We compared the above Service-I Limit State bearing pressures with previous bearing pressures, and the above Service-I Limit State bearing pressures are less due to the larger base width. As a result, the previous design is conservative.

ATTACHMENT 3

DESIGN CALCULATIONS FOR WALL 224

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

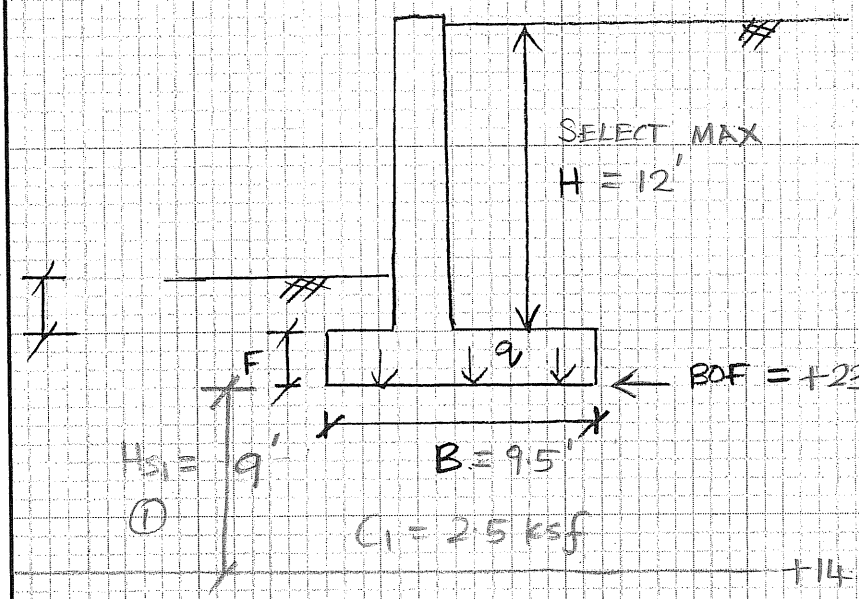
17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/14/11 Checked By Lino Date 8/23/11 Sheet 1 of 2

Bearing Capacity Calculations - RW 224

Caltrans Standard Type 1 wall



* H varies from 6' to 12'

* B, F, and toe pressure were obtained from Std. plans. (2010),
  B = 9.5'
  F = 1.33'

Service q_{all} = 2.8 ksf ; Per
Strength q_{ult} = 3.8 ksf Designas
Extreme q_{ult} = 6.6 ksf

D = 1.5 + F
= 2.83'.

Bearing Capacity Equation (10.6.3.1.2a-1)

$$q_u = c N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \qquad (\because \phi = 0)$$

$$N_{cm} = N_c s_c i_c \; ; \; N_{qm} = N_q s_q i_q d_q \; ; \; N_{\gamma m} = N_\gamma s_\gamma i_\gamma$$

load inclination factors $i_c = i_q = i_\gamma = 1$
shape factors $s_c = s_q = s_\gamma = 1$ ($\phi = 0$ & $L \gg B$)
depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

$\therefore q_u = c N_{cm} + \gamma D$

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date 8/23/11 Sheet 2 of 2

Bearing Capacity Equation (10.6.3.1.2a-1)

$$q_u = C N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \qquad (\because \phi = 0)$$

$N_{cm} = N_c s_c i_c$; $N_{qm} = N_q s_q i_q d_q$; $N_{\gamma m} = N_\gamma s_\gamma i_\gamma$

load inclination factors $i_c = i_q = i_\gamma = 1$

shape factors $s_c = s_q = s_\gamma = 1$ ($\phi = 0$, $L \gg B$)

depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

$$q_u = C N_{cm} + \gamma D$$

for stronger layer overlies weaker layer:

$$N_{cm} = \left(\frac{1}{\beta_m} + K N_c\right) \le N_c = 5.14 \quad (\because s_c = 1)$$

$$\beta_m = \frac{BL}{2(B+L)H_{s1}} = 0.51 \qquad \left(\because \frac{L}{B} \ge 100\right)$$

$$K = c_2/c_1 = 2/2.5 = 0.8$$

$N_{cm} = 6.1$

$\Rightarrow$ USE $N_{cm} = 5.14$

$\therefore q_u = (2.5 \times 5.14) + (0.12 \times 2.83)$

$= 13.1$ ksf //

Service Limit

$$q_{all} = \frac{q_u}{FoS} = \frac{13.1}{3} = 4.3 \text{ ksf} > \text{Bearing stress } q_o' = 2.8 \text{ ksf}$$ //

Strength Limit

$q_{all} = 0.45 q_u = 5.8$ ksf $>$ Bearing stress $q_o' = 3.8$ ksf //

Extreme Limit

$q_{all} = 1 \times q_u = 13.1$ ksf $>$ Bearing stress $q_o' = 6.6$ ksf //

I-880 Operational & Safety Improvement Project

RW 224 - Type 1 Wall (H=6')

Consolidation Settlement

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # 3-1) (ksf)	Stress Increase 2 (See Sheet # 3-1) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.002**	**1.439**	**1.44**	0.482	1.919	0.72
CL 2	16	8	4	0.960	**0.024**	**1.087**	**1.06**	0.984	2.047	0.31
CL 3	7	17	14	1.666	**0.129**	**0.570**	**0.44**	1.794	2.236	0.24
CL 4	-1.5	25.5	3	2.155	**0.209**	**0.372**	**0.16**	2.365	2.527	0.00
									Total Settlement (in):	**1.27**

After 2' overex $\Rightarrow \delta = 1''$

1.3"

I-880 Operational & Safety Improvement Project

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 224 - Type 1 Wall (H=8')

Consolidation Settlement

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # 3-1) (ksf)	Stress Increase 2 (See Sheet # 3-1) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.002**	**1.677**	**1.67**	0.482	2.157	0.78
CL 2	16	8	4	0.960	**0.024**	**1.138**	**1.11**	0.984	2.098	0.32
CL 3	7	17	14	1.666	**0.129**	**0.673**	**0.54**	1.794	2.339	0.29
CL 4	-1.5	25.5	3	2.155	**0.209**	**0.490**	**0.28**	2.365	2.646	0.00
									Total Settlement (in):	**1.39**

1.4"

After 2.5' overex $\Rightarrow \delta = 1"$

I-880 Operational & Safety Improvement Project

RW 224 - Type 1 Wall (H=10')

Consolidation Settlement

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # 3-1) (ksf)	Stress Increase 2 (See Sheet # 3-1) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.022**	**2.667**	**2.65**	0.502	3.147	0.96
CL 2	16	8	4	0.960	**0.163**	**1.998**	**1.84**	1.123	2.958	0.40
CL 3	7	17	14	1.666	**0.269**	**1.068**	**0.80**	1.935	2.734	0.38
CL 4	-1.5	25.5	3	2.155	**0.330**	**0.714**	**0.38**	2.485	2.869	0.00
							Total Settlement (in):			**1.74**

1.8"

After 3.5' overex ⇒ $\delta = 1"$

I-880 Operational & Safety Improvement Project

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 224 - Type 1 Wall (H=12')

Consolidation Settlement

Ground Surface El. = 24 ft

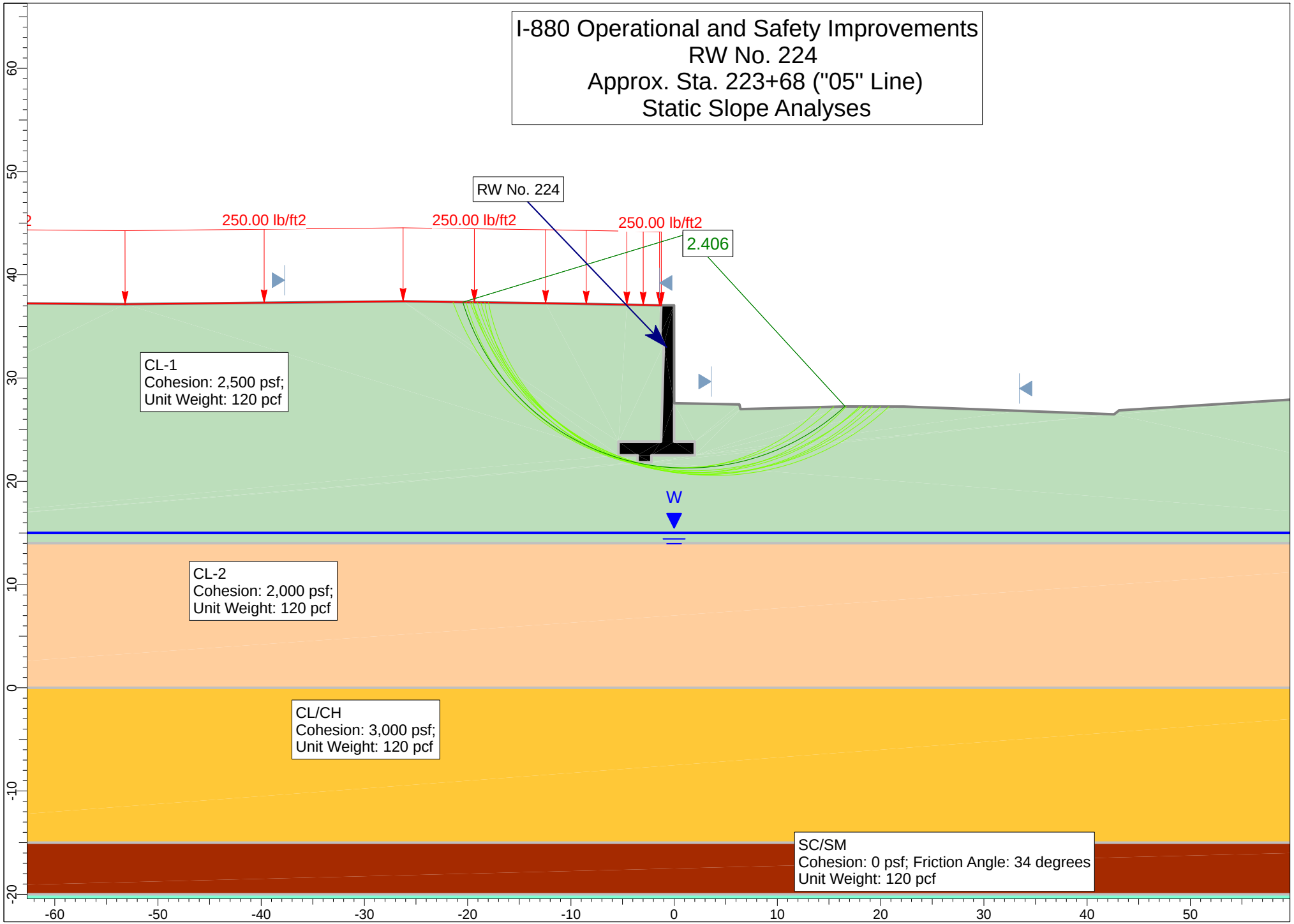
Groundwater El. = 13 ft

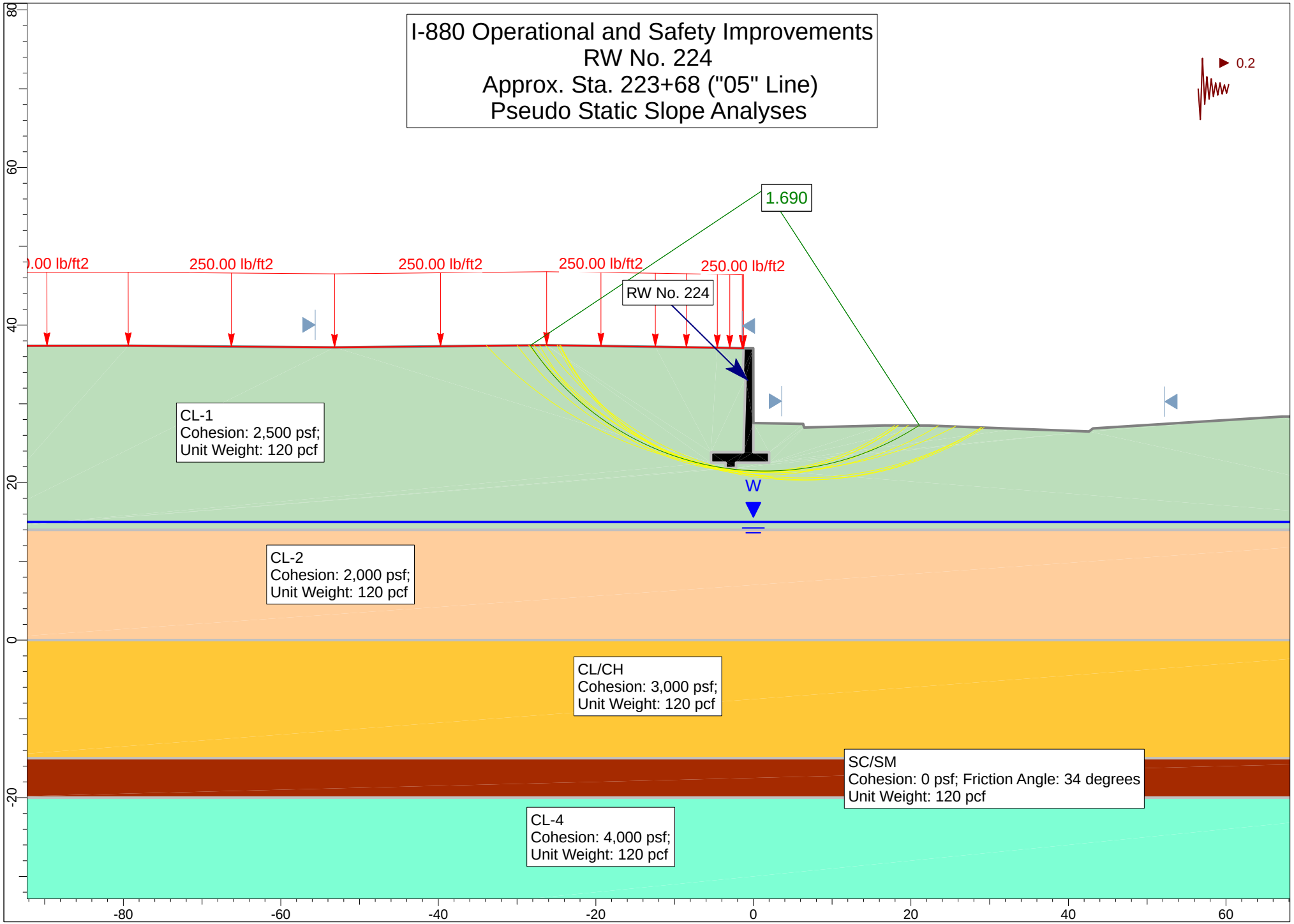
Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # 3-1) (ksf)	Stress Increase 2 (See Sheet # 3-1) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.022**	**2.667**	**2.65**	0.502	3.147	0.96
CL 2	16	8	4	0.960	**0.163**	**1.998**	**1.84**	1.123	2.958	0.40
CL 3	7	17	14	1.666	**0.269**	**1.068**	**0.80**	1.935	2.734	0.38
CL 4	-1.5	25.5	3	2.155	**0.330**	**0.714**	**0.38**	2.485	2.869	0.00
									Total Settlement (in):	**1.74**

1.8"

After 3.5' overex ⇒ S = 1"


I-880 Operational and Safety Improvements
RW No. 224
Approx. Sta. 223+68 ("05" Line)
Static Slope Analyses
RW No. 224
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
2.406
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
W
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
60
50
40
30
20
10
0
-10
-20
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50


I-880 Operational and Safety Improvements
RW No. 224
Approx. Sta. 223+68 ("05" Line)
Pseudo Static Slope Analyses
0.2
1.690
.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 224
W
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-80
-60
-40
-20
0
20
40
60

FINAL FOUNDATION REPORT

Overhead Sign Structures
I-880 Operational and Safety Improvements
Alameda County, California
04-Ala-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)
EMI Project No. 10-133
Date: June 25, 2012

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

June 25, 2012

EMI Project No. 10-133

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Attention: Ms. Jennifer Harmon, P.E.

Subject: Final Foundation Report for Overhead Sign Structures
I-880 Operational and Safety Improvements
Alameda County, California
04-Ala-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)

Dear Ms. Harmon:

Attached please find the Final Foundation Report for the Overhead Sign Structures for the I-880 Operational and Safety Improvements project. This report contains the findings and conclusions of our field investigation and laboratory testing program and our recommendations for the design and construction of the foundations for the proposed overhead sign structures. It should be noted that revised pile-head demands, which are slightly less than the original values, were recently provided for Sign "A" by the structural designers. These revised pile-head demands are included in this Final Foundation Report.

Earlier versions of this foundation report, dated September 6, 2011, January 10, 2012, and March 30, 2012, were submitted to Caltrans for review. Copies of the Caltrans review comments and our responses are included in Appendix D. All Caltrans review comments and our responses have been incorporated into this Final Foundation Report.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,

EARTH MECHANICS, INC.

6-25-12

REGISTERED PROFESSIONAL ENGINEER
GNANAPRAGASAM J. GUNARANJAN
No. C71758
Exp: 12-31-2013
CIVIL
STATE OF CALIFORNIA

6-25-12

REGISTERED PROFESSIONAL ENGINEER
LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

(Ranjan) G. J. Gunaranjan, PE 71758
Senior Staff Engineer

Lino Cheang, GE 2345
Project Manager

GJG/gjg,lcc

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

FINAL FOUNDATION REPORT

OVERHEAD SIGN STRUCTURES
I-880 OPERATIONAL AND SAFETY IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880, PM 28.4/29.2
CALTRANS PROJECT NO. 04000001601 (EA 04-0A7100)

Prepared for:

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 10-133

June 25, 2012

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Appendix C. Design Calculations
Appendix D. Caltrans Review Comments on the Foundation Report and EMI Responses

1.0 INTRODUCTION

1.1 Purpose and Scope of Study

This Foundation Report presents the findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for the proposed overhead (OH) sign structures as a part of the Interstate I-880 (I-880) Operational and Safety Improvements Project located in Alameda County, California. It presents results of our foundation evaluation and provides design and construction recommendations to assist RBF Consulting (RBF) designers in preparing the project Plans, Specifications, and Estimates (PS&E) for the project. A site location map is presented in Figure 1-1.

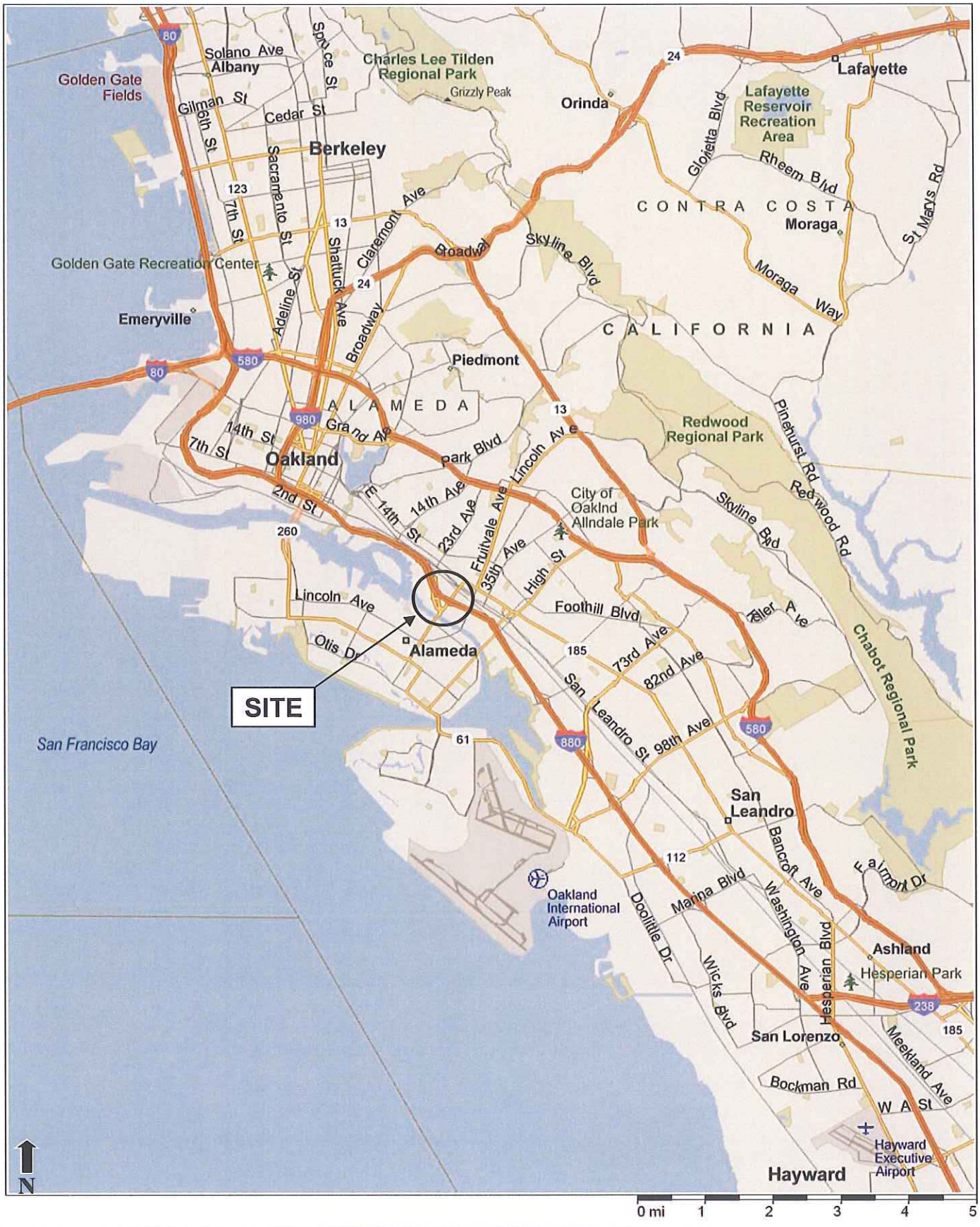
EMI is a subconsultant to RBF. The geotechnical services provided for this project included the following tasks:

- Field exploration consisting of drilling and logging two exploratory borings and one Cone Penetration Test (CPT) sounding;
- Laboratory testing of selected bulk and relatively undisturbed soil samples;
- Engineering calculations and analysis to develop foundation design and construction recommendations; and
- Preparation of this report presenting our findings, conclusions, and recommendations.

1.2 Project Description

The subject project is sponsored by the Alameda County Transportation Commission (ACTA). As part of this project, the California Department of Transportation (Caltrans), in cooperation and coordination with the City of Oakland, proposes to improve operations and safety at 29th Avenue and 23rd Avenue overcrossings (OC) of I-880.

The proposed project will replace the 29th Avenue OC and the two 23rd Avenue OCs and reconstruct the existing northbound 29th and 23rd Avenues off- and on-ramps. The intersection of E. 9th Street / 29th Avenue / northbound 29th Avenue on-ramp will be configured as a roundabout. Replacement of these OCs will also provide room to widen the existing I-880 mainline lanes outside shoulders to the Caltrans standard width and lengthen existing northbound auxiliary lane between the 29th Avenue on-ramp and 23rd Avenue off-ramp. To accommodate the bridge and road widening improvements, a series of retaining walls and a soundwall are proposed. In addition, two OH sign structures are also proposed to be constructed.



I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	Site Location Map Figure 1-1
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 10-133 | Date: 08-25-2011

This foundation report pertains to the OH sign structures only. In addition to this foundation report, a separate foundation report is prepared to address design and construction of the proposed retaining walls and the soundwall (EMI, 2012a). A Geotechnical Design Report (GDR) is prepared to address design and construction of roadway embankments and a Caltrans Standard Type-1 wall (EMI, 2012b), and a Materials Report is prepared to provide recommendations on pavement structural sections and mitigations of buried utility lines and drainage devices against soil corrosion (EMI, 2012c). Foundation reports for the two replacement overcrossings are being prepared by another geotechnical consultant, URS Corporation.

1.3 Proposed Overhead Signs

The proposed OH sign structures are "cantilever" type single-post structures. The OH sign pertinent information is presented in Table 1-1.

Table 1-1. Proposed OH Sign Structure Information

Sign Structure	Station Line	Approximate Station	Approximate Offset	Sign Structure Type	Sign Post Type	Standard Plan Sheet No.
A	"05" Line	223+73	58.5 feet RT	Cantilever	VIII	-
G	"05" Line	242+30	90.2 feet RT	Cantilever	IX	S8

Sign Structure "A" is situated at the eastern end of Wall 224. In order to support the sign post, the footprint of the Wall 224 is enlarged to 14.5 feet by 16 feet in Plan View. The sign and enlarged retaining wall are supported by five 24-inch diameter Cast-in-Drilled-Hole (CIDH) piles connected to a pile cap. Foundation design of Wall 224 is addressed in the GDR (EMI, 2012b).

Sign Structure "G" is located adjacent to the proposed soundwall 232 between 29th and 23rd Avenues. The foundation supporting this sign structure is a single 60-inch diameter CIDH pile similar to Standard Plan Sheet No. S8. Foundation design of soundwall 232 is addressed in a separate foundation report (EMI, 2012a).

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

A geotechnical field investigation was conducted between March 28 and April 19, 2011. Two exploratory borings and one CPT were accomplished under the supervision of EMI. Exploration information, including boring/CPT number, stations, offsets, ground surface elevations, boring/CPT depths, and groundwater elevations are summarized in Table 2-1. Locations of the exploratory borings and CPT are shown on the Log-of-Test-Borings (LOTB) sheets provided in Appendix A.

Table 2-1. Geotechnical Exploration Information

Exploration No.	Station Line	Approx. Station	Approx. Offset (feet)	GSE (ft)	GWE (ft)	Exploration Depth (ft)	Method
R-11-002	"05" Line	225+11	72RT	+26.6	+13.6	71.5	RW
R-11-014	"05" Line	242+02	85RT	+19.5	+10.0	71.5	
CPT-11-001	"05" Line	224+00	51RT	+27.0	NM	50.0	CPT

Notes:
GSE = Approximate Ground Surface Elevation; GWE = Approximate Groundwater Elevation; RW = Rotary Wash Boring; CPT = Cone Penetrometer Test; NM = Not Measured.

2.1.1 Soil Borings

Exploratory borings were drilled by Pitcher Drilling Co., under a subcontract with EMI, using a truck-mounted drill rig equipped with 5-inch diameter drill bit and a mud-rotary circulation drill system. The top 10 feet to 15 feet of depth was drilled using an 8-inch diameter drill bit. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval is generally 5 feet. Relatively undisturbed soil samples were obtained using a 3-inch outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1-inch long with a 2.5-inch outside diameter. The SPT sampler (1.4-inch inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18 inches into the ground or until refusal was encountered using a 140-lb automatic hammer free falling from a height of 30 inches. The numbers of blows to advance the sampler each 6 inches of penetration was recorded. The numbers of blows for the final 12 inches or shorter of driving was recorded on the LOTB sheets.

Charts published by Winterkorn and Fang (1975) can be used to determine a reduction factor used to convert blowcounts recorded using the MCD sampler into SPT blowcounts. Using those charts, we obtained a reduction factor of 0.5 which was used for this project.

2.1.2 CPT Sounding

The CPT sounding was performed by Middle Earth Geo Testing, Inc., under subcontract with EMI, using an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and ASTM D3441). The CPT equipment consisted of a cone penetrometer

assembly mounted at the end of a series of hollow sounding rods. The cone penetrometer assembly consisted of a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in² (10 cm²) and a cylindrical friction sleeve with a surface area of 23.25 in² (150 cm²). The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurements of cone tip and friction sleeve resistance during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79 inch per second (20 mm per second) while the cone tip resistance and sleeve friction resistance are recorded every 1.967 inches (50 mm) and stored in digital form. A specially designed all-wheel drive 25-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

2.2 Laboratory Testing

Soil samples considered representative of the subsurface conditions were tested to obtain or derive relevant physical and engineering soil properties. The following laboratory tests were conducted to supplement the observations recorded during the field investigation:

- In-situ Moisture Content and Unit Weight
- Percent Passing No. 200 Sieve
- Atterberg Limit
- Direct Shear
- Unconsolidated Undrained Triaxial
- Pocket Penetrometer
- Consolidation
- Maximum Density and Optimum Moisture Content
- R-Value
- Minimum Resistivity, pH, Sulfate Content and Chloride Content

The laboratory tests were conducted in general accordance with California Test Methods or American Society for Testing and Materials (ASTM) Standards. Laboratory test results are included in Appendix B.

R-value test is noted on the LOTBs in Appendix A. These test results were not used in preparation of the recommendations included in this report and therefore, they were omitted from Appendix B.

3.0 REGIONAL GEOLOGY AND SUBSURFACE CONDITIONS

3.1 Regional Geology

The project area is located in the Coast Ranges geomorphic province of California. The Coast Ranges are bounded by the Pacific Ocean on the west and the Great Valley on the east. The ranges extend from the Oregon border south to the Santa Ynez River near Santa Barbara; San Francisco Bay further subdivides the province into the northern and southern sections. The Coast Ranges are characterized by discontinuous, northwest-trending mountain ranges, ridges, and valleys. East of the San Andreas Fault, most of the province bedrock is composed of a heterogeneous mix of marine and volcanic rocks of the Franciscan Assemblage, including chert, greywacke sandstone, altered mafic volcanic rock, shale, serpentinite, and metamorphic rock. Granitic rocks of the Salinian block comprise much of the basement rock of the ranges located west of the San Andreas Fault.

The project area is underlain predominantly by medium stiff to very stiff layers of clay with silt and sandy clay and few interbedded layers of medium dense to very dense sand and gravel. The geologic formations of importance to this project are flat-lying sediments with no notable geologic structures such as faults, folds, or unconformities. The site area is flat, with no natural hills or slopes.

The subsurface soil conditions at the project location consist primarily of unconsolidated Holocene alluvial fan deposits. These materials are typical of late Quaternary-age sediments deposited in a distal alluvial fan environment. The project site is mapped as undifferentiated Holocene alluvial gravel, sand, and clay by Dibblee (2005) and as Holocene alluvial fan sand and sandy gravel upwardly fining to sandy or silty clay by Graymer (2000) and Helley and Graymer (1997). According to Knudsen et al. (2006) and CGS (2003), the site is underlain by Holocene alluvial fan deposits. Regional mapping indicates that elevation of Franciscan bedrock in the vicinity of site is about 800 to 850 feet below MSL.

3.2 Soil Conditions

Recent field investigation indicates that the subsurface materials at the OH sign locations consist predominately of medium stiff to hard layers of lean clay and fat clay with varying amounts of sand and gravel and few interbedded layers of medium dense to very dense clayey sand, silty sand, and sand with gravel down to the exploration termination depth.

The idealized soil profile and design strength parameters for foundation design of the two OH sign structures are presented in Table 3-1. As shown in the calculation sheets included in Appendix C, foundation design of sign structures is not sensitive to soil condition at deep depths. For this reason, the idealized soil profiles and strength parameters in Table 3-1 were limited to a depth of no more than El. -20 feet and -10 feet for Sign "A" and Sign "G", respectively.

Table 3-1. Idealized Soil Profile and Strength Parameters

Approximate Elevation (feet)	Predominant Soil Type	Equivalent SPT Blowcount* (blows/foot)	Friction Angle (degree)	Cohesion / Undrained Shear Strength (psf)
Sign A at Sta. 223+73 ("05" Line) (Boring R-11-002 and Sounding CPT-11-001)				
+27 to +14	Lean Clay and Lean Clay with Sand	(11) to 17 Average = 13	-	2,500
+14 to +9	Lean Clay and Lean Clay with Sand	(5)	-	1,000
+9 to 0	Lean Clay and Lean Clay with Sand	(17) to 18 Average = 17	-	2,500
0 to -15	Lean Clay and Fat Clay	(9) to 34 Average = 16	-	3,000
-15 to -20	Clayey Sand and Silty Sand	22 to 35 Average = 29	34	100
Sign G at Sta. 242+30 ("05" Line) (Boring R-11-014)				
+19.5 to +10	Lean Clay with Sand and Fat Clay with Sand	(9) to (21) Average = 15	-	2,000
+10 to -10	Lean Clay with Sand and Fat Clay	3 to 19 Average = 9	-	2,500

** Values in ( ) are converted SPT blowcounts corrected for sampler size; correction factor from Modified California Drive sampler blowcounts to SPT blowcounts is 0.5.*

In Table 3-1, the soil strength parameters for sandy soils are based on the correlations with SPT blowcounts (Lam and Martin, 1986) and laboratory direct shear test results; and soil strength parameters for clayey soils are based on CPT sounding data (Robertson and Campanella, 1989) and laboratory unconsolidated undrained triaxial compression test results.

3.3 Groundwater Conditions

As shown in Table 2-1, groundwater was recorded in the two soil borings at depths of 9.5 feet and 13.0 feet below the ground surface, which is at El. +10 feet and El. +13.6 feet. Groundwater was also encountered between El. +4.9 feet and El. +14.3 feet from additional soil borings drilled along the project corridor between March 28 and April 20, 2011 (EMI, 2012c). In a past field investigation conducted in 1993, groundwater was encountered in two explorations at elevations -1.5 feet and -1.7 feet. Based on California Geological Survey (Division of Mines and Geology, 2003), the recorded highest historical groundwater depth varies from about 5 to 10 feet along the project corridor.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Seismic Design Criteria

Based on the ARS curve presented in the Preliminary Foundation Reports for 23rd Avenue OC Replacement (URS, 2011a) and 29th Avenue OC Replacement (URS, 2011b), a peak ground acceleration (PGA) of 0.72g is obtained for the proposed OH sign structures. The PGA is the zero-period spectral acceleration in the ARS curve.

4.2 Liquefaction

Liquefaction analysis was performed using the available subsurface information collected for the whole project and the historical high groundwater depth of 5 feet below the existing grade.

The liquefaction potential of the saturated, granular materials below the historical high groundwater table was evaluated using the procedures outlined by Seed et al. (1983), Seed and Harder (1990), and updated by NCEER (1997). Only two soil borings R-11-002 and R-11-021 that contain about 5-foot thick isolated coarse-grained soil layers were selected for the liquefaction analyses for the project; other borings have scattered coarse-grained soil layers less than 5 feet thick. These relatively thin soil layers, even if liquefy, will have a minimal impact on the OH sign foundation.

Result of the liquefaction analysis is included in Appendix C and it shows that the isolated layer of coarse-grained soil is not expected to be susceptible to liquefaction. As a result, liquefaction induced ground subsidence is anticipated to be small and soil liquefaction should not have any adverse impact on the OH sign foundations.

4.3 Soil Corrosivity

Two soil samples recovered from borings drilled near the proposed OH sign structures were tested for pH, minimum resistivity, soluble chloride content and soluble sulfate content. The test results are summarized in Table 4-1.

Table 4-1. Soil Corrosion Test Results

Boring No.	Station Line	Approx. Station	Approx. Offset (feet)	Sample Depth (feet)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
R-11-002	"05" Line	225+11	32RT	5	CL	1,300	7.3	65	219
R-11-014	"05" Line	242+02	85RT	5	CH	1,300	6.6	70	158

Minimum resistivity was 1,300 ohm-cm. The pH values were 6.6 and 7.3. The soluble sulfate measurements were 65 and 70 parts per million (ppm), and the soluble chloride measurements were 158 and 219 ppm.

Based on the Caltrans Corrosion Guidelines (Caltrans, 2003), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate

concentration is 2,000 ppm or greater. Based on the test results and the Caltrans criteria, the on-site soils are considered to be non-corrosive to bare metals and concrete.

Additional soil samples were tested for pH, minimum resistivity, soluble chloride content and soluble sulfate content along the project corridor. Test results are summarized in the Materials Report (EMI, 2012c). These test results also indicate that the on-site soils are not corrosive to bare metals and concrete per Caltrans criteria.

4.4 Foundation Design for OH Sign Structures

Foundation design recommendations for two OH sign structures ("A" and "G") are included in this report.

4.5 Pile Foundation Design of Sign "A"

As mentioned in Section 1.3, the proposed OH sign "A" is situated on a 14.5 feet by 16 feet enlarged portion of Wall 224. A total of five 24-inch diameter CIDH piles are used to support the sign and Wall 224.

4.5.1 Pile Foundation Demand

Single pile loads are provided by the structural designers and presented in Table 4-2.

Table 4-2. Foundation Information for Sign "A"

LRFD Load Case	Pile Head Shear (kips)	Compression (kips)	Tension (kips)
Service-I Limit State	22	85	0
Strength Limit State	25	135	12
Extreme Event Limit State	33	119	4

4.5.2 Pile Capacity Calculations

Axial Pile Analyses: Results of the axial pile analysis are included in Appendix C. Pile foundation design recommendations are presented in Table 4-3. The Pile Data Table for the Contract Plans is presented in Table 4-4.

Based on the pile layout provided by the structural designers, a GEF of 0.9 was used for the analysis. The pile capacity is based on soil resistance only and may be further limited by the pile-head connection details and the strength of the pile materials.

The maximum pile-head settlement due to the nominal resistances is estimated to be less than 1-inch for a minimum pile length of 12 feet. Therefore, no design pile tip elevation is required for settlement.

Table 4-3. Pile Foundation Design Recommendations for Sign "A"

Pile Type	Cut-off El. (feet)	Service-I Limit State Loads per Pile (kips)	Total Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip El. (feet)	Specified Tip El. (feet)
				Strength Limit		Extreme Event			
				Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)		
24" CIDH	+23.08	90	1	140	20	120	10	-17 (a-I) -4 (a-II) +15 (b-I) +17 (b-II) -2 (d)	-17

Notes:
1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. There is no design tip elevation for Tolerable Settlement.
3. The specified tip elevation shall not be raised.

Table 4-4. Pile Data Table for Sign "A"

Pile Type	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevation (feet)
	Compression	Tension		
24" CIDH	200	30	-17 (a) +15 (b) -2 (d)	-17

Notes:
1. Design tip elevations are controlled by the following demands: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
2. There is no design tip elevation for Tolerable Settlement.
3. The specified tip elevation shall not be raised.

Lateral Pile Analyses: Lateral pile solutions were performed using the computer program LPILE (Ensoft, 2010), the soil strength parameters in Table 4-1, and the pile-head shear. The soil resistance versus pile deflection (p-y) curves for sandy soils were developed using the API criteria (API, 2000), and the p-y curves for clayey soils were developed using the Matlock criteria (1970). A cracked sectional modulus (EI) of the CIDH pile equal to one-half the gross EI was used. Based on the pile layout provided by the structural designers, a GEF of 0.88 was used for the lateral pile solutions.

Lateral pile analyses were performed to determine the minimum pile length for allowable pile-head deflection under Service-I Limit State condition, and to size the minimum required pile reinforcement under the larger of the Strength or Extreme Limit State load conditions. Results of the lateral pile analyses in terms of maximum shear, bending moment, and lateral deflection along the pile length for a free-head condition are included in Appendix C. A summary is presented in Table 4-5.

Table 4-5. Lateral Pile Solutions for Sign "A"

Selected LRFD Case	Maximum Pile-Head Deflection (in)	Maximum Shear (kip)	Depth to Max. Shear from Pile Top (feet)	Maximum Moment (kip-ft)	Depth to Max. Moment from Pile Top (feet)
Service-I Limit State	0.20	30	0.0	70	5
Strength Limit State	0.52	50	0.0	146	6

4.6 Pile Foundation Design of Sign "G"

Sign "G" seats on a typical pedestal on a single-large diameter CIDH pile. The diameter of the CIDH pile is 60 inches. The applicable Caltrans Standard Plan sheet for Sign "G" is Sheet S8 (Caltrans, 2010). Based on this plan sheet, the foundation depth is 25 feet. The foundation depth is measured from the bottom of the pile pedestal.

4.6.1 Pile Foundation Demand

According to the previous version of Caltrans Standard Plans (2006a), the CIDH pile foundation design is based on the 2001 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, Traffic Signals, article 13.6, Broms' approximate procedure for cohesionless material, assuming an angle of internal friction (ϕ) of 30 degrees and a unit weight (γ) of 120 lb/ft^3 (pcf).

The site-specific field investigation reveals that the subsurface soil type within the "foundation depth" zone consists of fine-grained materials of lean clay and fat clay with undrained shear strengths of 2 ksf or more (see Table 3-1). As a result, pile foundation design should be performed using the site-specific soil parameters listed in Table 3-1, the pile diameter and depth shown on the Caltrans Standard Plans Sheet S8 for Post Type IX, and foundation demands provided by the structural designers. Single pile loads provided by the structural designers are presented in Table 4-6.

Table 4-6. Foundation Information for Sign "G"

LRFD Load Case	Pile Head Shear (kips)	Pile Head Moment (kip-ft)	Axial Compression (kips)
Service-I Limit State	12	515	25
Strength Limit State	20	740	35
Extreme Event Limit State	12	420	25

4.6.2 Pile Capacity Calculations

Axial Capacity: Axial capacity is estimated using the computer program SHAFT Version 6.0 (Ensoft, 2007) and the soil strength parameters in Table 3-1. Results of the axial pile analysis are included in Appendix C. Pile foundation design recommendations are presented in Table 4-7. The Pile Data Table for the Contract Plans is presented in Table 4-8.

The maximum pile-head settlement due to the nominal resistances is estimated to be less than 1-inch for a minimum pile length of 12 feet. Therefore, no design pile tip elevation is required for settlement.

Table 4-7. Pile Foundation Design Recommendations for Sign "G"

Pile Type	Pile Cut-off El. (feet)	Service-I Limit State Loads per Pile (kips)	Total Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip El. (feet)	Specified Tip El. (feet)
				Strength Limit		Extreme Event			
				Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)		
60" CIDH	+18.8	25	1	35	0	25	0	+5 (a-I) +6 (a-II) -6 (d)	-6

Notes:
1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. There are no design tip elevations for Tension and Tolerable Settlement.
3. The specified tip elevations shall not be raised.

Table 4-8. Pile Data Table for Sign "G"

Pile Type	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevation (feet)
	Compression	Tension		
60" CIDH	50	0	+5 (a) -6 (d)	-6

Notes:
1. Design tip elevations are controlled by the following demands: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
2. There are no design tip elevations for Tension and Tolerable Settlement.
3. The specified tip elevations shall not be raised.

Based on the pile layout provided by the structural designers, a pile group efficiency factor (GEF) of unity was used for the axial capacity calculations. The pile capacity is based on soil resistance only and may be further limited by the pile-head connection details and the strength of the pile materials.

Lateral Pile Analyses: Lateral pile solutions were performed using the computer program LPILE (Ensoft, 2010), the soil strength parameters in Table 4-1, and a combined pile-head shear and overturning moment. The soil resistance versus pile deflection (p-y) curves for sandy soils were developed using the API criteria (API, 2000), and the p-y curves for clayey soils were developed using the Matlock criteria (1970). A cracked sectional modulus (EI) of the CIDH pile equal to one-half the gross EI was used. A GEF of unity was used for the lateral pile solutions based on the pile layout provided by the structural designers.

Lateral pile analyses were performed to determine the minimum pile length for allowable pile-head deflection under Service-I Limit State condition, and to size the minimum required pile reinforcement under the larger of the Strength or Extreme Limit State load conditions. Results of the lateral pile analyses in terms of maximum shear, bending moment, and lateral deflection along the pile length for a free-head condition are included in Appendix C. A summary is presented in Table 4-9.

Table 4-9. Lateral Pile Solutions for Sign "G"

Selected LRFD Case	Maximum Pile-Head Deflection (in)	Maximum Shear (kip)	Depth to Max. Shear from Pile Top (feet)	Maximum Moment (kip-ft)	Depth to Max. Moment from Pile Top (feet)
Service-I Limit State	0.12	53	14	560	5
Strength Limit State	0.40	110	16	1,180	6

It should be noted that pile reinforcement requirements should be based on either Standard Plans Sheet S8 (Caltrans, 2010) or results of Table 4-9, whichever is more stringent.

4.7 Global Stability Analyses

Based on plans provided by the designers, the proposed OH sign structures are founded on relatively flat grades; therefore, the global stability of the ground supporting the OH sign structures under static and pseudo static conditions are not considered to be a design issue.

5.0 CONSTRUCTION RECOMMENDATIONS

5.1 Earthwork

Earthwork should be performed in accordance with Caltrans Standard Specifications, Section 19 (Caltrans, 2006b). Appropriate measures should be taken to prevent damage to adjacent structures and utilities. Any design and construction of temporary sloping, sheeting, or shoring should be made the contractor's responsibility. It should be noted that it is the responsibility of the contractor to oversee the safety of the workers in the field during construction. The contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented in this section. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

During the recent field investigation conducted the proposed OH sign structures by EMI between March 28 and April 19, 2011, groundwater was recorded in two soil borings at the depths of 9.5 feet and 13.0 feet below the ground surface, which is at El. +10 feet and El. +13.6 feet. Groundwater was encountered between El. +4.9 feet and El. +14.3 feet from the additional soil borings drilled along the project corridor (EMI, 2012c). Based on California Geological Survey (Division of Mines and Geology, 2003), the recorded highest historical groundwater depth varies from about 5 to 10 feet along the project corridor. Using the above groundwater measurements, groundwater may be encountered during footing construction. Therefore, groundwater encountered during footing construction should be controlled in accordance with Section 19-3.04 of the Caltrans Standard Specifications (Caltrans, 2006b).

5.2 Pile Construction

Twenty-four and sixty-inch diameter CIDH piles will be used to support the proposed sign structures. A wet construction is anticipated for these CIDH piles. As a standard Caltrans practice for wet-constructions, PVC tubings should be installed within the reinforcement cage for gamma-ray testing.

Construction of CIDH piles should follow Section 49-4, "Cast-in-Place Concrete Piles" of the Caltrans Standard Specifications (2006b). The Contractor should be required to drill the bottom of the shaft boring with a clean-out bucket to ensure adequate removal of loose soils. Both clean-out and concrete placement should be addressed in the specifications. The shaft borings should be inspected and approved by the Resident Engineer prior to installation of reinforcement. Per latest Caltrans requirement, 3-inch and 4-inch of concrete covers over reinforcement should be provided to improve the construction of 24-inch and 60-inch diameter CIDH piles, respectively.

Onsite soils are generally fine-grained and contain pockets of granular soils. These granular soils are susceptible to caving. The use of temporary casing is at the contractor's discretion. If a casing is deployed, vibratory and oversized predrilling techniques for casing installation are not allowed. The temporary casing should be placed tight in the borehole. The casing should be pulled as the concrete is being poured while always maintaining at least a 5-foot head of concrete inside the casing. In the event that any boring becomes bell-shaped and cannot be advanced due to severe caving, all loose material should be removed from the bottom of the boring and the

caved region filled with a low strength sand-cement slurry. Drilling may continue when the slurry has reached its initial set.

5.3 Review of Construction Plans

Recommendations contained in this report are based on preliminary plans. The geotechnical consultant should review the final construction plans and specifications in order to confirm that the general intent of the recommendations contained in this report have been incorporated into the final construction documents. Recommendations contained in this report may require modification or additional recommendations may be necessary based on the final design.

5.4 Geotechnical Observation and Testing

It is recommended that inspections and testing be performed by the geotechnical consultant during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill
- Shoring installation
- Footing excavations and constructions
- Pile construction
- When any unusual subsurface conditions are encountered

6.0 LIMITATIONS

This report is intended for the use of Alameda County Transportation Commission (ACTA), RBF Consulting, and Caltrans for the proposed overhead sign structures on CIDH pile foundation within the I-880 Operational and Safety Improvements Project. This report is based on the project as described and the information obtained from the exploratory borings and CPT soundings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings and CPT soundings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings and CPT soundings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI has no responsibility for construction means, methods, techniques, sequences, or procedures; for safety precautions or programs in connection with the construction; for the acts or omissions of the CONTRACTOR or any other person performing any of the construction; or for the failure of any worker to carry out the construction in accordance with the Final Construction Drawings and Specifications.

Services performed by EMI have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

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Appendix A

LOG OF TEST BORINGS SHEETS

BENCH MARK:

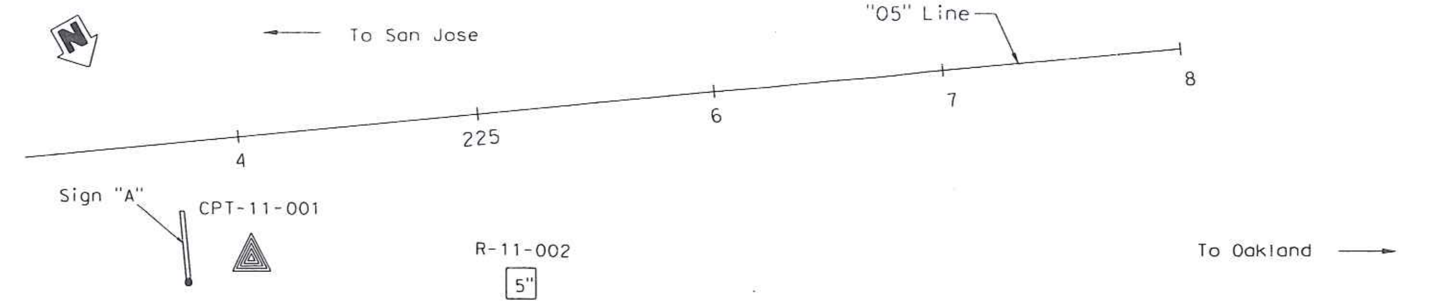
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

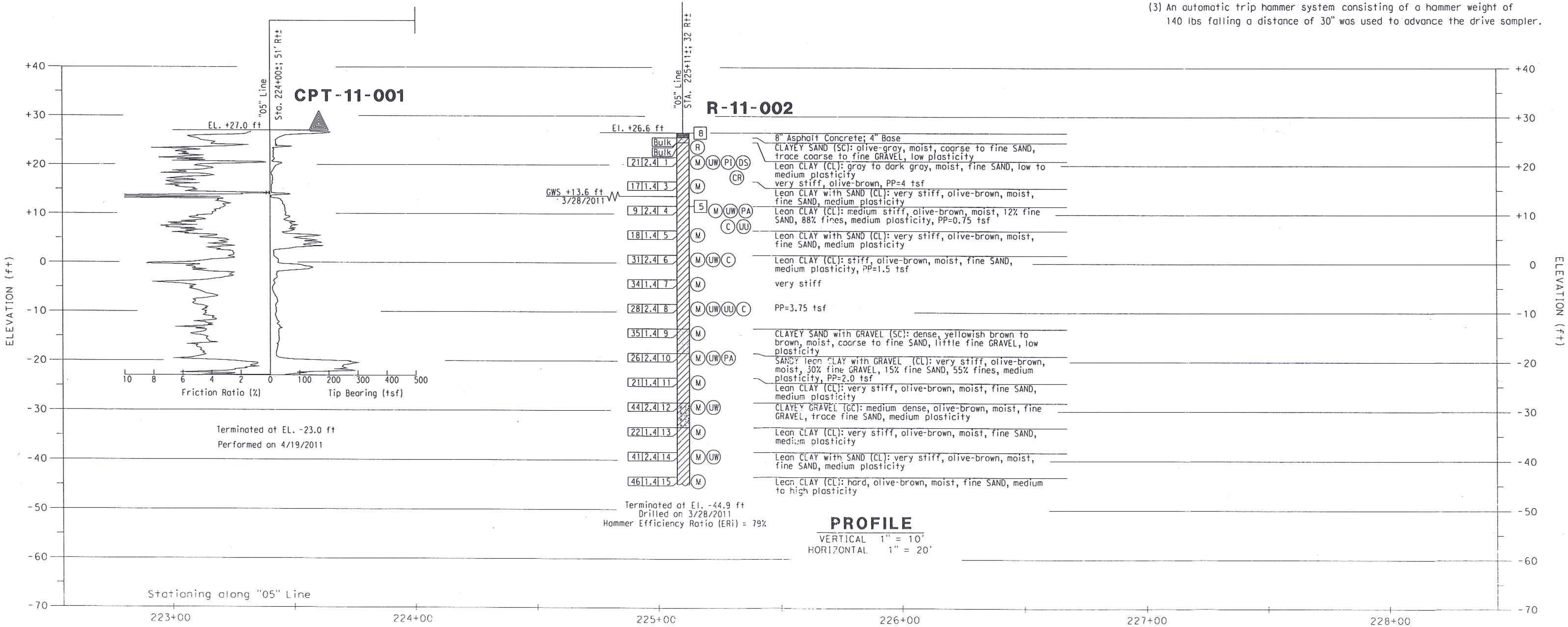
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	DATE: 3/2011, 4/2011			POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 0400000160

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET — OF

CONTRACT NO. — PROJECT ID:

BENCH MARK:

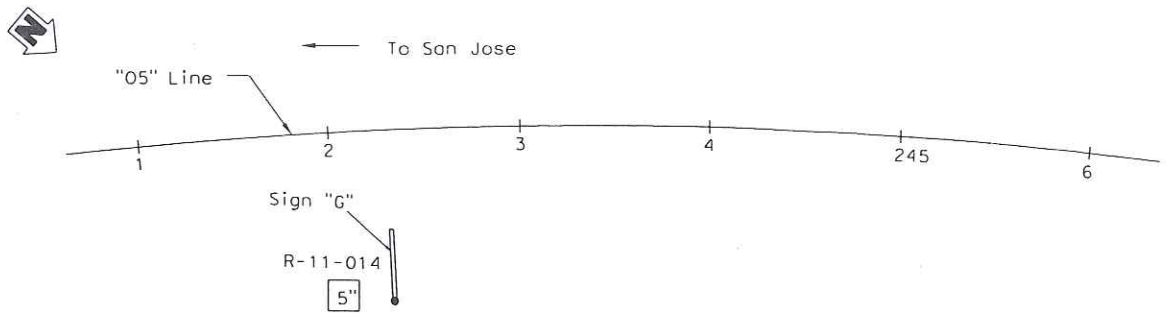
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



To Oakland →

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG NO. GE 2345 EXP. 9-30-13 GEOTECHNICAL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

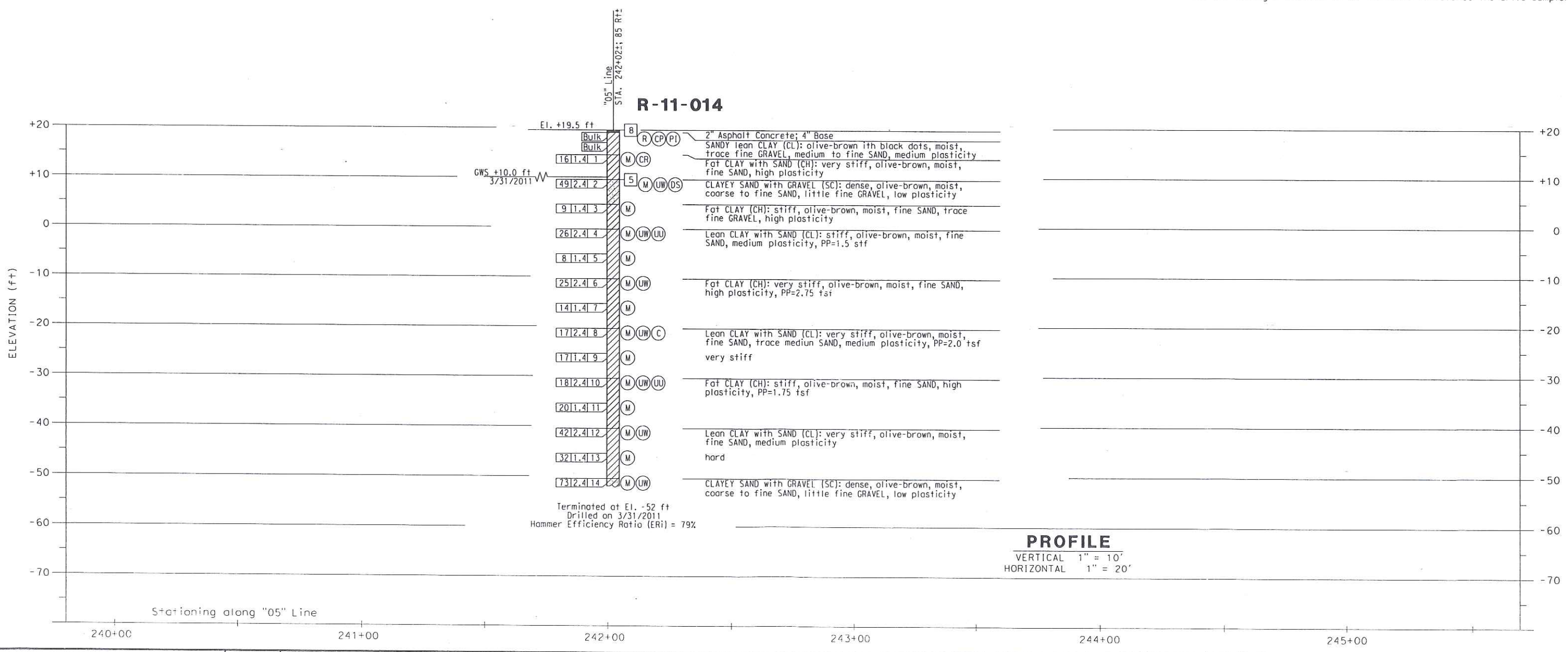
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

PLAN

1" = 50'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L.Cheang PROJECT ENGINEER	BRIDGE NO. -	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	DATE: 3/2011, 4/2011			POST MILES Varies	LOG OF TEST BORING 2 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER _____ DATE _____

PLANS APPROVAL DATE _____

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

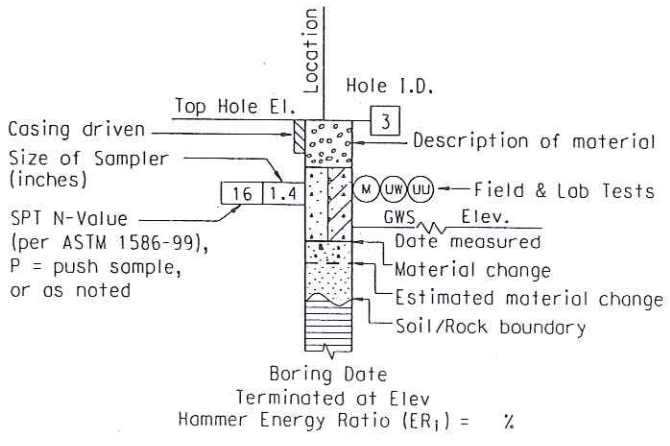
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R	Rotary drilled boring (conventional)
	RW	Rotary drilled with self-casing wire-line
	RC	Rotary core with continuously-sampled, self-casing wire-line
	P	Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD	Hand driven (1-inch soil tube)
	HA	Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778)
[ ]	O	Other (note on LOTB)

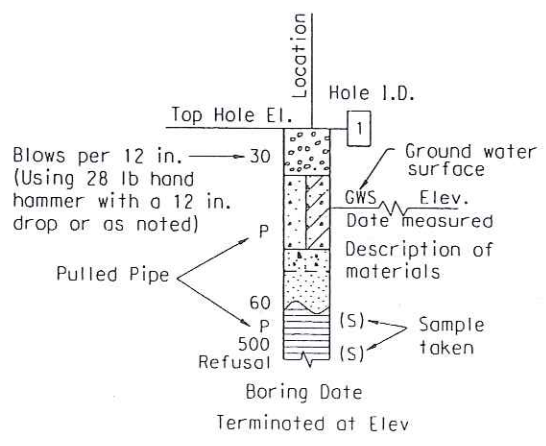
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

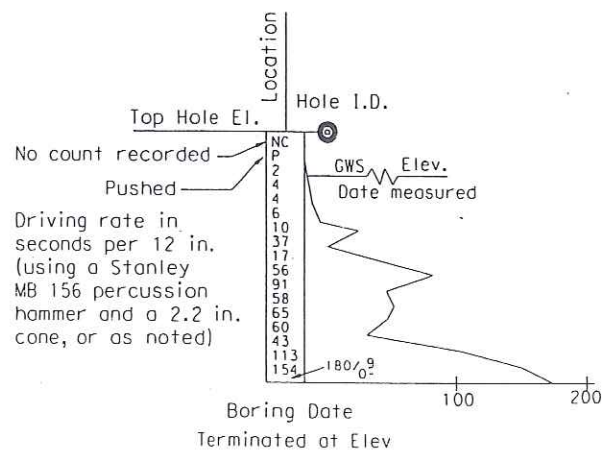
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



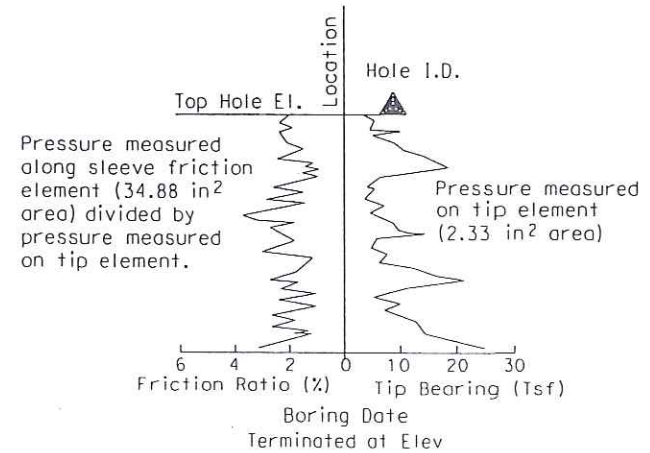
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -	SOIL LEGEND
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247 PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES | SHEET | OF

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (UC) Unconfined Compression-Soil (ASTM D 2166)
Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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FOUNTAIN VALLEY, CA 92708

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

DESIGN OVERSIGHT

SIGN OFF DATE

DRAWN BY: J. Fang

CHECKED BY: G. J. Gunaranjan

K. Thant
FIELD INVESTIGATION BY:
DATE: 3/2011, 4/2011

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

L. Cheang
PROJECT ENGINEER

BRIDGE NO. -

POST MILES Varies

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET OF

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

SOIL LEGEND
LOG OF TEST BORINGS 2 OF 2

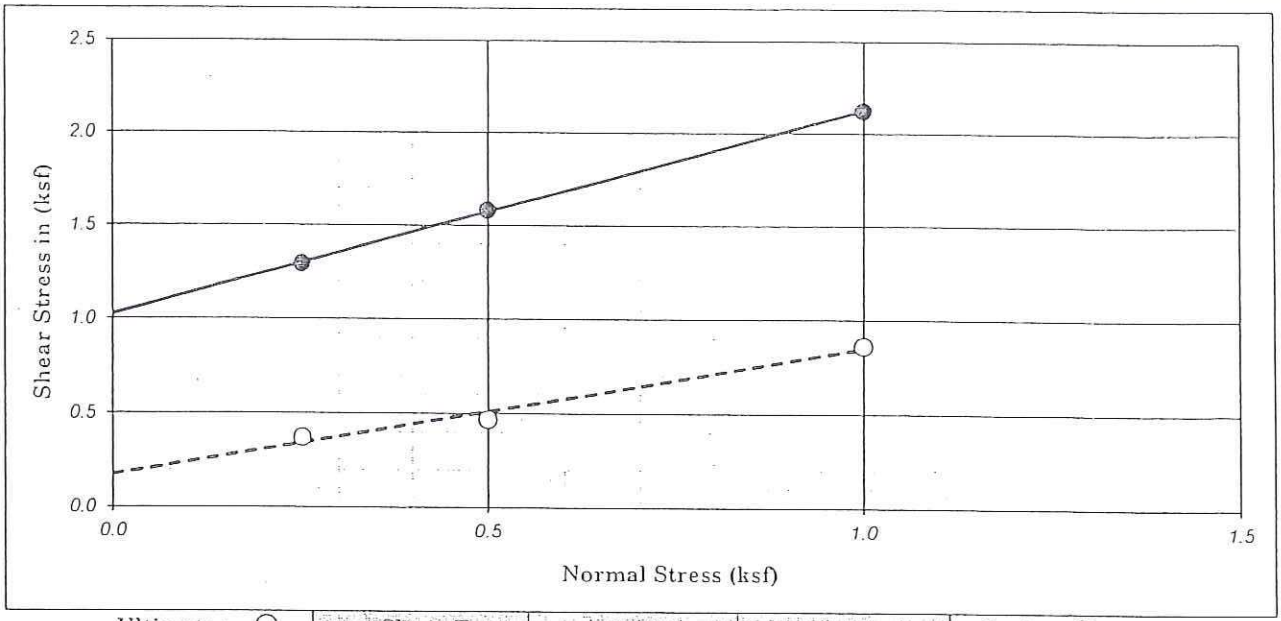
Appendix B

LABORATORY TEST RESULTS

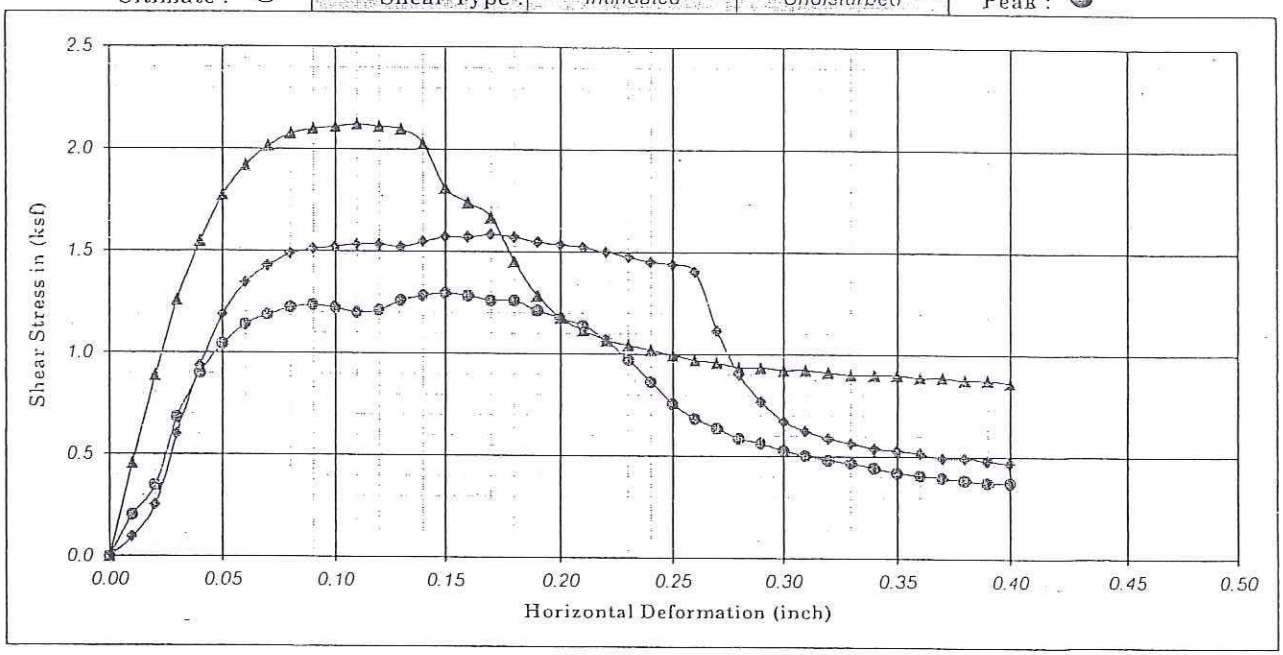
TABLE B1 SUMMARY OF LABORATORY TEST RESULTS FOR OH SIGNS (1 OF 1)

Project No. : *10-133* Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil-pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-002	*D-1*	5	CL	17.8	127.9	4.0				41/17/24	1300	7.3	65	219
R-11-002	*S-3*	10	CL	17.9										
R-11-002	*D-4*	15	CL	25.9	124.0	0.75		0:12:88						
R-11-002	*S-5*	20	CL	17.1										
R-11-002	*D-6*	25	CL	19.6	128.9	1.5								
R-11-002	*S-7*	30	CL	20.7										
R-11-002	*D-8*	35	CL	19.3	130.3	3.75								
R-11-002	*S-9*	40	SC	13.3										
R-11-002	*D-10*	45	CL	23.4	128.3	2.0		30:15:55						
R-11-002	*S-11*	50	CL	19.6										
R-11-002	*D-12*	55	GC	11.9	141.4									
R-11-002	*S-13*	60	CL	33.8										
R-11-002	*D-14*	65	CL	20.9	130.0	2.0								
R-11-002	*S-15*	70	CL	29.1										
R-11-014	*S-1*	5	CH	17.6							1300	6.6	70	158
R-11-014	*D-2*	10	SC	10.3	144.6									
R-11-014	*S-3*	15	CH	30.9										
R-11-014	*D-4*	20	CL	14.3	133.0	1.5								
R-11-014	*S-5*	25	CL	28.4										
R-11-014	*D-6*	30	CH	28.4	125.2	2.75								
R-11-014	*S-7*	35	CH	26.9										
R-11-014	*D-8*	40	CL	22.8	127.9	2.0								
R-11-014	*S-9*	45	CL	22.1										
R-11-014	*D-10*	50	CH	27.5	123.8	1.75								
R-11-014	*S-11*	55	CH	19.6										
R-11-014	*D-12*	60	CL	18.9	131.6	3.0								
R-11-014	*S-13*	65	CL	21.3										
R-11-014	*D-14*	70	SC	12.5	133.7									



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-002		Strength Intercept (C) :	1.03	(ksf)	Peak	0.17	(ksf)	Ultimate
Sample No. : D-1			49.12	(kPa)		8.33	(kPa)	
Depth (ft/m) : 5.0	0.00	Friction Angle (ϕ) :	47.74	Degree		34.04	Degree	
Description : olive-brown/black, yellow dots, Lean CLAY (CL)						Shear Rate (inch/minute) :		0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	24.35	103.22	16.25	0.63	0.25	11.97	1.30	62.05	0.37	17.81
◆	22.75	104.52	16.45	0.61	0.50	23.94	1.58	75.64	0.47	22.41
▲	24.46	101.82	16.03	0.66	1.00	47.68	2.12	101.70	0.86	41.37

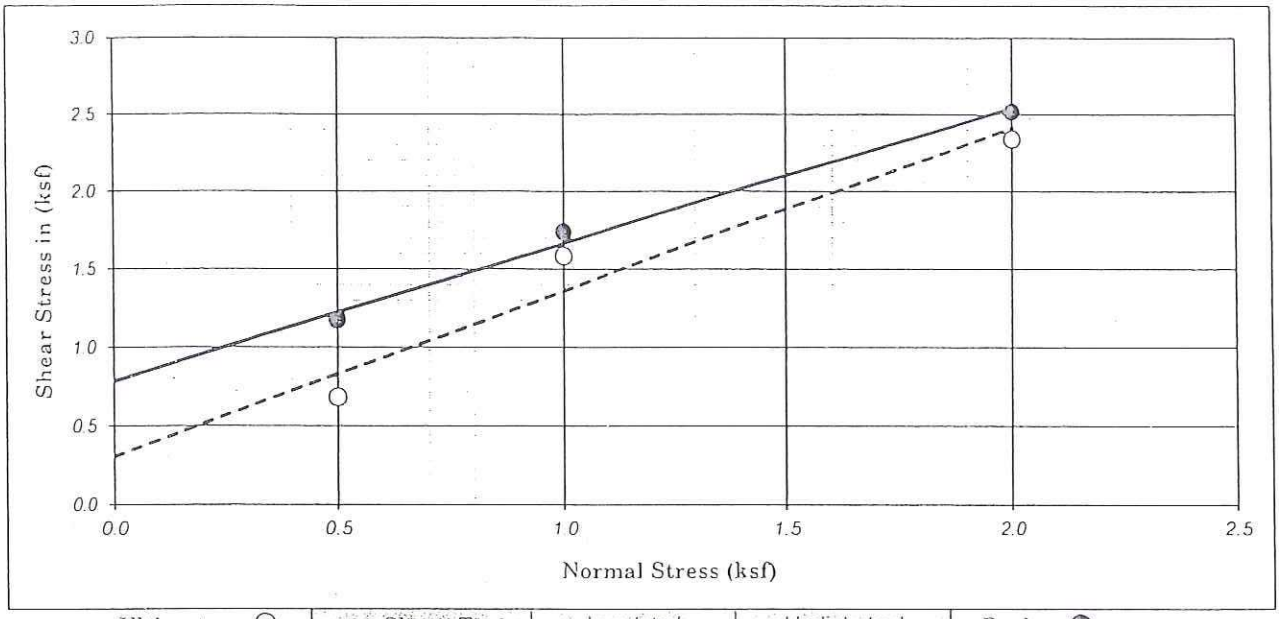
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 North safety and Operational Improvement

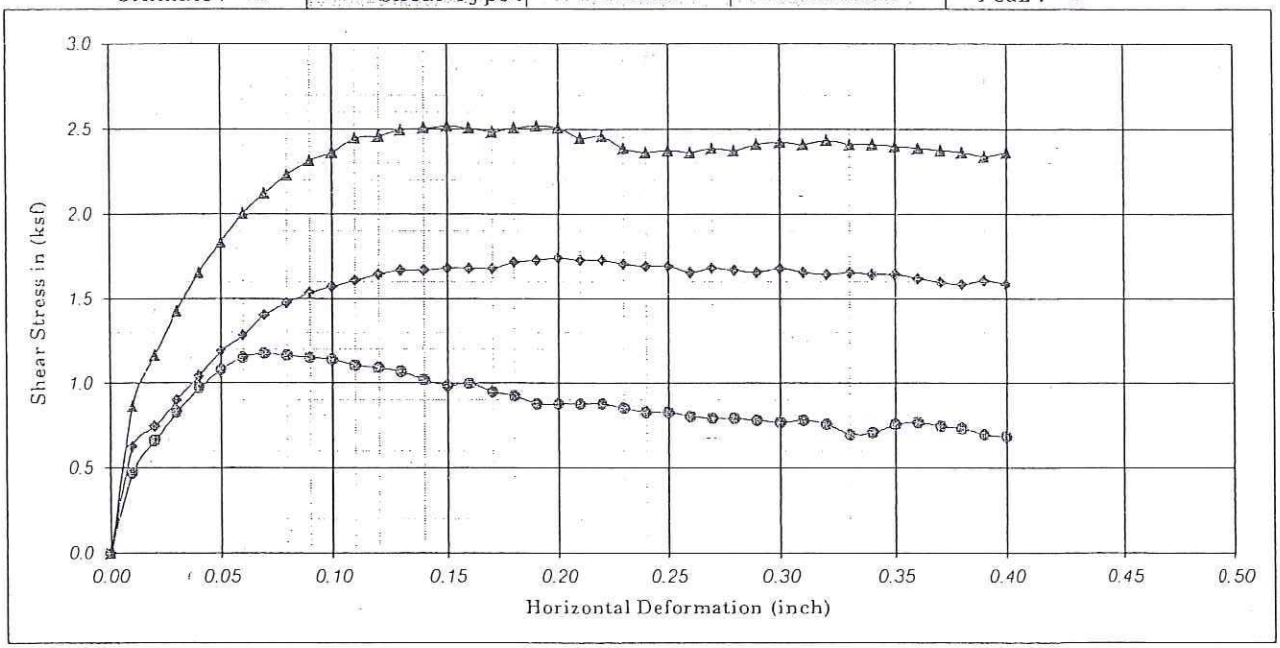
DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 10-133 | Date : 06/09/11

Figure No. :



Ultimate : ○ | Shear Type : Inundated | Undisturbed | Peak : ●



Boring No. : R-11-014		Strength Intercept (C) :	0.79	(ksf)		0.31	(ksf)	
Sample No. : D-2			37.63	(kPa)	Peak	14.65	(kPa)	Ultimate
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	41.33	Degree		46.51	Degree	

Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC) — Shear Rate (inch/minute) : 0.02

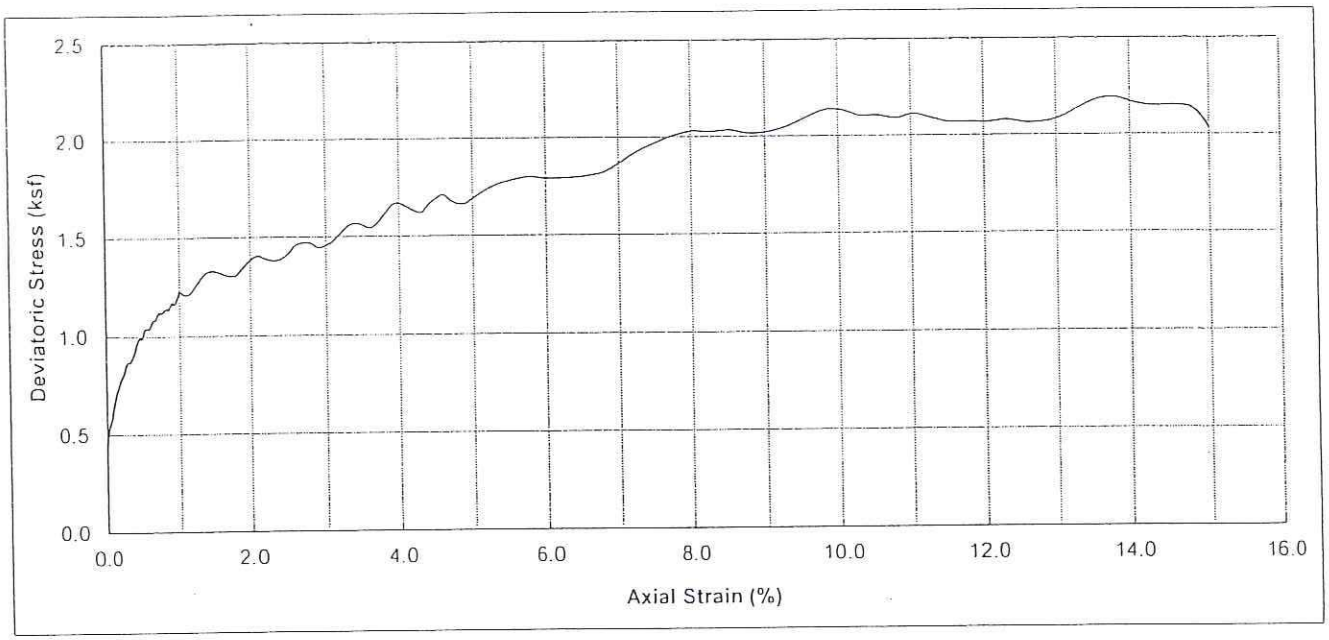
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	15.98	120.37	18.95	0.40	0.50	23.94	1.18	56.31	0.68	32.75
◆	16.15	125.97	19.83	0.34	1.00	47.88	1.74	83.31	1.58	75.64
▲	16.43	121.54	19.13	0.39	2.00	95.76	2.52	120.66	2.34	112.04

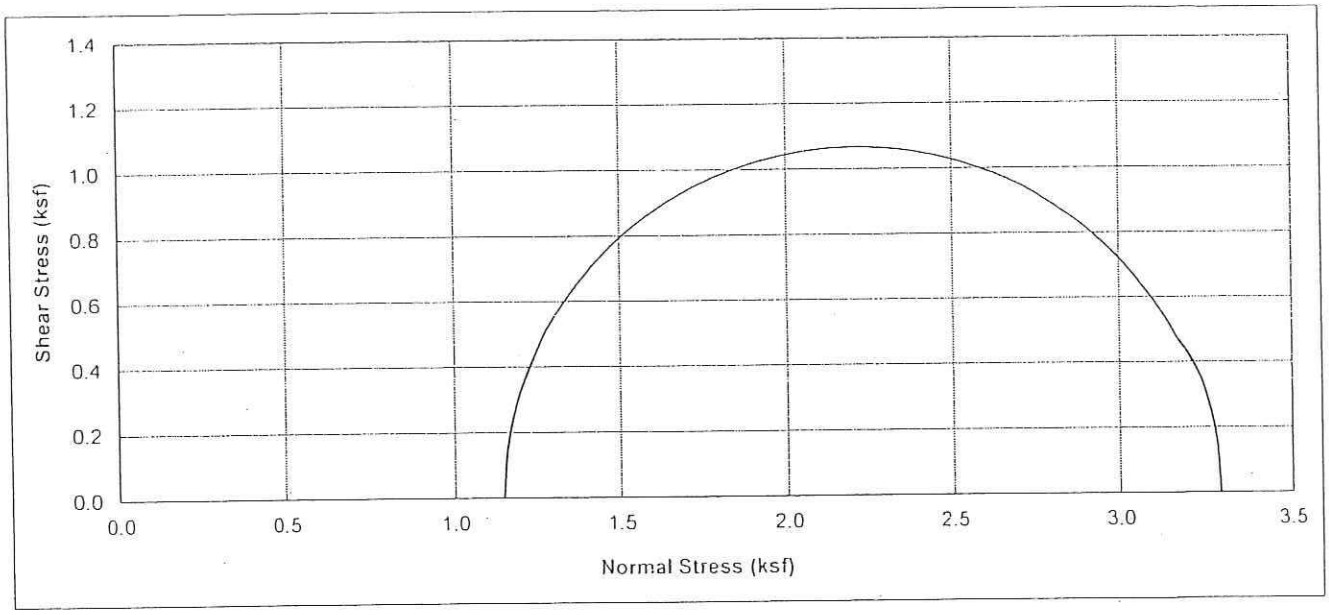
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 North safety and Operational Improvement

DIRECT SHEAR TEST (ASTM D-3080)

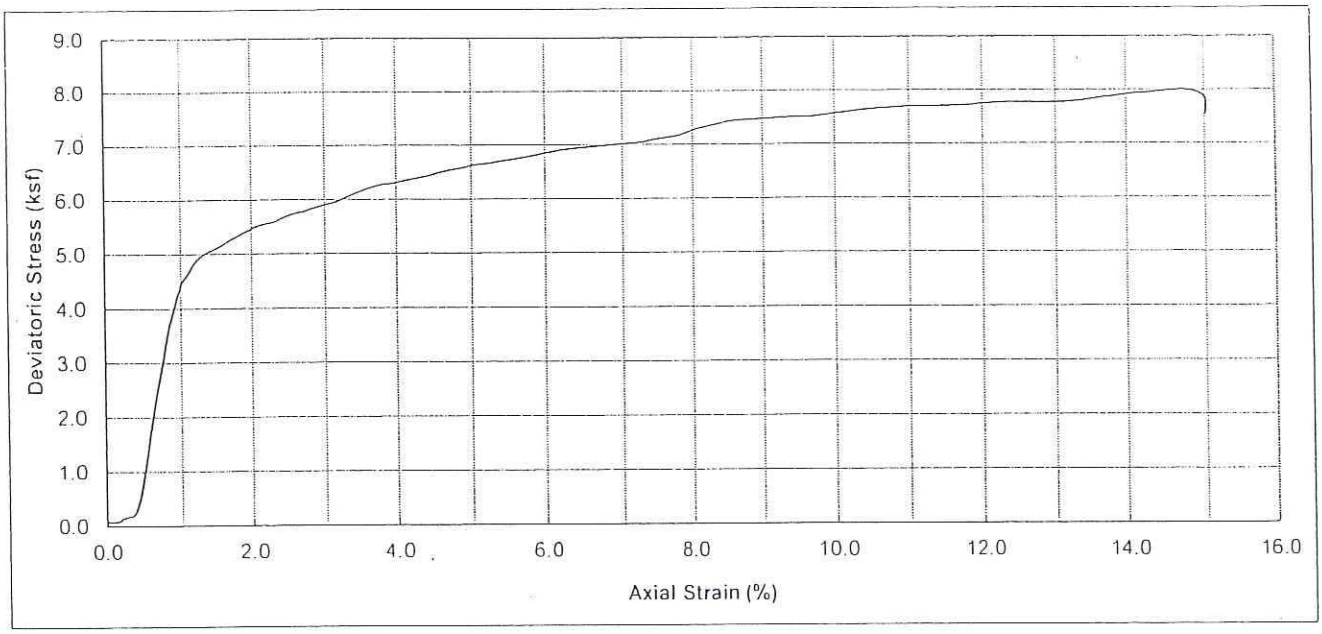
Project No. : 10-133 | Date : 06/09/11 | Figure No. :

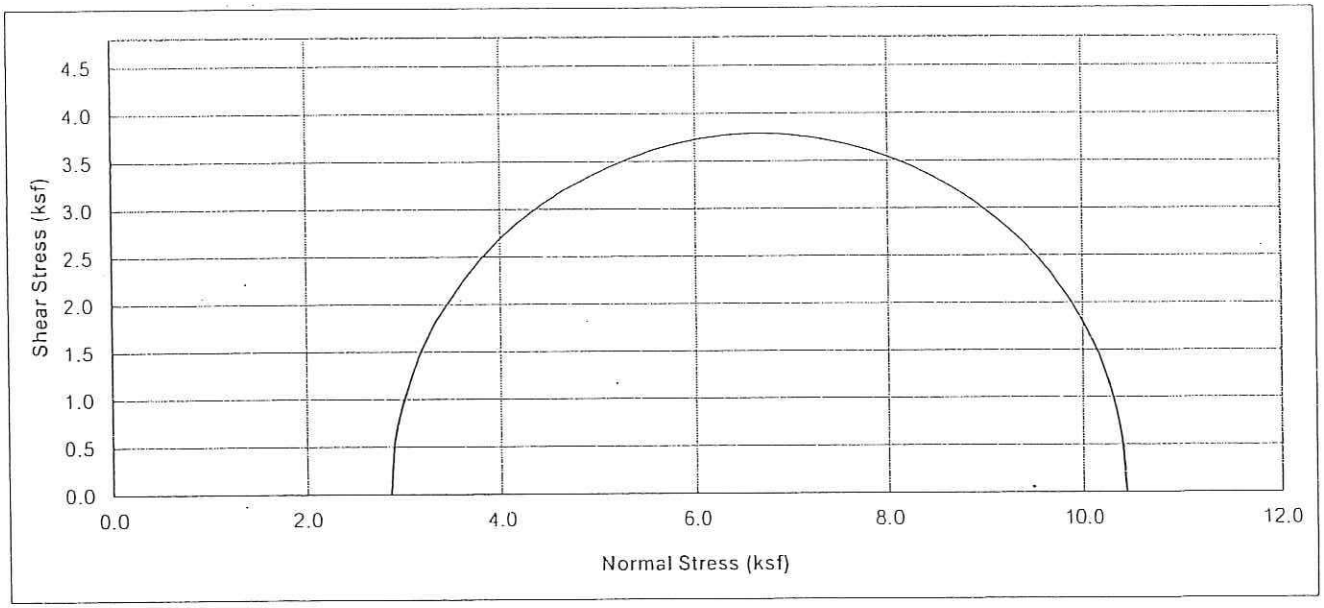




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-002	D-4	15	Olive Brown, LEAN CLAY (CL)	96.8	25.92	1.15	2.13	94.5

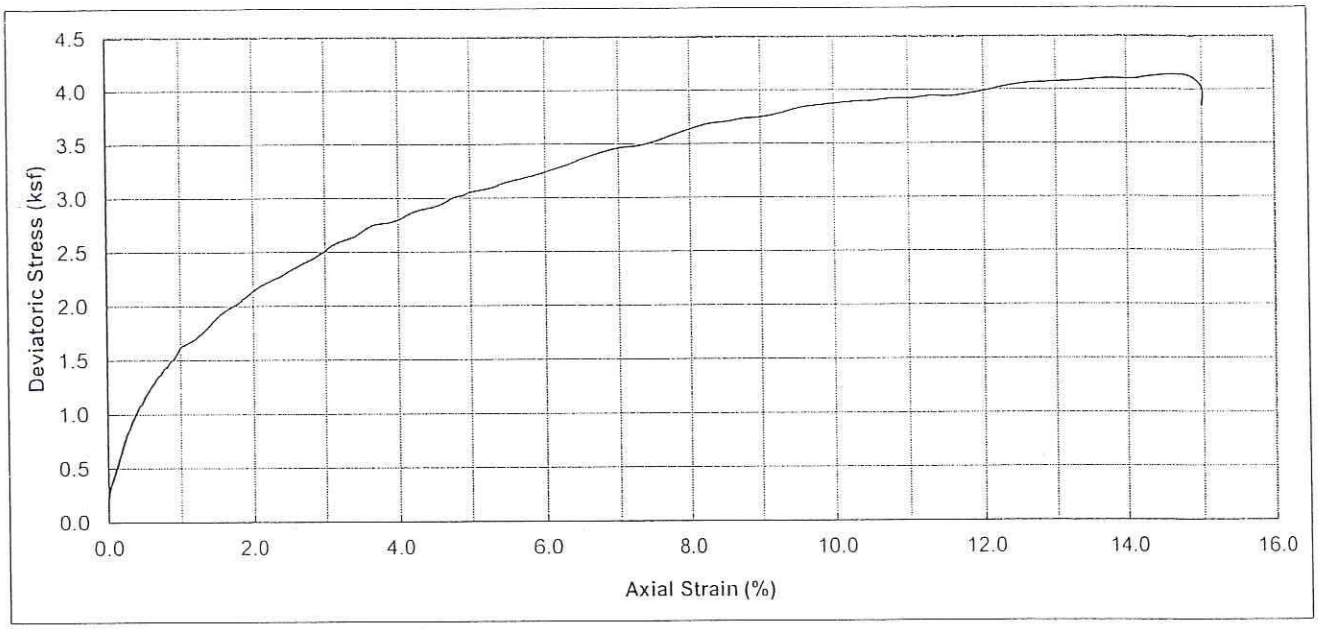
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
Project No. : 10-133 / Date : 06/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :

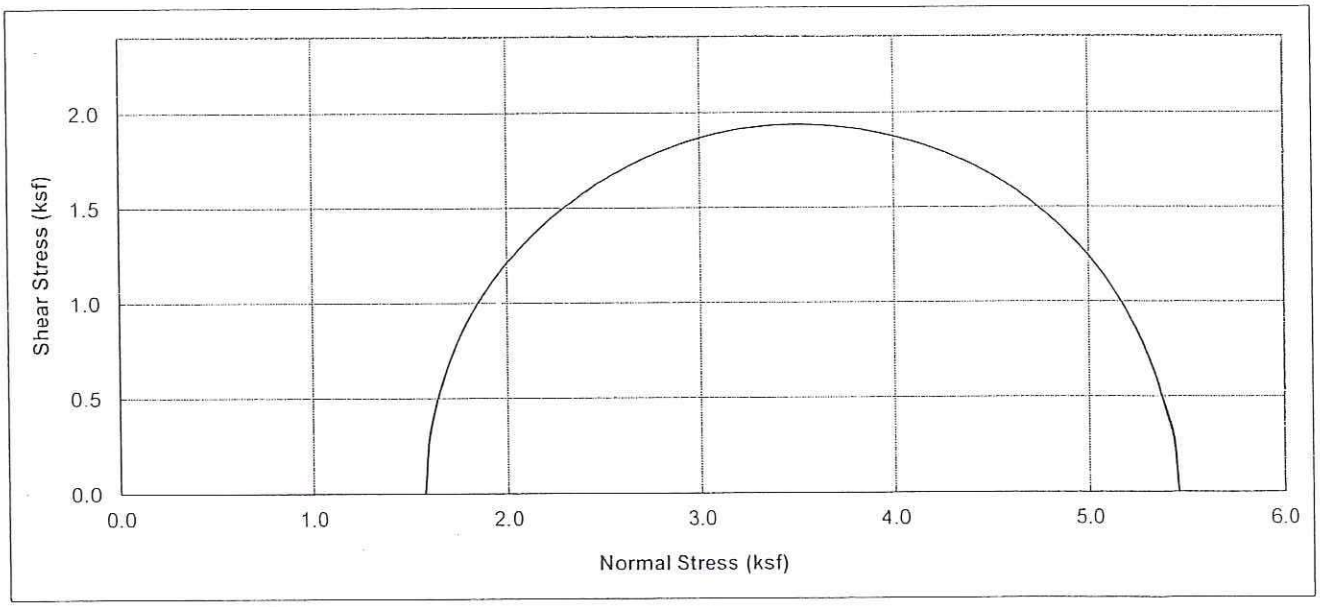




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-002	D-8	35	Olive Brown, LEAN CLAY (CL)	107.9	19.30	2.87	7.58	92.8

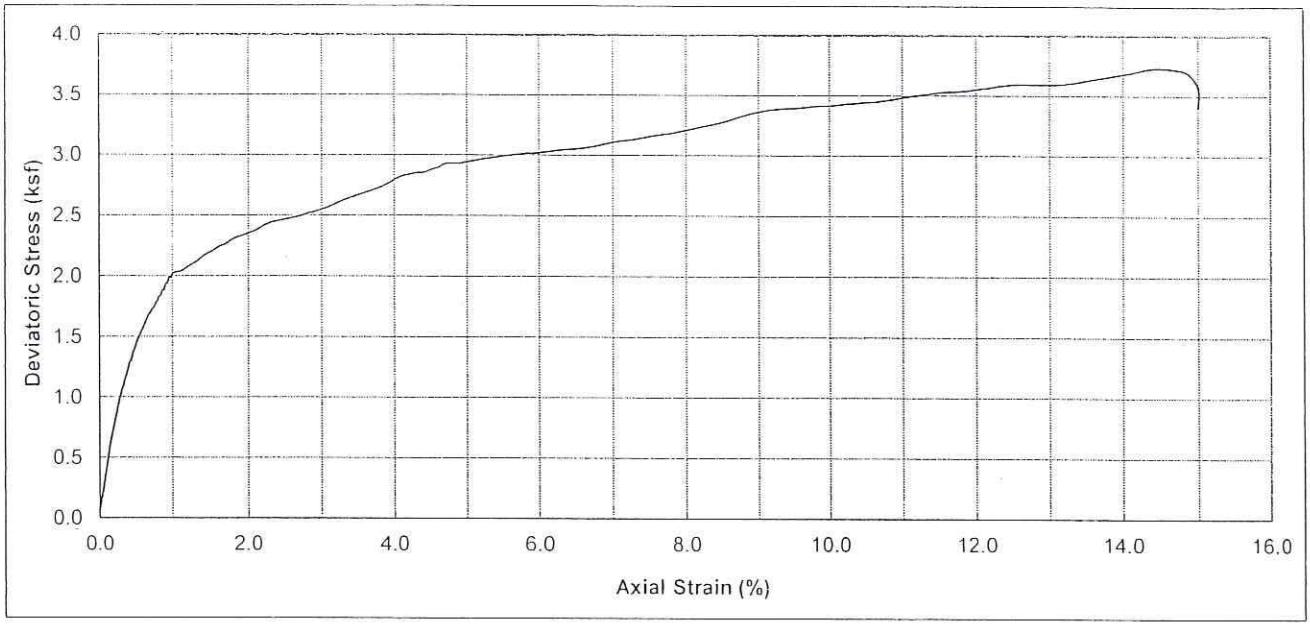
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
Project No. : 10-133 Date : 06/07/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850) Figure No. :

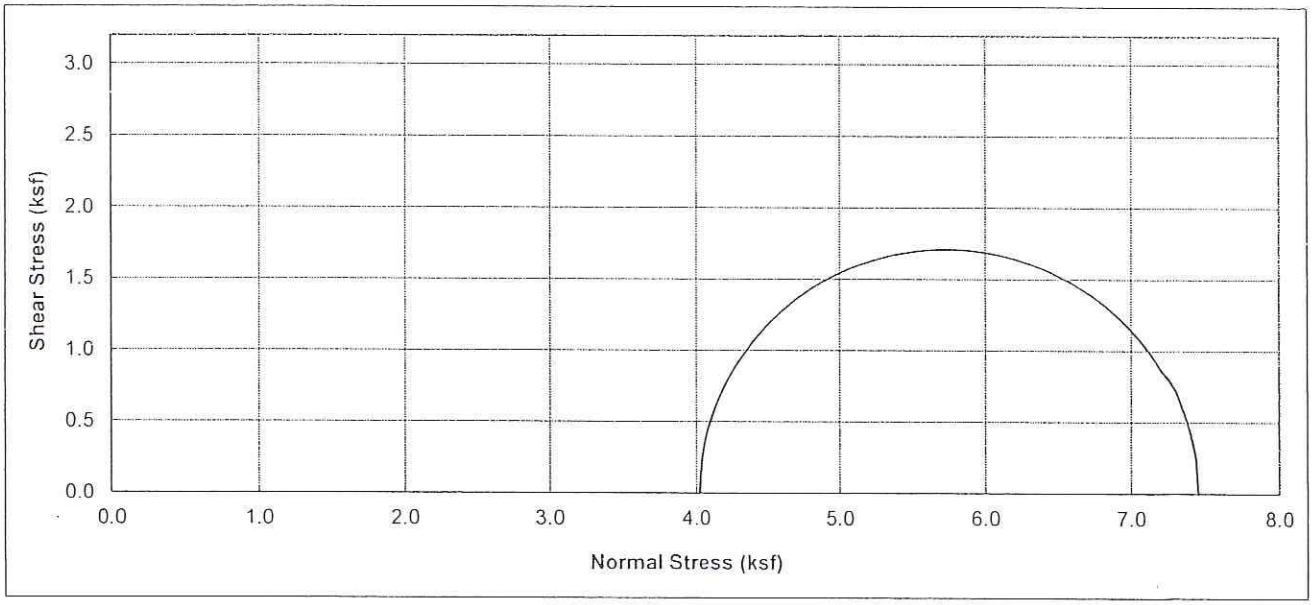




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-014	D-4	20	Olive Brown , LEAN CLAY (CL)	115.9	14.26	1.57	3.88	84.8

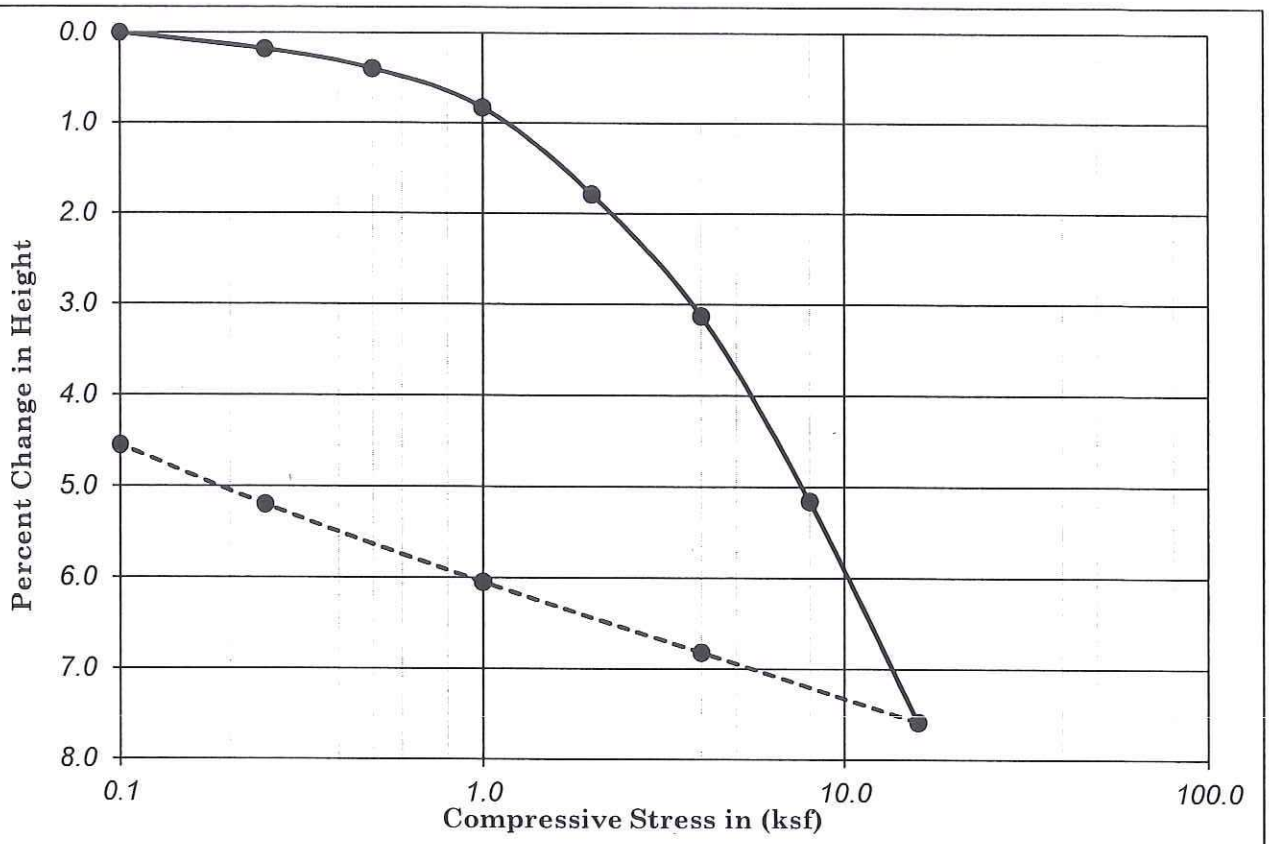
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 Date : 06/08/11	(ASTM D2850) Figure No. :

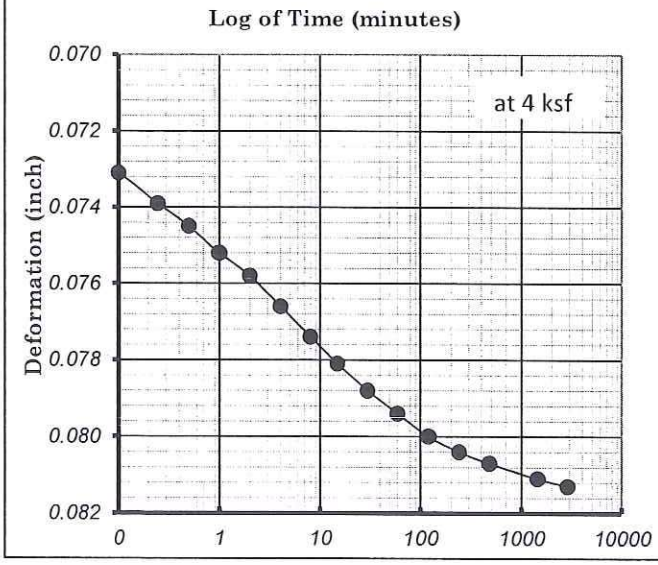


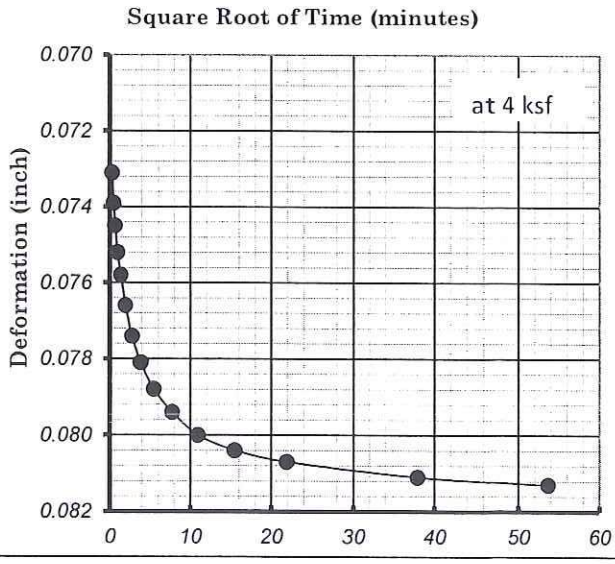


Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-014	D-10	50	Olive Brown , FAT CLAY (CH)	95.2	27.47	4.02	3.42	96.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 North safety and Operational Improvement
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 Date : 06/08/11	(ASTM D2850) Figure No. :







Boring No.	: R-11-002		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 25.0	26.5	Plasticity Index :	-	Initial	23.86	102.16	16.08	99.12	0.65
Depth (m)	: 7.63	8.08	Specific Gravity :	2.70	Final	21.56	107.04	16.85	101.27	0.57

Description : *Olive-brown, Lean CLAY with SAND (CL)*

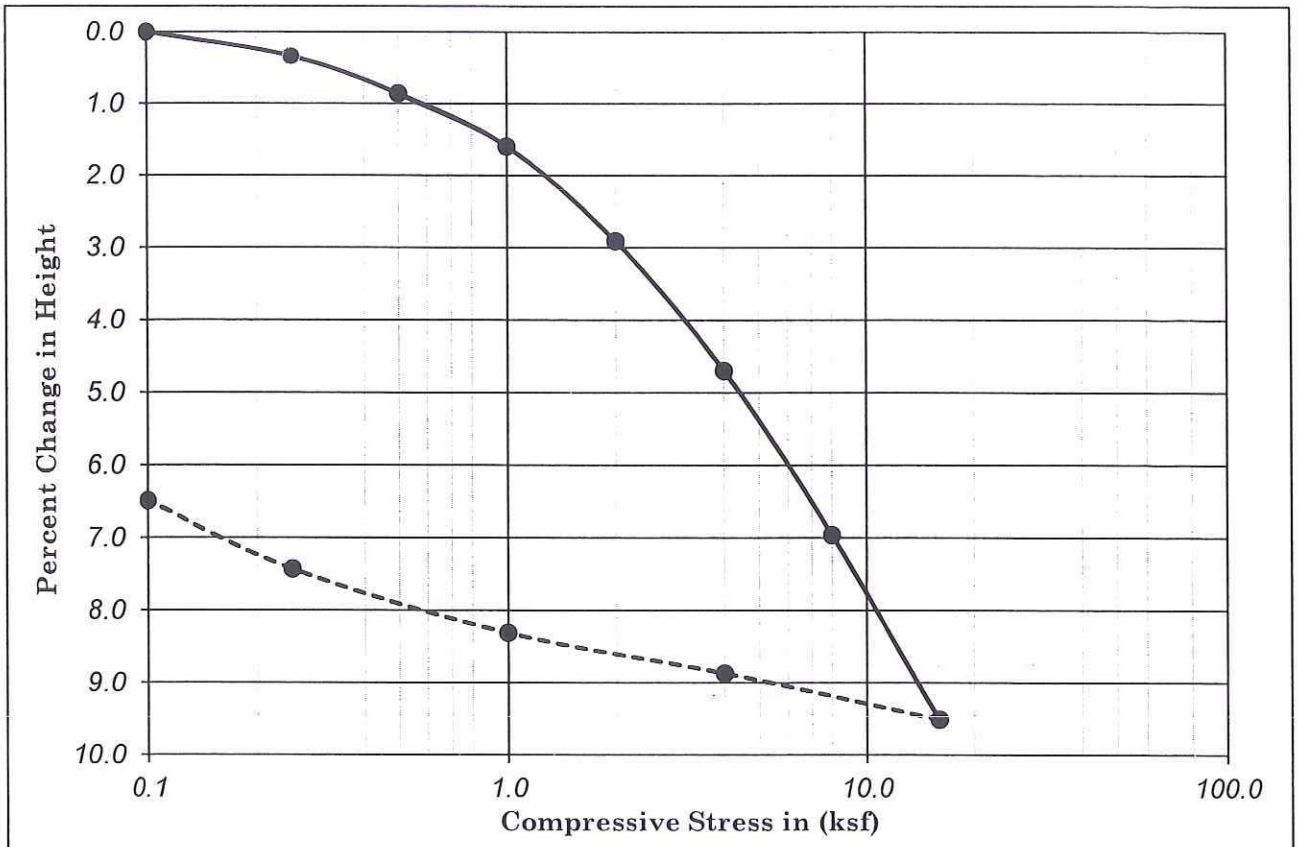
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

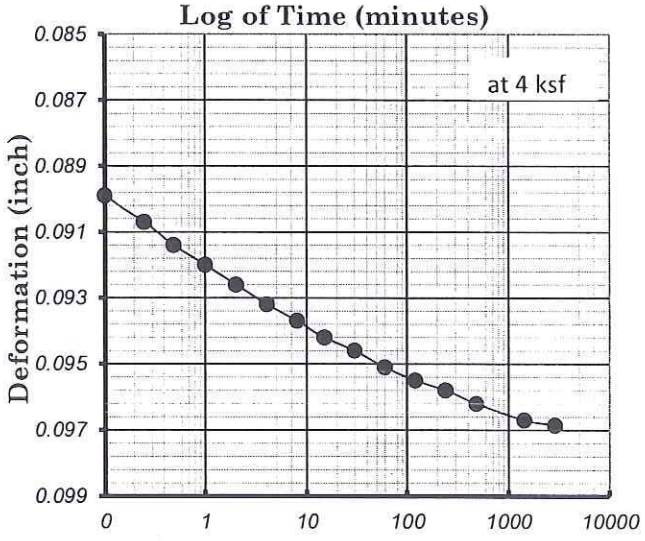
I-880 North Safety and Operational Improvement

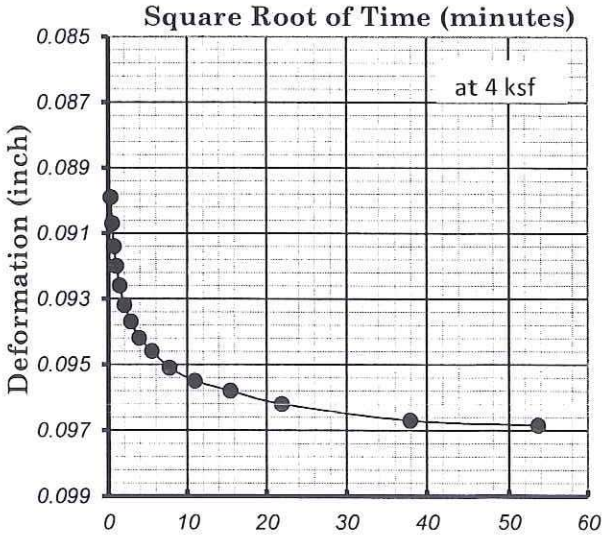
Project No. : 10-133

05/26/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)







Boring No.	: R-11-014		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-8		Plastic Limit :	-						
Depth (ft)	: 40.0	41.5	Plasticity Index :	-	Initial	23.92	100.90	15.88	96.31	0.67
Depth (m)	: 12.20	12.66	Specific Gravity :	2.70	Final	21.74	107.92	16.99	104.47	0.56

Description : Olive-brown, SANDY lean CLAY (CL)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 North Safety and Operational Improvement

Project No. : 10-133 | 05/29/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)

Laboratory Maximum Wet Density (CTM 216)

CTL Job No.:	641-013	Boring:	R-11-014	Date:	5/23/2011
Client:	Earth Mechanics	Sample:		Tested :	PJ
Project Name:	I-880 Improvements	Depth (ft.):	2.5-5	Checked:	DC
Project No:	10-133				

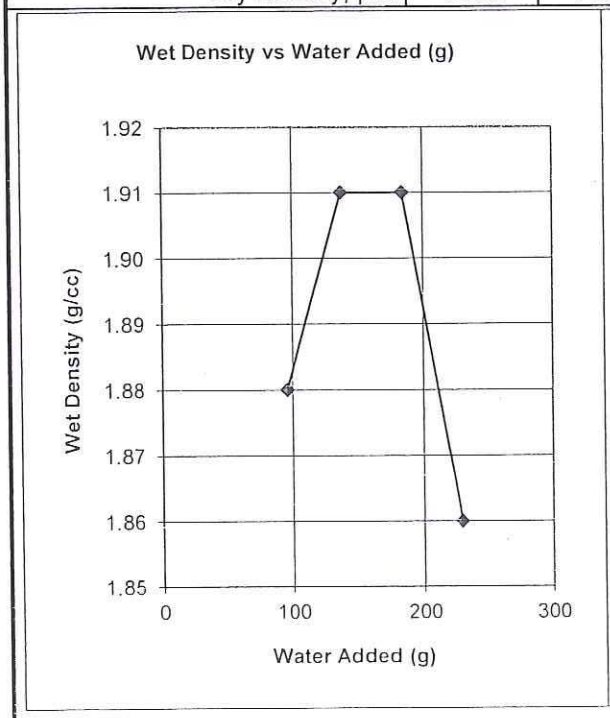
Visual Description: Very Dark Brown Sandy CLAY

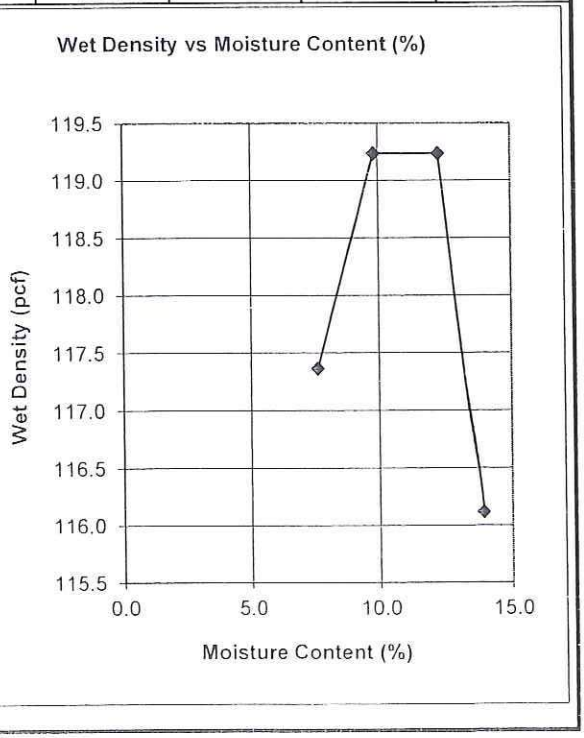
Test Results

Maximum Wet Density (g/cc):	1.91	Remarks:
Maximum Dry Density (g/cc):	1.75	
Maximum Wet Density (pcf):	119.2	
Maximum Dry Density (pcf):	109.1	

Test Data

Point Number:	1	2	3	4	5	6
Initial Wet Weight of Soil (g):	2300	2300	2300	2300		
Water Added (mL):	184	230	138	96		
Tamper Reading:	11.4	11.7	11.4	11.6		
Wet Density (g/cc):	1.91	1.86	1.91	1.88		
Dry Density (g/cc):	1.70	1.63	1.74	1.75		
Dish Number:						
Weight of Dish (g):	197.1	193.3	188.5	200.0		
Wet Weight of Soil and Dish (g):	887.7	653.3	931.2	876.0		
Dry Weight of Soil and Dish (g):	812.1	597.3	864.7	828.2		
Moisture Content, %:	12.3	13.9	9.8	7.6		
Wet Density, pcf:	119.2	116.1	119.2	117.4		
Dry Density, pcf:	106.2	102.0	108.6	109.1		





Appendix C

DESIGN CALCULATIONS

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/16/11 Checked By Lino Date 8/17/11 Sheet 1 of 1

Proposed Overhead Sign Structures - Liquefaction Potential

* Analysis was performed using two site-specific soil borings R-11-002 and R-11-021, which contain a considerable thickness of coarse-grained soil layer.

* Remaining soil borings contain predominately fine-grained soils; therefore analysis was not performed.

* Historical high ground water depth of 5 feet was used.

∴ Liquefaction potential at the site is low. //

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
^1C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
$CRR\ r = CRR_{7.5} \times Cm \times K\ sigma$

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

$F_L = CRR\ r / CSR\ i$

R-11-002

Emean (%)	75		Present Ground El.	26.6	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.2	=Field Water Table Depth	Acc. max =	0.710	g					Earthq. M=	7.3	
C_E	1.25		Future Ground El.	26.6	C_B	1.00	120	21.6	=Design Water El.	13.4	=Field Water El.								Cm=	1.07	

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	21.6	21	CL	90.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	24	34	1.00	High N	0.00	LARGE	high N
10	16.6	17	CL	85.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	29	39	1.00	High N	0.00	LARGE	high N
15	11.6	9	CL	88.0	0.90	0.84	1.11	0.85	1.00	0.67	2	2	0.97	0.59	0.68	7	14	1.00	0.15	0.16	0.23	Fines
20	6.6	18	CL	75.0	1.20	0.99	1.03	0.95	1.20	1.00	1	1	0.95	0.73	0.72	26	37	1.00	High N	0.00	LARGE	high N
25	1.6	31	CL	95.0	1.50	1.13	0.96	0.95	1.00	0.67	2	2	0.94	0.88	0.74	24	33	1.00	High N	0.00	LARGE	high N
30	-3.4	34	CL	88.0	1.80	1.28	0.90	1.00	1.20	1.00	1	1	0.93	1.02	0.76	46	60	1.00	High N	0.00	LARGE	high N
35	-8.4	32	CL	95.0	2.10	1.42	0.86	1.00	1.00	0.67	2	2	0.89	1.16	0.74	23	32	0.98	High N	0.00	LARGE	high N
40	-13	35	SC	20.0	2.40	1.56	0.82	1.00	1.20	1.00	1	1	0.85	1.31	0.72	43	50	0.96	High N	0.00	LARGE	high N
45	-18	26	CL	55.0	2.70	1.71	0.78	1.00	1.00	0.67	2	2	0.81	1.45	0.69	17	25	0.94	0.30	0.30	0.43	Fines
50	-23	21	CL	87.0	3.00	1.85	0.75	1.00	1.20	1.00	1	1	0.77	1.60	0.67	24	33	0.92	High N	0.00	LARGE	high N
55	-28	44	GC	40.0	3.30	2.00	0.72	1.00	1.00	0.67	2	2	0.73	1.74	0.64	26	37	0.90	High N	0.00	LARGE	high N
60	-33	44	CL	95.0	3.60	2.14	0.70	1.00	1.20	1.00	1	1	0.69	1.88	0.60	46	60	0.88	High N	0.00	LARGE	high N
65	-38	42	CL	85.0	3.90	2.28	0.68	1.00	1.00	0.67	2	2	0.64	2.03	0.57	24	33	0.88	High N	0.00	LARGE	high N
70	-43	46	CL	90.0	4.20	2.43	0.66	1.00	1.20	1.00	1	1	0.60	2.17	0.54	45	59	0.87	High N	0.00	LARGE	high N

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines (Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-021

Emean (%)	75			Present Ground El.	24.2	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.2	=Field Water Table Depth	Acc. max =	0.710	g		Earthq. M=	7.3			
C_E	1.25			Future Ground El.	24.2	C_B	1.00	120	19.2	=Design Water El.	11	=Field Water El.					Cm=	1.07			

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
5	19.2	27	CL	85.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	31	42	1.00	High N	0.00	LARGE	high N
10	14.2	13	CL	90.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	22	31	1.00	High N	0.00	LARGE	high N
11.5	12.7	11	CL	85.0	0.69	0.69	1.23	0.85	1.20	1.00	1	1	0.97	0.49	0.64	17	26	1.00	0.31	0.33	0.52	Fines
15	9.2	4	CL	85.0	0.90	0.84	1.11	0.85	1.00	0.67	2	2	0.97	0.59	0.68	3	9	1.00	0.10	0.11	0.16	Fines
20	4.2	7	CH	81.0	1.20	0.99	1.03	0.95	1.20	1.00	1	1	0.95	0.73	0.72	10	17	1.00	0.18	0.20	0.27	Fines
25	-0.8	46	GP-GM	5.0	1.50	1.13	0.96	0.95	1.00	0.67	2	2	0.94	0.88	0.74	35	35	1.00	High N	0.00	LARGE	high N
30	-5.8	21	SC-SM	30.0	1.80	1.28	0.90	1.00	1.20	1.00	1	1	0.93	1.02	0.76	28	38	1.00	High N	0.00	LARGE	high N
35	-11	24	CL	65.0	2.10	1.42	0.86	1.00	1.00	0.67	2	2	0.89	1.16	0.74	17	26	0.98	0.30	0.32	0.43	Fines
40	-16	5	CH	95.0	2.40	1.56	0.82	1.00	1.20	1.00	1	1	0.85	1.31	0.72	6	12	0.96	0.13	0.14	0.19	Fines
45	-21	22	SC/CL	45.0	2.70	1.71	0.78	1.00	1.00	0.67	2	2	0.81	1.45	0.69	14	22	0.94	0.24	0.25	0.35	Fines
50	-26	18	CL	80.0	3.00	1.85	0.75	1.00	1.20	1.00	1	1	0.77	1.60	0.67	20	29	0.92	0.43	0.42	0.63	Fines

SIGN "A"

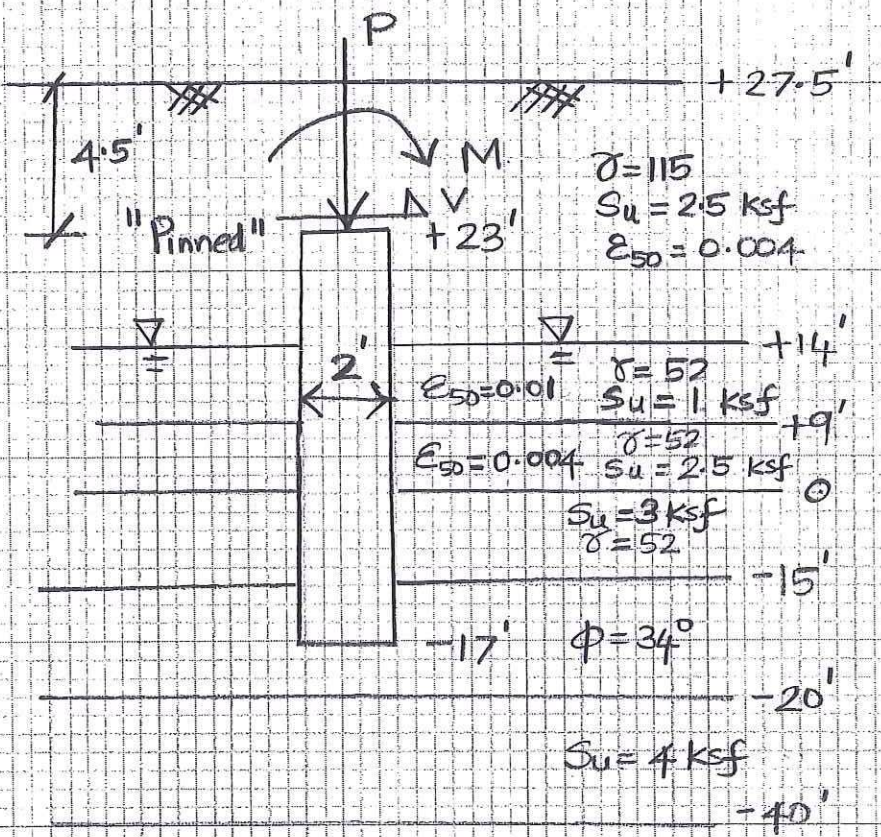
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/26/11 Checked By Lino Date 8/27/11 Sheet 1 of 4

Sign "A" on Wall 224 [Sta 223+73 ("05" Line); 58.5' RT]



Per Designers,
Under Service-I
P = 130 K
V = 30 K

Under Strength
P = 200 K
V = 30 K

Under Extreme
P = 160 K
V = 40 K

Axial Pile Calculations

Under Strength Limit

P = 200 K
Nominal Resistance = 200/0.7 = 286 K
SELECT 290 kips //

⇒ Required skin resistance = 286/0.9 = 317 kips
≅ 320 kips

From SHAFT, Required pile length = 44'
∴ Pile tip El. = 27' − 44'
= −17 ft //

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By Ranjan Date 5/21/12 Checked By Lino Date 5/24/12 Sheet 2 of 4

Tension

Under Strength Limit,

Tension per pile = 12 kips

Required Nominal Resistance = $\frac{12}{0.7}$ = 18 kips

SELECT 20 kips //

Per Caltrans BDS,

Ultimate axial capacity for tension = $\frac{20}{0.7 \times 0.9}$

= 32 kips

SELECT 40 kips //

From SHAFT,

Required pile length = 12 ft

∴ Required pile tip El. = 27' − 12'

= +15 ft //

Under Extreme Limit

P = 160 kips

∴ Nominal Resistance = $\frac{160}{1}$ = 160 kips

∴ Required skin = $\frac{160}{0.9}$ = 178 kips ≈ 180 kips

From SHAFT,

Required pile length = 31 ft

∴ Required pile tip El. = 27' − 31'

= −4 ft //

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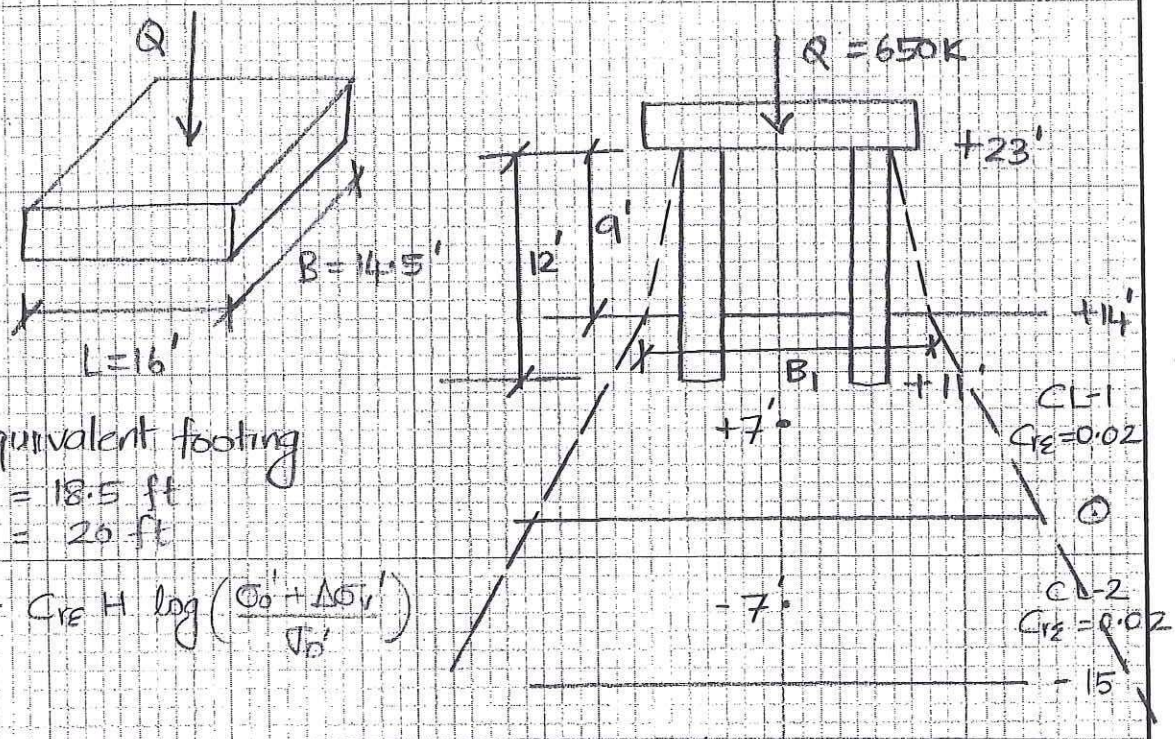
By Ranjan Date 8/26/11 Checked By Lino Date 8/27/11 Sheet 3 of 4

Settlement Check

Under Service-I Limit

P = 130 kips/pile

∴ Load on pedestal (Q) = 130 × 5
= 650 kips



@ Equivalent footing

B_1 = 18.5 ft

L_1 = 20 ft

$$\Delta H = C_{r\varepsilon} H \log\left(\frac{\sigma_0' + \Delta\sigma_v'}{\sigma_0'}\right)$$

Layer	H (ft)	$C_{r\varepsilon}$	σ_0' (ksf)	$\Delta\sigma_v'$ (ksf)	ΔH (in)
CL-1	14	0.02	1.40	0.95	0.75
CL-2	15	0.02	2.14	0.40	0.24

$\Sigma H \approx 1.0''$

⇒ No design pile tip for settlement //

Under Service-I Limit

Nominal Resistance = 130 × 2 = 260 kips

Required skin = 260/0.9 = 290 kips

∴ Pile tip El. = −14 ft //

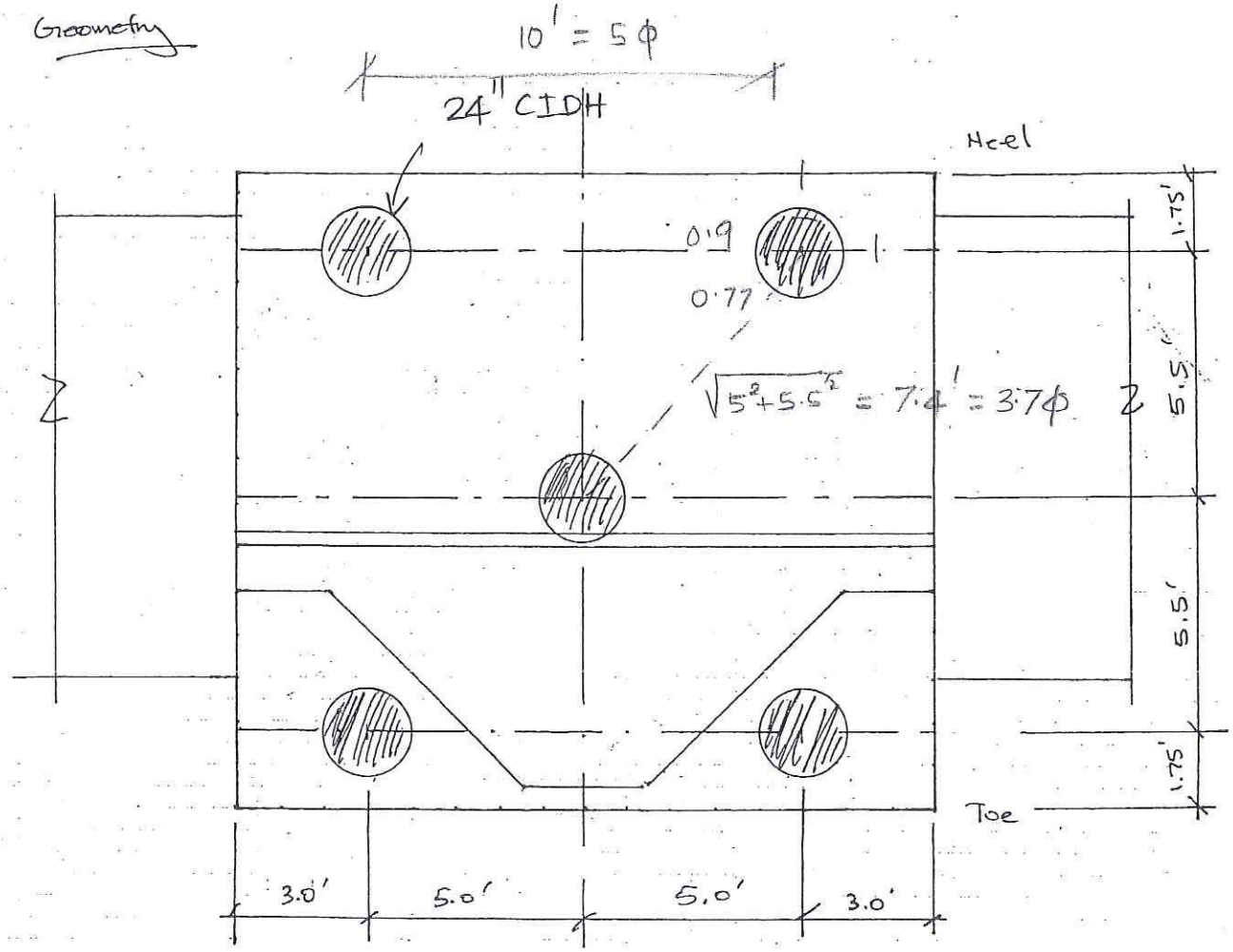
RBF CONSULTING

PLANNING ■ DESIGN ■ CONSTRUCTION
800.479.3808 • www.RBF.com

JOB NAME I-880
JOB NO. 35-101088
SHEET NO. _____ OF _____
DESIGNED BY S. McCauley DATE 8/22/11
CHECKED BY _____ DATE _____

Sign Pedestal (Sign A)

Geometry



Pedestal Footing Plan

Per AASHTO,

$\eta = 0.77$ for 3.7ϕ

$\eta = 0.9$ for 5ϕ

for exterior piles,

$$\text{Avg } \eta = \frac{1 + 1 + 0.9 + 0.77}{4} = 0.92$$

for interior pile

$$\text{Avg } \eta = 0.77$$

$\Rightarrow$ Overall avg $\eta = [(0.92)(4) + 0.77]/5 = 0.9$

pi 0151

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

I-880 Operational and Safety Improvement Project - Signs

TOTAL LOAD = 250.0 TONS

NUMBER OF LAYERS = 6

WATER TABLE DEPTH = 14.5 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 1.00

FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00

SOIL INFORMATION

LAYER NO 1----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.600E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.135E+02

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.100E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.135E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.100E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.185E+02

LAYER NO 3----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04

INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.185E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.275E+02

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.300E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.275E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.300E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.425E+02

LAYER NO 5----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.620E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.340E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.425E+02

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.570E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.340E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.475E+02

LAYER NO 6----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.511E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.400E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.475E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.511E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.400E+04

INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.675E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	2.000	FT.
DIAMETER OF BASE	=	2.000	FT.
END OF STEM TO BASE	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	7.000	FT.
IGNORED BOTTOM PORTION	=	0.000	FT.
AREA OF ONE PERCENT STEEL	=	4.524	SQ.IN.
ELASTIC MODULUS, Ec	=	0.360E+07	LB/SQ IN
VOLUME OF UNDERREAM	=	0.000	CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
8.0	0.93	4.32	32.94	37.26	37.26	37.26	40.03
9.0	1.05	8.64	33.78	42.43	42.43	42.43	40.51
10.0	1.16	12.96	34.63	47.59	47.59	47.59	40.89
11.0	1.28	17.28	27.59	44.87	44.87	44.87	35.06
12.0	1.40	21.60	18.68	40.28	40.28	40.28	28.85
13.0	1.51	25.92	14.14	40.06	40.06	40.06	26.48
14.0	1.63	30.24	14.14	44.38	44.38	44.38	27.24
15.0	1.75	31.97	14.14	46.11	46.11	46.11	26.41
16.0	1.86	33.70	21.71	55.41	55.41	55.41	29.76
17.0	1.98	35.43	30.80	66.23	66.23	66.23	33.48
18.0	2.09	37.15	35.35	72.50	72.50	72.50	34.61
19.0	2.21	38.88	35.35	74.23	74.23	74.23	33.57
20.0	2.33	43.20	35.35	78.55	78.55	78.55	33.75
21.0	2.44	47.52	35.35	82.87	82.87	82.87	33.91
22.0	2.56	51.84	35.35	87.19	87.19	87.19	34.06
23.0	2.68	56.16	35.35	91.51	91.51	91.51	34.19
24.0	2.79	60.48	35.35	95.83	95.83	95.83	34.31
25.0	2.91	64.80	37.87	102.68	102.68	102.68	35.29
26.0	3.03	69.12	40.90	110.03	110.03	110.03	36.36
27.0	3.14	73.44	42.42	115.86	115.86	115.86	36.88
28.0	3.26	77.76	42.42	120.18	120.18	120.18	36.88
29.0	3.37	82.95	42.42	125.37	125.37	125.37	37.15
30.0	3.49	88.13	42.42	130.55	130.55	130.55	37.40
31.0	3.61	93.32	42.42	135.73	135.73	135.73	37.63
32.0	3.72	98.50	42.42	140.92	140.92	140.92	37.84
33.0	3.84	103.69	42.42	146.10	146.10	146.10	38.05
34.0	3.96	108.87	42.42	151.29	151.29	151.29	38.24
35.0	4.07	114.05	42.42	156.47	156.47	156.47	38.42
36.0	4.19	119.24	42.42	161.66	161.66	161.66	38.59
37.0	4.31	124.42	42.42	166.84	166.84	166.84	38.75
38.0	4.42	129.61	42.42	172.02	172.02	172.02	38.90
39.0	4.54	134.79	42.42	177.21	177.21	177.21	39.05
40.0	4.65	139.98	39.24	179.22	179.22	179.22	38.50
41.0	4.77	145.16	35.43	180.59	180.59	180.59	37.85
42.0	4.89	150.34	33.52	183.86	183.86	183.86	37.62
43.0	5.00	155.53	33.52	189.05	189.05	189.05	37.78
44.0	5.12	161.58	33.52	195.10	195.10	195.10	38.10
45.0	5.24	167.64	41.75	209.38	209.38	209.38	39.98
46.0	5.35	173.68	51.62	225.30	225.30	225.30	42.09
47.0	5.47	179.72	56.56	236.28	236.28	236.28	43.20
48.0	5.59	185.75	56.56	242.31	242.31	242.31	43.38
49.0	5.70	192.17	56.56	248.73	248.73	248.73	43.62
50.0	5.82	198.60	56.56	255.15	255.15	255.15	43.85

Strength – Tension

Extreme

Service - I

Strength - Compression

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6997E-01	0.3489E-04	0.1862E-02	0.1000E-04
0.3498E+00	0.1744E-03	0.9308E-02	0.5000E-04
0.6997E+00	0.3489E-03	0.1862E-01	0.1000E-03
0.3546E+02	0.1755E-01	0.9308E+00	0.5000E-02
0.5329E+02	0.2637E-01	0.1396E+01	0.7500E-02
0.6957E+02	0.3506E-01	0.1862E+01	0.1000E-01
0.1326E+03	0.7760E-01	0.4654E+01	0.2500E-01
0.1803E+03	0.1266E+00	0.9308E+01	0.5000E-01
0.2014E+03	0.1642E+00	0.1396E+02	0.7500E-01
0.2108E+03	0.1951E+00	0.1862E+02	0.1000E+00
0.2281E+03	0.3587E+00	0.3233E+02	0.2500E+00
0.2245E+03	0.6114E+00	0.4503E+02	0.5000E+00
0.2287E+03	0.7396E+00	0.4933E+02	0.6250E+00
0.2310E+03	0.8975E+00	0.5162E+02	0.7813E+00
0.2342E+03	0.1319E+01	0.5486E+02	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1207E+00	0.5003E-04	0.2781E-02	0.1000E-04
0.6036E+00	0.2501E-03	0.1390E-01	0.5000E-04
0.1207E+01	0.5003E-03	0.2781E-01	0.1000E-03
0.6173E+02	0.2533E-01	0.1390E+01	0.5000E-02
0.8921E+02	0.3776E-01	0.2086E+01	0.7500E-02
0.1105E+03	0.4925E-01	0.2781E+01	0.1000E-01
0.1779E+03	0.9811E-01	0.6952E+01	0.2500E-01
0.2120E+03	0.1432E+00	0.1390E+02	0.5000E-01
0.2279E+03	0.1783E+00	0.2086E+02	0.7500E-01
0.2387E+03	0.2106E+00	0.2781E+02	0.1000E+00
0.2525E+03	0.3723E+00	0.4294E+02	0.2500E+00
0.2479E+03	0.6233E+00	0.5194E+02	0.5000E+00
0.2505E+03	0.7502E+00	0.5453E+02	0.6250E+00
0.2516E+03	0.9073E+00	0.5564E+02	0.7813E+00
0.2522E+03	0.1326E+01	0.5627E+02	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3343E-01	0.2287E-04	0.9426E-03	0.1000E-04
0.1671E+00	0.1143E-03	0.4713E-02	0.5000E-04
0.3343E+00	0.2287E-03	0.9426E-02	0.1000E-03
0.1678E+02	0.1144E-01	0.4713E+00	0.5000E-02
0.2524E+02	0.1719E-01	0.7070E+00	0.7500E-02
0.3371E+02	0.2293E-01	0.9426E+00	0.1000E-01
0.7913E+02	0.5612E-01	0.2357E+01	0.2500E-01
0.1325E+03	0.1043E+00	0.4713E+01	0.5000E-01
0.1624E+03	0.1439E+00	0.7070E+01	0.7500E-01
0.1795E+03	0.1778E+00	0.9426E+01	0.1000E+00
0.2029E+03	0.3449E+00	0.2173E+02	0.2500E+00
0.2010E+03	0.5995E+00	0.3813E+02	0.5000E+00
0.2070E+03	0.7289E+00	0.4414E+02	0.6250E+00
0.2104E+03	0.8877E+00	0.4753E+02	0.7813E+00
0.2159E+03	0.1310E+01	0.5316E+02	0.1200E+01

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/26/11 Checked By Lino Date 8/27/11 Sheet 4 of 4

Lateral Pile Analyses - Sign "A"

(A) For Deflection (Select 25' long pile)

Under Service-I Limit

P = 130 k/ pile
V = 30 k/ pile
} Per Designers

From LPILE, pile head deflection $\pm$ 0.2" < 0.25"

$\Rightarrow$ Select 25' long pile ; M_{max} = 70 k-ft @ 5' deep
V_{max} = 30 k @ pile top

(B) For sizing reinforcement

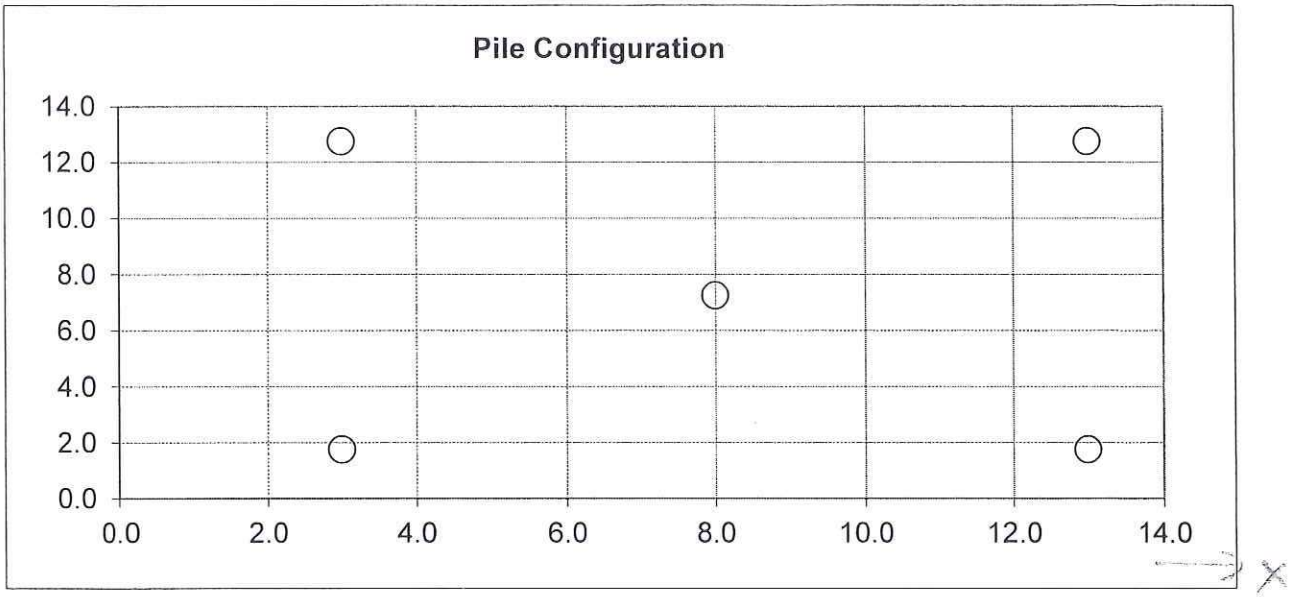
Under Strength Limit,

P = 290 k
V = 50 k
} Per Designers

RESULTS: Pile-head δ = 0.52"
M_{max} = 146 k-ft @ 6' deep
V_{max} = 50 k @ Pile head

Project: I-880 Operational and Safety Improvements
By: Ranjan 8/27/2011

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



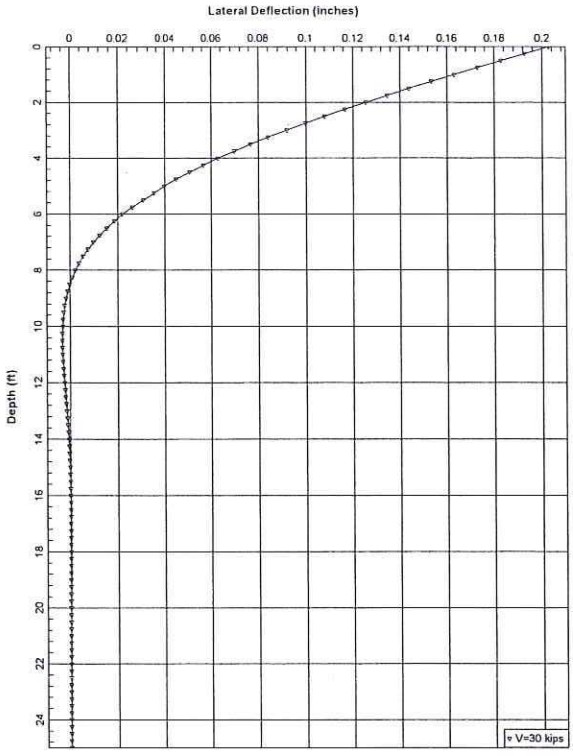
Pile Dia.:	2.000
No. of Piles:	5

Group Efficiency	**X-Dir (Trans)**	**Y-Dir (Long)**
	0.884	0.880

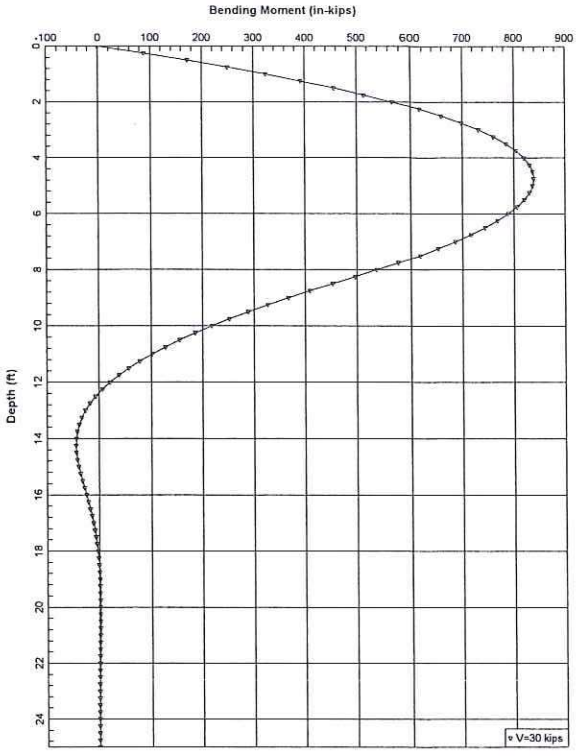
Pile No.	X (Transverse)	Y (Longitudinal)
1	3.000	1.75
2	13.000	1.75
3	8.000	7.25
4	3.000	12.75
5	13.000	12.75

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.806	0.818
0.993	0.818
0.819	0.781
0.806	0.992
0.993	0.992

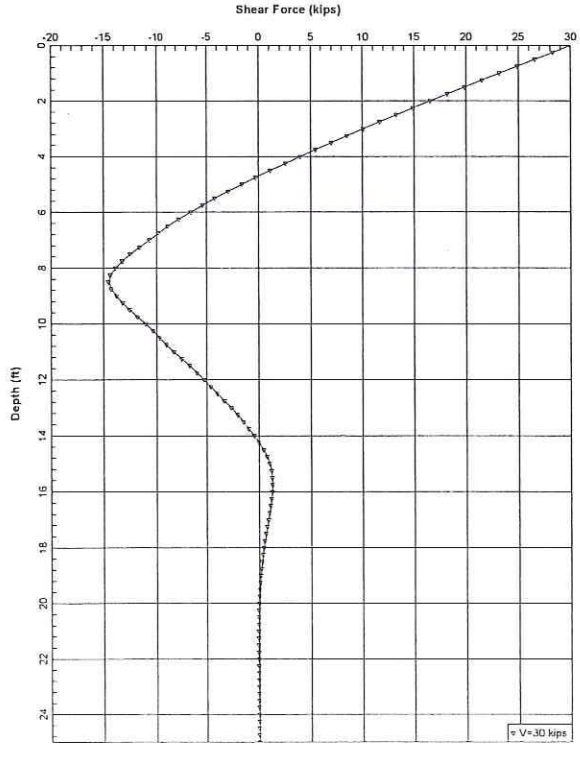
SELECT $\eta = 0.88$ //



I-880 Operational and Safety Improvements - Sign A - 24" CIDH - Free



I-880 Operational and Safety Improvements - Sign A - 24" CIDH - Free



I-880 Operational and Safety Improvements - Sign A - 24" CIDH - Free

```
================================================================================

                LPile Plus for Windows, Version 6.0 (6.0.09)

               Analysis of Individual Piles and Drilled Shafts
              Subjected to Lateral Loading Using the p-y Method

                        (c) 1985-2010 by Ensoft, Inc.
                            All Rights Reserved

================================================================================

This program is licensed to:



--------------------------------------------------------------------------------
                            Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880 North Safety & Operational Improvements at 23rd & 29th Ave\Report\FR\Signs\Analyses\LPILE\Sign A\For Deflection\
Name of input data file:     24-in CIDH at Sign A.lp6d
Name of output file:         24-in CIDH at Sign A.lp6o
Name of plot output file:    24-in CIDH at Sign A.lp6p
Name of runtime file:        24-in CIDH at Sign A.lp6r


--------------------------------------------------------------------------------
                           Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  December 13, 2011     Time:  16:35:20


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - Signs

Job Number: 10-133

Client: RBF

Engineer: GJG

Description: 24-in CIDH piles at Sign A



--------------------------------------------------------------------------------
                             Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =          100
- Maximum number of iterations allowed               =          300
- Deflection tolerance for convergence               =   1.0000E-05  in
- Maximum allowable deflection                       =     100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1
```

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 25.00 ft

Depth of ground surface below top of pile = -4.50 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	25.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	25.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 in^4
Moment of Inertia at Bottom	=	1.629E+04 in^4
Elastic Modulus	=	1300000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -4.500 ft
Distance from top of pile to bottom of layer = 9.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 9.000 ft
Distance from top of pile to bottom of layer = 14.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 14.000 ft
Distance from top of pile to bottom of layer = 23.000 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 23.000 ft
Distance from top of pile to bottom of layer = 38.000 ft

(Depth of lowest layer extends 13.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.50	115.00000
2	9.00	115.00000
3	9.00	52.00000
4	14.00	52.00000
5	14.00	52.00000
6	23.00	52.00000
7	23.00	52.00000
8	38.00	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-4.500	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		9.000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	9.000	52.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
		14.000	52.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
3	Soft Clay	14.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		23.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
4	Soft Clay	23.000	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--
		38.000	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8800	1.0000
2	20.000	0.8800	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 30000.000 lbs	M = 0.000 in-lbs	130000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 30000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 130000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.2050	1.306E-06	30000.	-0.003383	287.3631	2.117E+10	-566.3555	4143.4669	0.000
3.000	0.1949	88771.	28301.	-0.003376	352.7718	2.117E+10	-566.6189	8722.4935	0.000
6.000	0.1848	172437.	26601.	-0.003358	414.4194	2.117E+10	-566.2400	9193.5957	0.000
9.000	0.1747	250997.	24904.	-0.003328	472.3049	2.117E+10	-565.2129	9704.0295	0.000
12.000	0.1648	324457.	23211.	-0.003287	526.4321	2.117E+10	-563.5319	10258.	0.000
15.000	0.1550	392827.	21524.	-0.003236	576.8090	2.117E+10	-561.1909	10861.	0.000
18.000	0.1454	456124.	19845.	-0.003176	623.4484	2.117E+10	-558.1841	11518.	0.000
21.000	0.1360	514373.	18176.	-0.003107	666.3676	2.117E+10	-554.5053	12236.	0.000
24.000	0.1267	567602.	16519.	-0.003031	705.5887	2.117E+10	-550.1483	13022.	0.000
27.000	0.1178	615849.	14876.	-0.002947	741.1385	2.117E+10	-545.1063	13885.	0.000
30.000	0.1091	659156.	13249.	-0.002856	773.0483	2.117E+10	-539.3722	14836.	0.000
33.000	0.1006	697573.	11641.	-0.002760	801.3544	2.117E+10	-532.9382	15887.	0.000
36.000	0.0925	731154.	10053.	-0.002659	826.0980	2.117E+10	-525.7956	17052.	0.000
39.000	0.0847	759962.	8487.0311	-0.002553	847.3250	2.117E+10	-517.9347	18349.	0.000
42.000	0.0772	784068.	6946.1128	-0.002444	865.0864	2.117E+10	-509.3442	19798.	0.000
45.000	0.0700	803545.	5432.0800	-0.002332	879.4382	2.117E+10	-500.0110	21424.	0.000
48.000	0.0632	818479.	3947.1845	-0.002217	890.4415	2.117E+10	-489.9194	23258.	0.000
51.000	0.0567	828957.	2493.7298	-0.002100	898.1625	2.117E+10	-479.0504	25339.	0.000
54.000	0.0506	835079.	1074.0830	-0.001982	902.6731	2.117E+10	-467.3808	27714.	0.000
57.000	0.0448	836948.	-309.3104	-0.001864	904.0502	2.117E+10	-454.8814	30444.	0.000
60.000	0.0394	834677.	-1653.9057	-0.001745	902.3766	2.117E+10	-441.5154	33607.	0.000
63.000	0.0344	828386.	-2957.0318	-0.001627	897.7412	2.117E+10	-427.2353	37308.	0.000
66.000	0.0296	818204.	-4215.8525	-0.001511	890.2389	2.117E+10	-411.9785	41686.	0.000
69.000	0.0253	804269.	-5427.3132	-0.001396	879.9713	2.117E+10	-395.6619	46933.	0.000
72.000	0.0213	786729.	-6588.0629	-0.001283	867.0471	2.117E+10	-378.1713	53327.	0.000
75.000	0.0176	765741.	-7694.3393	-0.001173	851.5830	2.117E+10	-359.3463	61276.	0.000
78.000	0.0142	741477.	-8741.7891	-0.001066	833.7048	2.117E+10	-338.9536	71424.	0.000
81.000	0.0112	714122.	-9725.1775	-0.000963	813.5486	2.117E+10	-316.6386	84845.	0.000
84.000	0.008459	683878.	-10638.	-0.000864	791.2635	2.117E+10	-291.8278	103503.	0.000
87.000	0.006012	650969.	-11471.	-0.000769	767.0154	2.117E+10	-263.5097	131495.	0.000
90.000	0.003842	615652.	-12211.	-0.000680	740.9933	2.117E+10	-229.6332	179313.	0.000
93.000	0.001934	578235.	-12832.	-0.000595	713.4234	2.117E+10	-184.8050	286723.	0.000
96.000	0.000271	539123.	-13223.	-0.000516	684.6043	2.117E+10	-75.3704	833802.	0.000
99.000	-0.001162	499303.	-13097.	-0.000442	655.2635	2.117E+10	159.2920	411222.	0.000
102.000	-0.002383	460888.	-12551.	-0.000374	626.9587	2.117E+10	204.7118	257704.	0.000
105.000	-0.003408	424291.	-11894.	-0.000312	599.9927	2.117E+10	233.2038	205273.	0.000
108.000	-0.004253	389769.	-11285.	-0.000254	574.5559	2.117E+10	172.3099	121546.	0.000
111.000	-0.004932	356776.	-10849.	-0.000201	550.2459	2.117E+10	118.4313	72039.	0.000
114.000	-0.005459	324829.	-10486.	-0.000153	526.7067	2.117E+10	123.6692	67958.	0.000
117.000	-0.005849	293978.	-10109.	-0.000109	503.9744	2.117E+10	127.7263	65516.	0.000
120.000	-0.006113	264260.	-9721.3045	-6.939E-05	482.0771	2.117E+10	130.8241	64203.	0.000
123.000	-0.006265	235704.	-9325.4019	-3.397E-05	461.0367	2.117E+10	133.1110	63740.	0.000
126.000	-0.006317	208334.	-8923.6984	-2.507E-06	440.8693	2.117E+10	134.6914	63968.	0.000
129.000	-0.006280	182164.	-8518.1990	2.516E-05	421.5867	2.117E+10	135.6416	64796.	0.000
132.000	-0.006166	157205.	-8110.7081	4.920E-05	403.1962	2.117E+10	136.0189	66180.	0.000
135.000	-0.005985	133461.	-7702.8790	6.980E-05	385.7012	2.117E+10	135.8671	68106.	0.000
138.000	-0.005747	110933.	-7296.2482	8.711E-05	369.1018	2.117E+10	135.2201	70586.	0.000
141.000	-0.005462	89616.	-6892.2617	0.000101	353.3947	2.117E+10	134.1042	73655.	0.000
144.000	-0.005139	69501.	-6492.2949	0.000113	338.5731	2.117E+10	132.5403	77371.	0.000
147.000	-0.004787	50574.	-6097.6681	0.000121	324.6277	2.117E+10	130.5443	81819.	0.000
150.000	-0.004413	32820.	-5709.6592	0.000127	311.5459	2.117E+10	128.1284	87112.	0.000
153.000	-0.004025	16217.	-5330.7587	0.000130	299.3125	2.117E+10	124.4719	92785.	0.000
156.000	-0.003630	733.8259	-4963.6603	0.000132	287.9038	2.117E+10	120.2604	99398.	0.000
159.000	-0.003234	-13667.	-4609.6788	0.000131	297.4336	2.117E+10	115.7273	107339.	0.000
162.000	-0.002845	-27026.	-4269.7622	0.000128	307.2768	2.117E+10	110.8837	116923.	0.000
165.000	-0.002467	-39386.	-3944.8273	0.000123	316.3836	2.117E+10	105.7396	128578.	0.000
168.000	-0.002106	-50791.	-3500.8528	0.000117	324.7876	2.117E+10	190.2434	271007.	0.000
171.000	-0.001766	-60482.	-2765.1867	0.000109	331.9279	2.117E+10	300.2007	509856.	0.000
174.000	-0.001453	-67467.	-1889.6167	9.984E-05	337.0750	2.117E+10	283.5127	585561.	0.000
177.000	-0.001167	-71897.	-1065.8038	8.997E-05	340.3392	2.117E+10	265.6960	682829.	0.000
180.000	-0.000913	-73932.	-297.1895	7.964E-05	341.8386	2.117E+10	246.7135	810928.	0.000
183.000	-0.000690	-73743.	412.5772	6.917E-05	341.6988	2.117E+10	226.4642	985323.	0.000
186.000	-0.000498	-71511.	1059.3654	5.888E-05	340.0543	2.117E+10	204.7279	1234130.	0.000
189.000	-0.000336	-67432.	1609.8076	4.904E-05	337.0492	2.117E+10	162.2335	1447581.	0.000

192.000	-0.000203	-61890.	2001.5303	3.988E-05	332.9656	2.117E+10	98.9150	1458687.	0.000
195.000	-9.696E-05	-55454.	2221.1571	3.156E-05	328.2235	2.117E+10	47.5029	1469793.	0.000
198.000	-1.406E-05	-48588.	2302.7889	2.419E-05	323.1641	2.117E+10	6.9183	1476470.	0.000
201.000	4.819E-05	-41657.	2277.5909	1.780E-05	318.0568	2.117E+10	-23.7169	1476470.	0.000
204.000	9.273E-05	-34936.	2173.5599	1.237E-05	313.1051	2.117E+10	-45.6371	1476470.	0.000
207.000	0.000122	-28625.	2014.7321	7.868E-06	308.4547	2.117E+10	-60.2481	1476470.	0.000
210.000	0.000140	-22854.	1821.0541	4.221E-06	304.2026	2.117E+10	-68.8705	1476470.	0.000
213.000	0.000148	-17702.	1608.6810	1.347E-06	300.4063	2.117E+10	-72.7115	1476470.	0.000
216.000	0.000148	-13203.	1390.3401	-8.422E-07	297.0914	2.117E+10	-72.8491	1476470.	0.000
219.000	0.000143	-9359.0820	1175.7296	-2.441E-06	294.2591	2.117E+10	-70.2245	1476470.	0.000
222.000	0.000133	-6146.6929	971.9301	-3.539E-06	291.8921	2.117E+10	-65.6418	1476470.	0.000
225.000	0.000121	-3524.7405	783.8076	-4.224E-06	289.9602	2.117E+10	-59.7732	1476470.	0.000
228.000	0.000108	-1440.5520	614.3971	-4.576E-06	288.4245	2.117E+10	-53.1671	1476470.	0.000
231.000	9.399E-05	165.2119	465.2569	-4.667E-06	287.4848	2.117E+10	-46.2597	1476470.	0.000
234.000	8.003E-05	1354.6294	336.7871	-4.559E-06	288.3612	2.117E+10	-39.3868	1476470.	0.000
237.000	6.664E-05	2189.4906	228.5109	-4.308E-06	288.9764	2.117E+10	-32.7974	1476470.	0.000
240.000	5.418E-05	2729.0546	139.3159	-3.959E-06	289.3739	2.117E+10	-26.6660	1476470.	0.000
243.000	4.288E-05	3028.4742	67.6587	-3.551E-06	289.5946	2.117E+10	-21.1055	1476470.	0.000
246.000	3.287E-05	3137.7769	11.7324	-3.115E-06	289.6751	2.117E+10	-16.1787	1476470.	0.000
249.000	2.420E-05	3101.2982	-30.3980	-2.673E-06	289.6482	2.117E+10	-11.9083	1476470.	0.000
252.000	1.684E-05	2957.4737	-60.6904	-2.243E-06	289.5422	2.117E+10	-8.2867	1476470.	0.000
255.000	1.074E-05	2738.9054	-81.0463	-1.840E-06	289.3812	2.117E+10	-5.2839	1476470.	0.000
258.000	5.799E-06	2472.6306	-93.2533	-1.471E-06	289.1850	2.117E+10	-2.8541	1476470.	0.000
261.000	1.913E-06	2180.5324	-98.9468	-1.141E-06	288.9698	2.117E+10	-0.9416	1476470.	0.000
264.000	-1.046E-06	1879.8394	-99.5872	-8.532E-07	288.7482	2.117E+10	0.5147	1476470.	0.000
267.000	-3.206E-06	1583.6750	-96.4485	-6.078E-07	288.5300	2.117E+10	1.5777	1476470.	0.000
270.000	-4.692E-06	1301.6226	-90.6177	-4.034E-07	288.3222	2.117E+10	2.3094	1476470.	0.000
273.000	-5.626E-06	1040.2832	-83.0004	-2.374E-07	288.1296	2.117E+10	2.7688	1476470.	0.000
276.000	-6.117E-06	803.8055	-73.8798	-1.068E-07	287.9554	2.117E+10	3.3116	1624117.	0.000
279.000	-6.267E-06	597.0877	-63.3610	-7.526E-09	287.8030	2.117E+10	3.7009	1771764.	0.000
282.000	-6.162E-06	423.6454	-52.3506	6.479E-08	287.6752	2.117E+10	3.6393	1771764.	0.000
285.000	-5.878E-06	282.9336	-41.6846	1.149E-07	287.5716	2.117E+10	3.4713	1771764.	0.000
288.000	-5.473E-06	173.4483	-31.6291	1.472E-07	287.4909	2.117E+10	3.2323	1771764.	0.000
291.000	-4.995E-06	93.0444	-22.3559	1.661E-07	287.4316	2.117E+10	2.9498	1771764.	0.000
294.000	-4.477E-06	39.1836	-13.9654	1.754E-07	287.3920	2.117E+10	2.6439	1771764.	0.000
297.000	-3.942E-06	9.1154	-6.5073	1.789E-07	287.3698	2.117E+10	2.3281	1771764.	0.000
300.000	-3.404E-06	0.000	0.000	1.795E-07	287.3631	2.117E+10	2.0101	885882.	0.000

" This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      0.2050296 inches
Computed slope at pile head      =     -0.0033825 radians
Maximum bending moment           =       836948. inch-lbs
Maximum shear force              =        30000. lbs
Depth of maximum bending moment  =     57.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             20
Number of zero deflection points =              3
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

```
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians
```

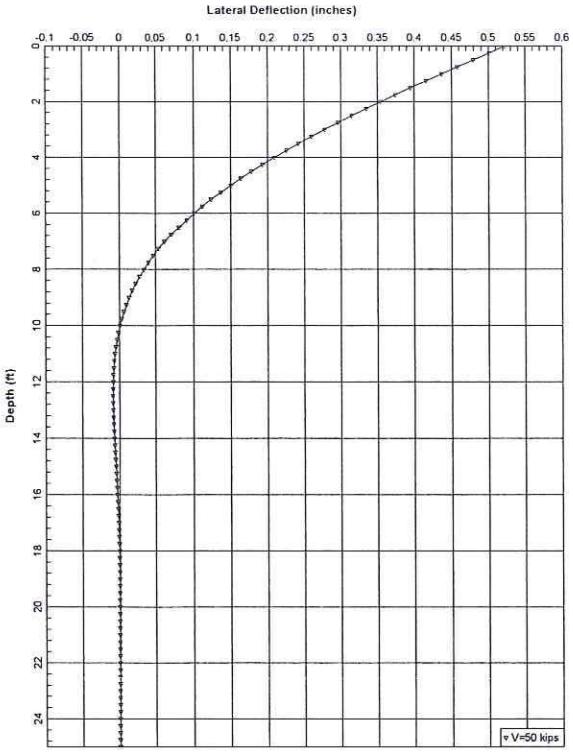
Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 30000.	M = 0.000	130000.	0.20502959	836948.	30000.	0.00000000

Summary of Warning Messages

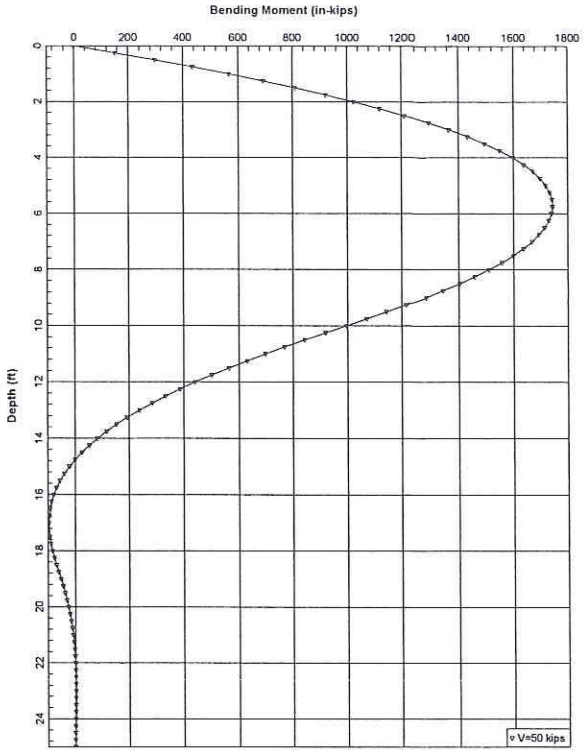
The following warning was reported 1501 times

**** Warning ****

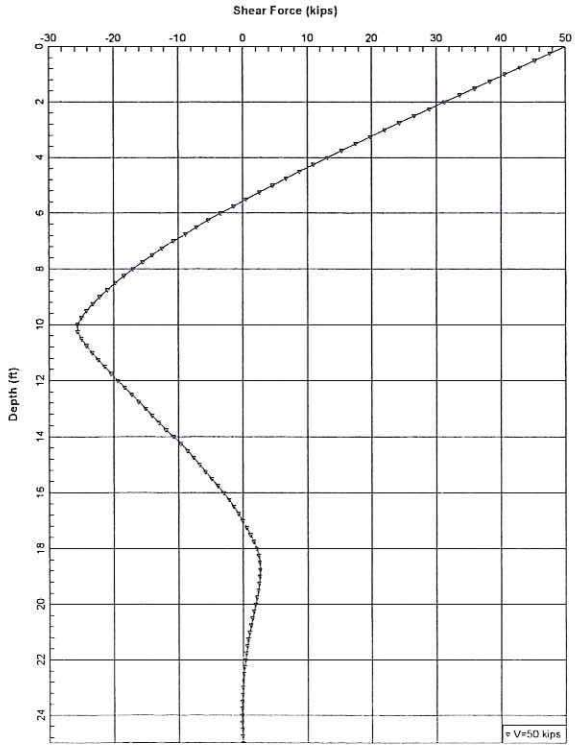
An unreasonable input value for shear strength has been specified for a soil defined using the soft clay criteria. The input value is greater than 8.68 psi (1,250 psf). You should check your input data for correctness.



I-880 Operational and Safety Improvements - Sign A - 24" CIDH - Free



I-880 Operational and Safety Improvements - Sign A - 24" CIDH - Free



I-880 Operational and Safety Improvements - Sign A - 24" CIDH - Free

```
================================================================================

                    LPile Plus for Windows, Version 6.0 (6.0.09)

                  Analysis of Individual Piles and Drilled Shafts
                 Subjected to Lateral Loading Using the p-y Method

                            (c) 1985-2010 by Ensoft, Inc.
                                All Rights Reserved

================================================================================

This program is licensed to:


--------------------------------------------------------------------------------
                              Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880 North Safety & Operational Improvements at 23rd & 29th Ave\Report\FR\Signs\Analyses\LPILE\Sign A\For Reinforcement\
Name of input data file:     24-in CIDH at Sign A.lp6d
Name of output file:         24-in CIDH at Sign A.lp6o
Name of plot output file:    24-in CIDH at Sign A.lp6p
Name of runtime file:        24-in CIDH at Sign A.lp6r

--------------------------------------------------------------------------------
                             Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  December 13, 2011     Time:  16:43:49

--------------------------------------------------------------------------------
                                  Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - Signs

Job Number: 10-133

Client: RBF

Engineer: GJG

Description: 24-in CIDH piles at Sign A


--------------------------------------------------------------------------------
                                  Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =          100
- Maximum number of iterations allowed               =          300
- Deflection tolerance for convergence               =   1.0000E-05  in
- Maximum allowable deflection                       =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1

--------------------------------------------------------------------------------
                      Pile Structural Properties and Geometry
```

Total Number of Sections = 1

Total Pile Length = 25.00 ft

Depth of ground surface below top of pile = -4.50 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	25.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	25.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	1.629E+04 inA4
Moment of Inertia at Bottom	=	1.629E+04 inA4
Elastic Modulus	=	1500000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -4.500 ft
Distance from top of pile to bottom of layer = 9.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 9.000 ft
Distance from top of pile to bottom of layer = 14.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 14.000 ft
Distance from top of pile to bottom of layer = 23.000 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 23.000 ft
Distance from top of pile to bottom of layer = 38.000 ft

(Depth of lowest layer extends 13.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.50	115.00000
2	9.00	115.00000
3	9.00	52.00000
4	14.00	52.00000
5	14.00	52.00000
6	23.00	52.00000
7	23.00	52.00000
8	38.00	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	-4.500	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		9.000	115.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
2	Soft Clay	9.000	52.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
		14.000	52.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
3	Soft Clay	14.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		23.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
4	Soft Clay	23.000	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--
		38.000	52.000	3000.000	--	--	--	0.00400	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8800	1.0000
2	20.000	0.8800	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 50000.000 lbs	M = 0.000 in-lbs	290000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 50000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 290000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.5249	-3.014E-07	50000.	-0.007239	641.0407	2.443E+10	-774.7671	2213.9705	0.000
3.000	0.5032	152811.	47672.	-0.007229	753.6363	2.443E+10	-777.3291	4634.3028	0.000
6.000	0.4815	298610.	45337.	-0.007201	861.0650	2.443E+10	-779.2139	4854.4926	0.000
9.000	0.4600	437364.	42998.	-0.007156	963.3029	2.443E+10	-780.4144	5089.7413	0.000
12.000	0.4386	569047.	40656.	-0.007094	1060.3310	2.443E+10	-780.9234	5341.4203	0.000
15.000	0.4174	693642.	38313.	-0.007017	1152.1357	2.443E+10	-780.7339	5611.0616	0.000
18.000	0.3965	811135.	35972.	-0.006925	1238.7084	2.443E+10	-779.8390	5900.3804	0.000
21.000	0.3759	921524.	33635.	-0.006818	1320.0458	2.443E+10	-778.2319	6211.3029	0.000
24.000	0.3556	1024810.	31304.	-0.006699	1396.1498	2.443E+10	-775.9056	6545.9981	0.000
27.000	0.3357	1121003.	28981.	-0.006567	1467.0278	2.443E+10	-772.8534	6906.9163	0.000
30.000	0.3162	1210121.	26668.	-0.006424	1532.6924	2.443E+10	-769.0683	7296.8344	0.000
33.000	0.2971	1292188.	24367.	-0.006270	1593.1616	2.443E+10	-764.5433	7718.9104	0.000
36.000	0.2786	1367236.	22082.	-0.006107	1648.4591	2.443E+10	-759.2711	8176.7496	0.000
39.000	0.2605	1435304.	19813.	-0.005935	1698.6139	2.443E+10	-753.2443	8674.4840	0.000
42.000	0.2430	1496440.	17563.	-0.005755	1743.6606	2.443E+10	-746.4548	9216.8699	0.000
45.000	0.2260	1550698.	15335.	-0.005568	1783.6394	2.443E+10	-738.8943	9809.4078	0.000
48.000	0.2096	1598141.	13131.	-0.005374	1818.5962	2.443E+10	-730.5537	10458.	0.000
51.000	0.1937	1638837.	10953.	-0.005175	1848.5825	2.443E+10	-721.4229	11172.	0.000
54.000	0.1785	1672866.	8803.9209	-0.004972	1873.6558	2.443E+10	-711.4909	11957.	0.000
57.000	0.1639	1700312.	6685.5669	-0.004765	1893.8791	2.443E+10	-700.7451	12827.	0.000
60.000	0.1499	1721270.	4600.6921	-0.004555	1909.3216	2.443E+10	-689.1714	13791.	0.000
63.000	0.1366	1735842.	2551.8053	-0.004343	1920.0584	2.443E+10	-676.7531	14866.	0.000
66.000	0.1239	1744137.	541.4693	-0.004129	1926.1707	2.443E+10	-663.4709	16070.	0.000
69.000	0.1118	1746275.	-1427.6892	-0.003915	1927.7460	2.443E+10	-649.3015	17424.	0.000
72.000	0.1004	1742383.	-3352.9668	-0.003700	1924.8779	2.443E+10	-634.2169	18956.	0.000
75.000	0.0896	1732596.	-5231.5669	-0.003487	1917.6669	2.443E+10	-618.1831	20700.	0.000
78.000	0.0794	1717061.	-7060.5780	-0.003275	1906.2200	2.443E+10	-601.1577	22700.	0.000
81.000	0.0699	1695932.	-8836.9454	-0.003066	1890.6514	2.443E+10	-583.0873	25011.	0.000
84.000	0.0611	1669373.	-10557.	-0.002859	1871.0826	2.443E+10	-563.9039	27708.	0.000
87.000	0.0528	1637562.	-12219.	-0.002656	1847.6429	2.443E+10	-543.5191	30891.	0.000
90.000	0.0451	1600684.	-13817.	-0.002457	1820.4699	2.443E+10	-521.8160	34697.	0.000
93.000	0.0380	1558938.	-15347.	-0.002263	1789.7105	2.443E+10	-498.6359	39323.	0.000
96.000	0.0315	1512538.	-16806.	-0.002075	1755.5217	2.443E+10	-473.7577	45064.	0.000
99.000	0.0256	1461713.	-18187.	-0.001892	1718.0722	2.443E+10	-446.8626	52379.	0.000
102.000	0.0202	1406709.	-19483.	-0.001716	1677.5442	2.443E+10	-417.4689	62038.	0.000
105.000	0.0153	1347799.	-20687.	-0.001547	1634.1370	2.443E+10	-384.8028	75455.	0.000
108.000	0.0109	1285280.	-21618.	-0.001385	1588.0720	2.443E+10	-235.9184	64887.	0.000
111.000	0.006989	1220502.	-22171.	-0.001231	1540.3412	2.443E+10	-133.0604	57113.	0.000
114.000	0.003521	1154395.	-22531.	-0.001085	1491.6321	2.443E+10	-106.8847	91076.	0.000
117.000	0.000477	1087203.	-22786.	-0.000948	1442.1232	2.443E+10	-62.7420	394245.	0.000
120.000	-0.002165	1019331.	-22741.	-0.000818	1392.1127	2.443E+10	92.5323	128201.	0.000
123.000	-0.004433	952182.	-22424.	-0.000697	1342.6355	2.443E+10	118.5944	80266.	0.000
126.000	-0.006349	885999.	-22044.	-0.000584	1293.8699	2.443E+10	134.9083	63747.	0.000
129.000	-0.007939	820935.	-21622.	-0.000480	1245.9291	2.443E+10	146.6563	55419.	0.000
132.000	-0.009227	757104.	-21168.	-0.000383	1198.8963	2.443E+10	155.5703	50584.	0.000
135.000	-0.0102	694591.	-20691.	-0.000294	1152.8355	2.443E+10	162.4715	47621.	0.000
138.000	-0.0110	633467.	-20196.	-0.000212	1107.7975	2.443E+10	167.8213	45820.	0.000
141.000	-0.0115	573786.	-19686.	-0.000138	1063.8225	2.443E+10	171.9078	44817.	0.000
144.000	-0.0118	515590.	-19166.	-7.100E-05	1020.9423	2.443E+10	174.9237	44415.	0.000
147.000	-0.0119	458914.	-18638.	-1.116E-05	979.1815	2.443E+10	177.0049	44499.	0.000
150.000	-0.0119	403781.	-18105.	4.181E-05	938.5584	2.443E+10	178.2506	45004.	0.000
153.000	-0.0117	350210.	-17571.	8.811E-05	899.0856	2.443E+10	177.5520	45595.	0.000
156.000	-0.0114	298200.	-17041.	0.000128	860.7626	2.443E+10	175.8706	46471.	0.000
159.000	-0.0109	247740.	-16517.	0.000161	823.5825	2.443E+10	173.5759	47708.	0.000
162.000	-0.0104	198816.	-16001.	0.000189	787.5339	2.443E+10	170.7201	49318.	0.000
165.000	-0.009782	151407.	-15494.	0.000210	752.6017	2.443E+10	167.3487	51325.	0.000
168.000	-0.009123	105488.	-14777.	0.000226	718.7674	2.443E+10	310.1053	101978.	0.000
171.000	-0.008425	62349.	-13554.	0.000236	686.9813	2.443E+10	505.2933	179929.	0.000
174.000	-0.007704	23751.	-12055.	0.000242	658.5411	2.443E+10	494.3956	192520.	0.000
177.000	-0.006974	-10400.	-10590.	0.000243	648.7039	2.443E+10	482.0850	207364.	0.000
180.000	-0.006249	-40211.	-9164.2907	0.000239	670.6697	2.443E+10	468.4263	224890.	0.000
183.000	-0.005538	-65803.	-7781.4378	0.000233	689.5260	2.443E+10	453.4756	245662.	0.000
186.000	-0.004851	-87305.	-6445.3042	0.000224	705.3699	2.443E+10	437.2801	270420.	0.000
189.000	-0.004197	-104863.	-5159.5670	0.000212	718.3071	2.443E+10	419.8781	300156.	0.000
192.000	-0.003581	-118631.	-3927.8034	0.000198	728.4516	2.443E+10	401.2976	336216.	0.000
195.000	-0.003009	-128775.	-2753.5263	0.000183	735.9256	2.443E+10	381.5538	380472.	0.000
198.000	-0.002484	-135471.	-1641.8478	0.000167	740.8593	2.443E+10	359.5653	434294.	0.000
201.000	-0.002009	-138916.	-599.9787	0.000150	743.3978	2.443E+10	335.0141	500280.	0.000
204.000	-0.001585	-139331.	366.9171	0.000133	743.7038	2.443E+10	309.5831	585848.	0.000
207.000	-0.001213	-136945.	1256.0247	0.000116	741.9458	2.443E+10	283.1553	700308.	0.000
210.000	-0.000891	-131996.	2064.0020	9.918E-05	738.2992	2.443E+10	255.4962	860140.	0.000
213.000	-0.000618	-124734.	2786.4536	8.342E-05	732.9480	2.443E+10	226.1382	1097968.	0.000
216.000	-0.000391	-115423.	3414.0130	6.867E-05	726.0874	2.443E+10	192.2348	1476470.	0.000
219.000	-0.000206	-104369.	3854.3199	5.518E-05	717.9428	2.443E+10	101.3031	1476470.	0.000
222.000	-5.952E-05	-92393.	4050.2174	4.310E-05	709.1183	2.443E+10	29.2953	1476470.	0.000
225.000	5.275E-05	-80143.	4055.2202	3.250E-05	700.0922	2.443E+10	-25.9601	1476470.	0.000

SIGN "G"

Earth Mechanics, Inc.
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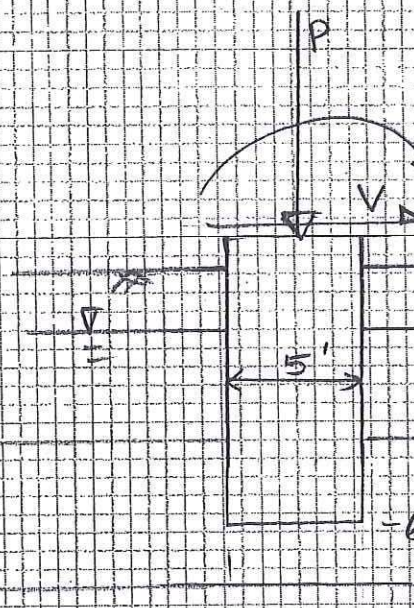
Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/26/11 Checked By Lino Date 8/27/11 Sheet 1 of 2

Sign G1 [Sta. 242+30 ("05" Line); ~90' RT]



5' CIDH

USE 50% EI

Per Designers,

Under service-I
P = 25 K
M = 515 K-ft
V = 12 K

Under strength
P = 35 K
M = 740 K-ft
V = 20 K

Under extreme
P = 25 K
M = 420 K-ft
V = 12 K

Axial Pile Calculation

Under strength Limit

P = 35 K

∴ Nominal resistance = 35/0.7 = 50 kips (∵ η = 1)

From SHAFT, Required shaft length = 12'

∴ Pile tip El. = +5'

Under Extreme Limit

Nominal resistance = 30 kips

Pile tip El = +6'

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

I-880 Operational and Safety Improvement Project - Signs

TOTAL LOAD = 300.0 TONS

NUMBER OF LAYERS = 4

WATER TABLE DEPTH = 4.0 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 1.00

FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00

SOIL INFORMATION

LAYER NO 1----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.600E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.696E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.400E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.696E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.400E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.816E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.200E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.500E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.900E+01

LAYER NO 3----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.816E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.700E+01
SOIL UNIT WEIGHT, LB/CU FT	= 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.900E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.250E+04
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00

BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.700E+01
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.290E+02

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.300E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.100E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.290E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.300E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.100E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.526E+02
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.540E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 5.000 FT.
DIAMETER OF BASE = 5.000 FT.
END OF STEM TO BASE = 0.000 FT.
ANGLE OF BELL = 0.000 DEG.
IGNORED TOP PORTION = 7.000 FT.
IGNORED BOTTOM PORTION = 2.000 FT.
AREA OF ONE PERCENT STEEL = 28.278 SQ.IN.
ELASTIC MODULUS, Ec = 0.360E+07 LB/SQ IN
VOLUME OF UNDERREAM = 0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
10.0	7.27	8.64	208.17	216.81	216.81	216.81	29.81
11.0	8.00	17.28	209.20	226.48	226.48	226.48	28.31
12.0	8.73	28.08	210.23	238.31	238.31	238.31	27.31
13.0	9.46	38.88	211.26	250.15	250.15	250.15	26.46
14.0	10.18	49.68	212.29	261.98	261.98	261.98	25.73
15.0	10.91	60.48	213.33	273.81	273.81	273.81	25.10
16.0	11.64	71.28	214.36	285.64	285.64	285.64	24.55
17.0	12.36	82.08	215.39	297.47	297.47	297.47	24.06
18.0	13.09	92.89	216.42	309.30	309.30	309.30	23.63

Extreme Strength

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1008E-01	0.1027E-04	0.2850E-02	0.1000E-04
0.5042E-01	0.5133E-04	0.1425E-01	0.5000E-04
0.1008E+00	0.1027E-03	0.2850E-01	0.1000E-03
0.5042E+01	0.5133E-02	0.1425E+01	0.5000E-02
0.7562E+01	0.7700E-02	0.2137E+01	0.7500E-02
0.1008E+02	0.1027E-01	0.2850E+01	0.1000E-01
0.2521E+02	0.2567E-01	0.7124E+01	0.2500E-01
0.5042E+02	0.5133E-01	0.1425E+02	0.5000E-01
0.6909E+02	0.7686E-01	0.2137E+02	0.7500E-01
0.8365E+02	0.1023E+00	0.2850E+02	0.1000E+00
0.1486E+03	0.2544E+00	0.7124E+02	0.2500E+00
0.1898E+03	0.5059E+00	0.1093E+03	0.5000E+00
0.2007E+03	0.6063E+00	0.1212E+03	0.6000E+00
0.2578E+03	0.1509E+01	0.1872E+03	0.1500E+01
0.2805E+03	0.3009E+01	0.2099E+03	0.3000E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1478E-01	0.1039E-04	0.4256E-02	0.1000E-04
0.7392E-01	0.5196E-04	0.2128E-01	0.5000E-04
0.1478E+00	0.1039E-03	0.4256E-01	0.1000E-03
0.7392E+01	0.5196E-02	0.2128E+01	0.5000E-02
0.1109E+02	0.7794E-02	0.3192E+01	0.7500E-02
0.1478E+02	0.1039E-01	0.4256E+01	0.1000E-01
0.3696E+02	0.2598E-01	0.1064E+02	0.2500E-01
0.7397E+02	0.5196E-01	0.2128E+02	0.5000E-01
0.9850E+02	0.7767E-01	0.3192E+02	0.7500E-01
0.1155E+03	0.1032E+00	0.4256E+02	0.1000E+00
0.1905E+03	0.2559E+00	0.1064E+03	0.2500E+00
0.2369E+03	0.5076E+00	0.1508E+03	0.5000E+00
0.2477E+03	0.6080E+00	0.1623E+03	0.6000E+00
0.2856E+03	0.1510E+01	0.2078E+03	0.1500E+01
0.2931E+03	0.3010E+01	0.2153E+03	0.3000E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5544E-02	0.1014E-04	0.1443E-02	0.1000E-04
0.2772E-01	0.5072E-04	0.7214E-02	0.5000E-04
0.5544E-01	0.1014E-03	0.1443E-01	0.1000E-03
0.2772E+01	0.5072E-02	0.7214E+00	0.5000E-02
0.4158E+01	0.7608E-02	0.1082E+01	0.7500E-02
0.5544E+01	0.1014E-01	0.1443E+01	0.1000E-01
0.1386E+02	0.2536E-01	0.3607E+01	0.2500E-01
0.2772E+02	0.5072E-01	0.7214E+01	0.5000E-01
0.4029E+02	0.7606E-01	0.1082E+02	0.7500E-01
0.5202E+02	0.1014E+00	0.1443E+02	0.1000E+00
0.1022E+03	0.2528E+00	0.3607E+02	0.2500E+00
0.1428E+03	0.5042E+00	0.6781E+02	0.5000E+00
0.1536E+03	0.6046E+00	0.8007E+02	0.6000E+00
0.2301E+03	0.1508E+01	0.1666E+03	0.1500E+01
0.2669E+03	0.3009E+01	0.2034E+03	0.3000E+01

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Project RBF / I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/26/11 Checked By Lino Date 8/27/11 Sheet 2 of 2

Settlement check

For minimum pile length of 12', the estimated settlement < 1"

$\Rightarrow$ No design pile tip for settlement //

Under Service-I Limit

Nominal resistance = 50 kips $\Rightarrow$ Pile tip El. = +5' //

Lateral Pile Calculation

(A) For Pile-head Deflection

Under Service-I Limit,

P = 25 K ; M = 515 k-ft ; V = 12 K (Per designers)

From LPILE,

For pile length of 25',

Pile-head deflection $\pm$ 0.12" < 0.25"

$\Rightarrow$ SELECT 25' long Pile.

Design pile tip for lateral = −6 ft //

M_{max} = 560 K-ft @ 5' deep

V_{max} = 53 K @ in' deep

(B) For sizing reinforcement

Under Strength Limit,

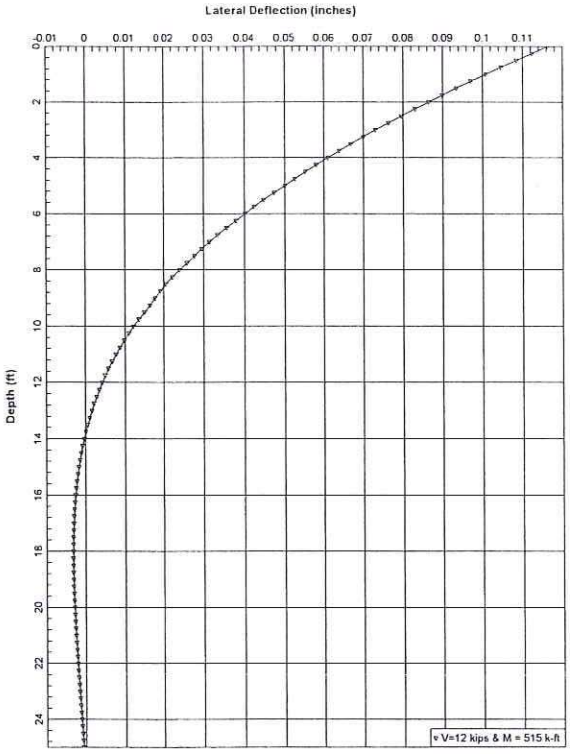
P = 50 K ; M = 1057 k-ft ; V = 29 K (Per designers)

RESULTS:

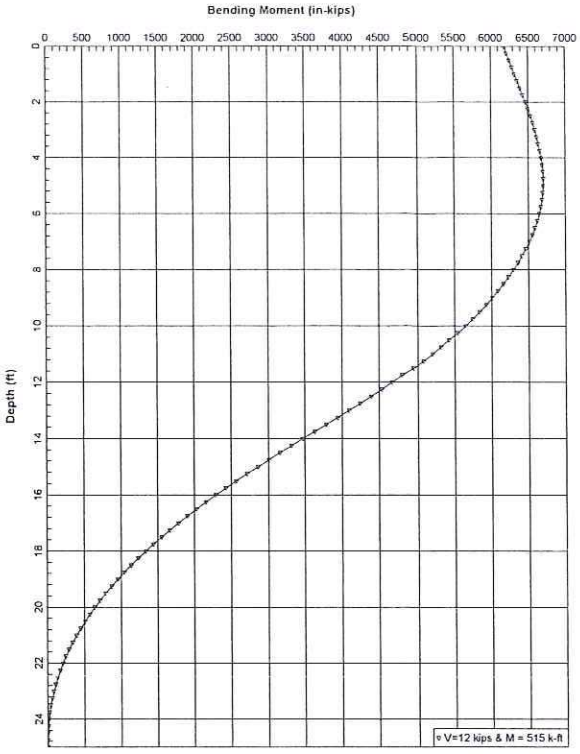
Pile-head δ $\pm$ 0.4"

M_{max} $\pm$ 1,180 k-ft @ 5.8 ft

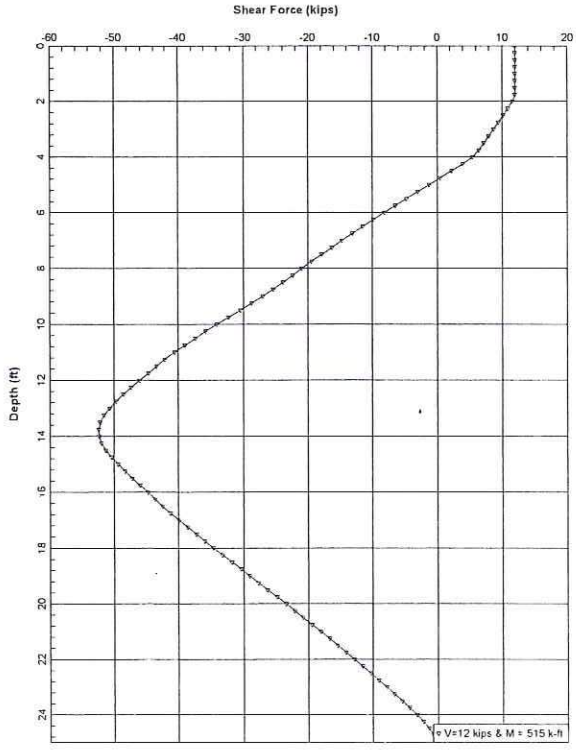
Max shear $\pm$ 110 kips @ 16 ft



I-880 Operational and Safety Improvements - Sign G - 60" CIDH - Free



I-880 Operational and Safety Improvements - Sign G - 60" CIDH - Free



I-880 Operational and Safety Improvements - Sign G - 60" CIDH - Free

```
================================================================================

                  LPile Plus for Windows, Version 6.0 (6.0.09)

                 Analysis of Individual Piles and Drilled Shafts
               Subjected to Lateral Loading Using the p-y Method

                         (c) 1985-2010 by Ensoft, Inc.
                              All Rights Reserved

================================================================================

This program is licensed to:



--------------------------------------------------------------------------------
                              Files Used for Analysis
--------------------------------------------------------------------------------


Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880\Report\FR\Signs\Analyses\LPILE\Sign G\For Deflection\
Name of input data file:     60-in CIDH at Sign G.lp6d
Name of output file:         60-in CIDH at Sign G.lp6o
Name of plot output file:    60-in CIDH at Sign G.lp6p
Name of runtime file:        60-in CIDH at Sign G.lp6r


--------------------------------------------------------------------------------
                              Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  August 31, 2011     Time:  12:10:07


--------------------------------------------------------------------------------
                                   Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - Signs
Job Number: 10-133
Client: RBF
Engineer: GJG
Description: 60-in CIDH piles at Sign G


--------------------------------------------------------------------------------
                                   Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =          100
- Maximum number of iterations allowed               =          300
- Deflection tolerance for convergence               =   1.0000E-05  in
- Maximum allowable deflection                       =     100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1


--------------------------------------------------------------------------------
                         Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Total Number of Sections                            =          1

Total Pile Length                                   =      25.00 ft

Depth of ground surface below top of pile           =       2.00 ft

Slope angle of ground surface                       =       0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point         Depth              Pile
                X              Diameter
               ft                in
-----       ---------        ----------
```

1	0.00000	60.0000000
2	25.000000	60.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	25.000 in
Top Width	=	60.000 in
Bottom Width	=	60.000 in
Top Area	=	2827.433388 sq. in
Bottom Area	=	2827.433388 sq. in
Moment of Inertia at Top	=	6.362E+05 inA4
Moment of Inertia at Bottom	=	6.362E+05 inA4
Elastic Modulus	=	1300000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	2.000 ft
Distance from top of pile to bottom of layer	=	4.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	4.000 ft
Distance from top of pile to bottom of layer	=	9.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	9.000 ft
Distance from top of pile to bottom of layer	=	29.000 ft

(Depth of lowest layer extends 4.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	2.00	115.00000
2	4.00	115.00000
3	4.00	52.00000
4	9.00	52.00000
5	9.00	52.00000
6	29.00	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	2.000	115.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
		4.000	115.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
2	Soft Clay	4.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		9.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
3	Soft Clay	9.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		29.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 12000.000 lbs	M = 6180000.000 in-lbs	25000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 12000.000 lbs
Applied moment at pile head = 6180000.000 in-lbs
Axial thrust load on pile head = 25000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-inA2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1164	6180000.	12000.	-0.001338	300.2723	8.270E+11	0.000	0.000	0.000
3.000	0.1124	6216100.	12000.	-0.001316	301.9747	8.270E+11	0.000	0.000	0.000
6.000	0.1085	6252187.	12000.	-0.001293	303.6769	8.270E+11	0.000	0.000	0.000
9.000	0.1047	6288294.	12000.	-0.001271	305.3791	8.270E+11	0.000	0.000	0.000
12.000	0.1009	6324388.	12000.	-0.001248	307.0812	8.270E+11	0.000	0.000	0.000
15.000	0.0972	6360481.	12000.	-0.001225	308.7833	8.270E+11	0.000	0.000	0.000
18.000	0.0935	6396572.	12000.	-0.001202	310.4852	8.270E+11	0.000	0.000	0.000
21.000	0.0900	6432661.	12000.	-0.001178	312.1871	8.270E+11	0.000	0.000	0.000
24.000	0.0865	6468748.	11638.	-0.001155	313.8888	8.270E+11	-241.4540	8376.5112	0.000
27.000	0.0830	6502661.	10912.	-0.001131	315.4881	8.270E+11	-242.4872	8759.7708	0.000
30.000	0.0797	6534390.	10183.	-0.001108	316.9843	8.270E+11	-243.3829	9162.7275	0.000
33.000	0.0764	6563926.	9451.8180	-0.001084	318.3771	8.270E+11	-244.1399	9586.7663	0.000
36.000	0.0732	6591263.	8718.4728	-0.001060	319.6663	8.270E+11	-244.7569	10033.	0.000
39.000	0.0700	6616396.	7983.4885	-0.001036	320.8514	8.270E+11	-245.2326	10504.	0.000
42.000	0.0670	6639319.	7247.2910	-0.001012	321.9325	8.270E+11	-245.5657	11001.	0.000
45.000	0.0640	6660031.	6510.3102	-0.000988	322.9092	8.270E+11	-245.7548	11526.	0.000
48.000	0.0610	6678530.	5546.5768	-0.000964	323.7815	8.270E+11	-396.7341	19500.	0.000
51.000	0.0582	6693455.	4059.3908	-0.000940	324.4854	8.270E+11	-594.7232	30665.	0.000
54.000	0.0554	6703027.	2281.4118	-0.000915	324.9367	8.270E+11	-590.5961	31982.	0.000
57.000	0.0527	6707281.	516.1819	-0.000891	325.1373	8.270E+11	-586.2238	33378.	0.000
60.000	0.0501	6706258.	-1235.5597	-0.000867	325.0891	8.270E+11	-581.6039	34859.	0.000
63.000	0.0475	6699998.	-2973.0658	-0.000842	324.7939	8.270E+11	-576.7336	36433.	0.000
66.000	0.0450	6688546.	-4695.5812	-0.000818	324.2538	8.270E+11	-571.6100	38108.	0.000
69.000	0.0426	6671947.	-6402.3412	-0.000794	323.4711	8.270E+11	-566.2301	39892.	0.000
72.000	0.0402	6650251.	-8092.5719	-0.000770	322.4479	8.270E+11	-560.5904	41797.	0.000
75.000	0.0380	6623507.	-9765.4882	-0.000746	321.1868	8.270E+11	-554.6872	43833.	0.000
78.000	0.0358	6591769.	-11420.	-0.000722	319.6901	8.270E+11	-548.5166	46012.	0.000
81.000	0.0336	6555093.	-13056.	-0.000698	317.9606	8.270E+11	-542.0741	48350.	0.000
84.000	0.0316	6513537.	-14672.	-0.000674	316.0009	8.270E+11	-535.3549	50862.	0.000
87.000	0.0296	6467161.	-16268.	-0.000651	313.8140	8.270E+11	-528.3535	53568.	0.000
90.000	0.0277	6416027.	-17842.	-0.000627	311.4027	8.270E+11	-521.0639	56487.	0.000
93.000	0.0258	6360203.	-19394.	-0.000604	308.7701	8.270E+11	-513.4793	59645.	0.000
96.000	0.0240	6299755.	-20922.	-0.000581	305.9196	8.270E+11	-505.5923	63069.	0.000
99.000	0.0223	6234755.	-22427.	-0.000558	302.8544	8.270E+11	-497.3941	66792.	0.000
102.000	0.0207	6165277.	-23906.	-0.000536	299.5780	8.270E+11	-488.8750	70852.	0.000
105.000	0.0191	6091398.	-25360.	-0.000514	296.0941	8.270E+11	-480.0239	75294.	0.000
108.000	0.0176	6013196.	-26897.	-0.000492	292.4064	8.270E+11	-544.8286	92771.	0.000
111.000	0.0162	5930090.	-28634.	-0.000470	288.4873	8.270E+11	-613.2560	113732.	0.000
114.000	0.0148	5841462.	-30454.	-0.000449	284.3079	8.270E+11	-599.9133	121614.	0.000
117.000	0.0135	5747434.	-32233.	-0.000428	279.8738	8.270E+11	-586.0497	130380.	0.000
120.000	0.0122	5648130.	-33969.	-0.000407	275.1909	8.270E+11	-571.6325	140182.	0.000
123.000	0.0110	5543679.	-35662.	-0.000387	270.2653	8.270E+11	-556.6223	151211.	0.000
126.000	0.009914	5434218.	-37308.	-0.000367	265.1035	8.270E+11	-540.9707	163705.	0.000
129.000	0.008843	5319886.	-38906.	-0.000347	259.7119	8.270E+11	-524.6182	177975.	0.000
132.000	0.007830	5200831.	-40455.	-0.000328	254.0976	8.270E+11	-507.4904	194429.	0.000
135.000	0.006874	5077208.	-41950.	-0.000309	248.2679	8.270E+11	-489.4926	213615.	0.000
138.000	0.005974	4949177.	-43390.	-0.000291	242.2304	8.270E+11	-470.5024	236290.	0.000
141.000	0.005127	4816911.	-44771.	-0.000274	235.9931	8.270E+11	-450.3572	263536.	0.000
144.000	0.004332	4680590.	-46090.	-0.000256	229.5646	8.270E+11	-428.8361	296965.	0.000
147.000	0.003589	4540408.	-47342.	-0.000240	222.9541	8.270E+11	-405.6268	339096.	0.000
150.000	0.002894	4396575.	-48521.	-0.000223	216.1713	8.270E+11	-380.2687	394137.	0.000
153.000	0.002248	4249316.	-49619.	-0.000208	209.2271	8.270E+11	-352.0377	469777.	0.000
156.000	0.001648	4098891.	-50627.	-0.000193	202.1334	8.270E+11	-319.6919	581951.	0.000
159.000	0.001093	3945586.	-51501.	-0.000178	194.9040	8.270E+11	-263.4423	723372.	0.000
162.000	0.000580	3789909.	-52108.	-0.000164	187.5628	8.270E+11	-140.8152	728326.	0.000

165.000	0.000109	3632964.	-52359.	-0.000151	180.1617	8.270E+11	-26.5762	733281.	0.000
168.000	-0.000323	3475778.	-52280.	-0.000138	172.7493	8.270E+11	79.4906	738235.	0.000
171.000	-0.000717	3319307.	-51894.	-0.000125	165.3706	8.270E+11	177.6132	743189.	0.000
174.000	-0.001075	3164433.	-51225.	-0.000114	158.0672	8.270E+11	268.0288	748144.	0.000
177.000	-0.001398	3011971.	-50348.	-0.000102	150.8775	8.270E+11	316.7425	679632.	0.000
180.000	-0.001689	2862359.	-49364.	-9.167E-05	143.8223	8.270E+11	339.5927	603274.	0.000
183.000	-0.001948	2715802.	-48317.	-8.156E-05	136.9111	8.270E+11	358.5261	552089.	0.000
186.000	-0.002178	2572472.	-47217.	-7.197E-05	130.1520	8.270E+11	374.5504	515888.	0.000
189.000	-0.002380	2432511.	-46073.	-6.289E-05	123.5519	8.270E+11	388.2925	489447.	0.000
192.000	-0.002555	2296045.	-44890.	-5.431E-05	117.1166	8.270E+11	400.1725	469793.	0.000
195.000	-0.002706	2163179.	-43674.	-4.622E-05	110.8510	8.270E+11	410.4873	455110.	0.000
198.000	-0.002833	2034008.	-42429.	-3.861E-05	104.7597	8.270E+11	419.4555	444219.	0.000
201.000	-0.002938	1908610.	-41159.	-3.146E-05	98.8463	8.270E+11	427.2435	436330.	0.000
204.000	-0.003022	1787058.	-39867.	-2.476E-05	93.1143	8.270E+11	433.9809	430890.	0.000
207.000	-0.003086	1669411.	-38557.	-1.849E-05	87.5664	8.270E+11	439.7710	427506.	0.000
210.000	-0.003132	1555721.	-37230.	-1.264E-05	82.2051	8.270E+11	444.6975	425894.	0.000
213.000	-0.003162	1446033.	-35890.	-7.194E-06	77.0326	8.270E+11	448.8289	425847.	0.000
216.000	-0.003176	1340385.	-34538.	-2.140E-06	72.0505	8.270E+11	452.2224	427214.	0.000
219.000	-0.003175	1238805.	-33177.	2.537E-06	67.2603	8.270E+11	454.9259	429886.	0.000
222.000	-0.003160	1141320.	-31809.	6.854E-06	62.6632	8.270E+11	456.9797	433788.	0.000
225.000	-0.003134	1047948.	-30436.	1.083E-05	58.2600	8.270E+11	458.4180	438871.	0.000
228.000	-0.003095	958701.	-29060.	1.446E-05	54.0514	8.270E+11	459.2697	445109.	0.000
231.000	-0.003047	873587.	-27682.	1.779E-05	50.0377	8.270E+11	459.5505	452486.	0.000
234.000	-0.002989	792608.	-26303.	2.081E-05	46.2190	8.270E+11	459.3078	461043.	0.000
237.000	-0.002922	715764.	-24927.	2.355E-05	42.5952	8.270E+11	458.5319	470777.	0.000
240.000	-0.002847	643046.	-23553.	2.601E-05	39.1661	8.270E+11	457.2456	481744.	0.000
243.000	-0.002766	574443.	-22184.	2.822E-05	35.9310	8.270E+11	455.4598	494008.	0.000
246.000	-0.002678	509939.	-20821.	3.019E-05	32.8891	8.270E+11	453.1821	507648.	0.000
249.000	-0.002585	449513.	-19465.	3.193E-05	30.0396	8.270E+11	450.4176	522770.	0.000
252.000	-0.002487	393141.	-18119.	3.345E-05	27.3813	8.270E+11	447.1679	539499.	0.000
255.000	-0.002384	340794.	-16783.	3.478E-05	24.9128	8.270E+11	443.4315	557992.	0.000
258.000	-0.002278	292437.	-15459.	3.593E-05	22.6324	8.270E+11	439.2034	578441.	0.000
261.000	-0.002168	248033.	-14149.	3.691E-05	20.5385	8.270E+11	434.4743	601079.	0.000
264.000	-0.002056	207540.	-12853.	3.774E-05	18.6289	8.270E+11	429.2306	626193.	0.000
267.000	-0.001942	170909.	-11574.	3.843E-05	16.9015	8.270E+11	423.4531	654139.	0.000
270.000	-0.001826	138089.	-10313.	3.899E-05	15.3538	8.270E+11	417.1163	685362.	0.000
273.000	-0.001708	109024.	-9072.2947	3.944E-05	13.9832	8.270E+11	410.1869	720422.	0.000
276.000	-0.001589	83650.	-7853.0818	3.978E-05	12.7866	8.270E+11	402.6217	760040.	0.000
279.000	-0.001469	61899.	-6657.6013	4.005E-05	11.7609	8.270E+11	394.3652	805153.	0.000
282.000	-0.001349	43698.	-5488.0344	4.024E-05	10.9026	8.270E+11	385.3460	857009.	0.000
285.000	-0.001228	28965.	-4346.8083	4.037E-05	10.2078	8.270E+11	375.4714	917302.	0.000
288.000	-0.001107	17611.	-3265.4429	4.046E-05	9.6724	8.270E+11	345.4389	936410.	0.000
291.000	-0.000985	9366.1030	-2283.5560	4.051E-05	9.2836	8.270E+11	309.1524	941365.	0.000
294.000	-0.000864	3903.5815	-1411.1787	4.053E-05	9.0260	8.270E+11	272.4325	946319.	0.000
297.000	-0.000742	892.9515	-649.5835	4.054E-05	8.8841	8.270E+11	235.2976	951273.	0.000
300.000	-0.000620	0.000	0.000	4.054E-05	8.8419	8.270E+11	197.7580	478114.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      0.1164139 inches
Computed slope at pile head      =     -0.0013385 radians
Maximum bending moment           =      6707281. inch-lbs
Maximum shear force              =       -52359. lbs
Depth of maximum bending moment  =     57.0000000 inches below pile head
Depth of maximum shear force     =    165.0000000 inches below pile head
Number of iterations             =             15
Number of zero deflection points =              1
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

```
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians
```

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 12000.	M = 6180000.	25000.	0.11641394	6707281.	-52359.	0.00000000

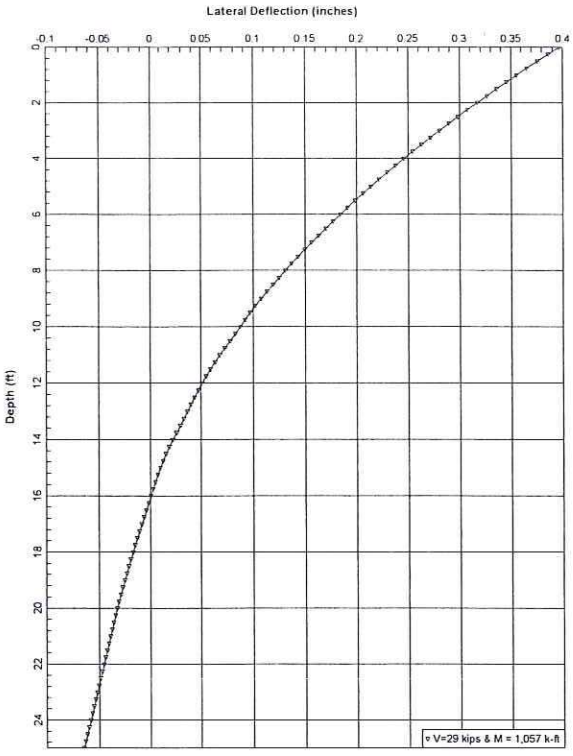
Summary of Warning Messages

The following warning was reported 1162 times

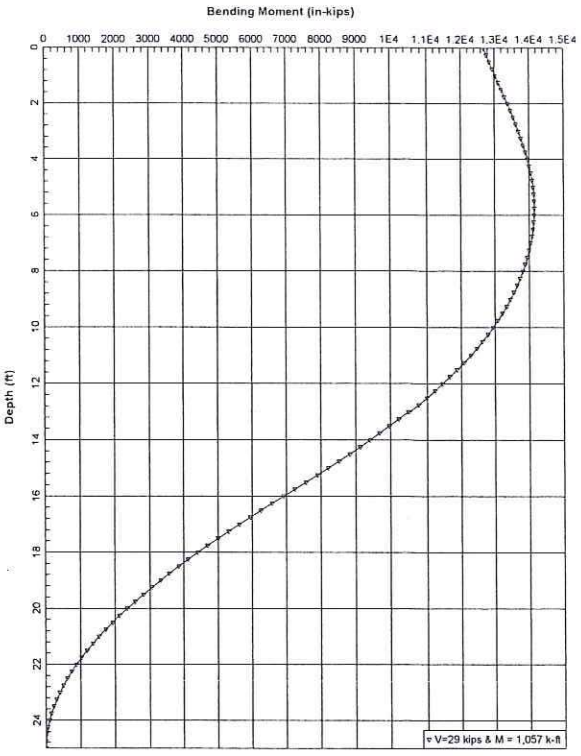
**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68

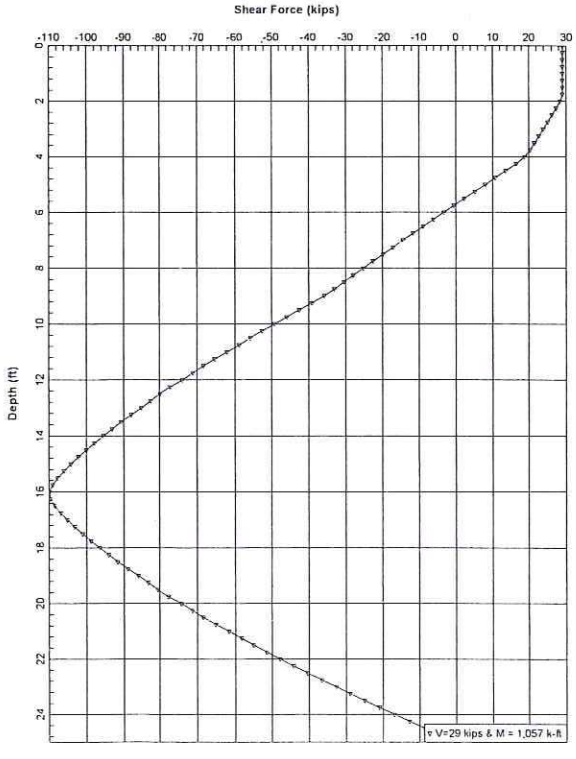
psi (1,250 psf). You should check your input data for correctness.



I-880 Operational and Safety Improvements - Sign G - 60" CIDH - Free



I-880 Operational and Safety Improvements - Sign G - 60" CIDH - Free



I-880 Operational and Safety Improvements - Sign G - 60" CIDH - Free

```
================================================================================

                  LPile Plus for Windows, Version 6.0 (6.0.09)

                 Analysis of Individual Piles and Drilled Shafts
               Subjected to Lateral Loading Using the p-y Method

                          (c) 1985-2010 by Ensoft, Inc.
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================================================================================

This program is licensed to:



--------------------------------------------------------------------------------
                            Files Used for Analysis
--------------------------------------------------------------------------------


Path to file locations:      X:\Projects\2010\10-133 - RBF, I-880\Report\FR\Signs\Analyses\LPILE\Sign G\For Reinforcement\
Name of input data file:     60-in CIDH at Sign G.lp6d
Name of output file:         60-in CIDH at Sign G.lp6o
Name of plot output file:    60-in CIDH at Sign G.lp6p
Name of runtime file:        60-in CIDH at Sign G.lp6r


--------------------------------------------------------------------------------
                            Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  August 31, 2011     Time:  12:08:23


--------------------------------------------------------------------------------
                                 Problem Title
--------------------------------------------------------------------------------

Project Name: I-880 Operational and Safety Improvements - Signs
Job Number: 10-133
Client: RBF
Engineer: GJG
Description: 60-in CIDH piles at Sign G


--------------------------------------------------------------------------------
                               Program Options
--------------------------------------------------------------------------------

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments                          =          100
- Maximum number of iterations allowed               =          300
- Deflection tolerance for convergence               =  1.0000E-05  in
- Maximum allowable deflection                       =    100.0000  in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points)  = 1


--------------------------------------------------------------------------------
                        Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Total Number of Sections                            =          1

Total Pile Length                                   =      25.00 ft

Depth of ground surface below top of pile           =       2.00 ft

Slope angle of ground surface                       =       0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point         Depth              Pile
```

	X ft	Diameter in
1	0.00000	60.0000000
2	25.000000	60.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	25.000 in
Top Width	=	60.000 in
Bottom Width	=	60.000 in
Top Area	=	2827.433388 sq. in
Bottom Area	=	2827.433388 sq. in
Moment of Inertia at Top	=	6.362E+05 in^4
Moment of Inertia at Bottom	=	6.362E+05 in^4
Elastic Modulus	=	1400000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	2.000 ft
Distance from top of pile to bottom of layer	=	4.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	4.000 ft
Distance from top of pile to bottom of layer	=	9.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	9.000 ft
Distance from top of pile to bottom of layer	=	29.000 ft

(Depth of lowest layer extends 4.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	2.00	115.00000
2	4.00	115.00000
3	4.00	52.00000
4	9.00	52.00000
5	9.00	52.00000
6	29.00	52.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Soft Clay	2.000	115.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
		4.000	115.000	1000.000	--	--	--	0.01000	--	--	--	--	--	--
2	Soft Clay	4.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
		9.000	52.000	2000.000	--	--	--	0.00500	--	--	--	--	--	--
3	Soft Clay	9.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--
		29.000	52.000	2500.000	--	--	--	0.00400	--	--	--	--	--	--

Loading Type

---

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 29000.000 lbs	M = 12684000.000 in-lbs	50000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 29000.000 lbs
Applied moment at pile head = 12684000.000 in-lbs
Axial thrust load on pile head = 50000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.3970	12684000.	29000.	-0.003497	615.8235	8.906E+11	0.000	0.000	0.000
3.000	0.3865	12771521.	29000.	-0.003454	619.9508	8.906E+11	0.000	0.000	0.000
6.000	0.3762	12859036.	29000.	-0.003411	624.0777	8.906E+11	0.000	0.000	0.000
9.000	0.3661	12946545.	29000.	-0.003368	628.2044	8.906E+11	0.000	0.000	0.000
12.000	0.3560	13034047.	29000.	-0.003324	632.3307	8.906E+11	0.000	0.000	0.000
15.000	0.3461	13121542.	29000.	-0.003280	636.4567	8.906E+11	0.000	0.000	0.000
18.000	0.3364	13209030.	29000.	-0.003235	640.5824	8.906E+11	0.000	0.000	0.000
21.000	0.3267	13296512.	29000.	-0.003191	644.7078	8.906E+11	0.000	0.000	0.000
24.000	0.3172	13383988.	28441.	-0.003146	648.8329	8.906E+11	-372.3683	3531.6045	0.000
27.000	0.3078	13468105.	27320.	-0.003101	652.7996	8.906E+11	-375.2706	3657.0744	0.000
30.000	0.2986	13548838.	26190.	-0.003055	656.6067	8.906E+11	-378.0190	3797.7713	0.000
33.000	0.2895	13626162.	25052.	-0.003009	660.2531	8.906E+11	-380.6122	3943.9727	0.000
36.000	0.2806	13700053.	23907.	-0.002963	663.7376	8.906E+11	-383.0490	4095.9748	0.000
39.000	0.2717	13770490.	22754.	-0.002917	667.0592	8.906E+11	-385.3281	4254.0941	0.000
42.000	0.2631	13837453.	21595.	-0.002871	670.2169	8.906E+11	-387.4481	4418.6695	0.000
45.000	0.2545	13900921.	20430.	-0.002824	673.2099	8.906E+11	-389.4076	4590.0634	0.000
48.000	0.2461	13960877.	18898.	-0.002777	676.0373	8.906E+11	-631.4296	7696.9183	0.000
51.000	0.2378	14015144.	16525.	-0.002730	678.5963	8.906E+11	-950.8955	11994.	0.000
54.000	0.2297	14060845.	13675.	-0.002683	680.7515	8.906E+11	-948.7988	12390.	0.000
57.000	0.2218	14098001.	10832.	-0.002635	682.5036	8.906E+11	-946.4323	12804.	0.000
60.000	0.2139	14126631.	7997.1325	-0.002588	683.8537	8.906E+11	-943.7934	13236.	0.000
63.000	0.2062	14146760.	5170.2235	-0.002540	684.8029	8.906E+11	-940.8793	13687.	0.000
66.000	0.1987	14158414.	2352.2742	-0.002492	685.3525	8.906E+11	-937.6869	14159.	0.000
69.000	0.1913	14161621.	-455.5756	-0.002445	685.5037	8.906E+11	-934.2130	14652.	0.000
72.000	0.1840	14156413.	-3252.5762	-0.002397	685.2582	8.906E+11	-930.4541	15169.	0.000
75.000	0.1769	14142825.	-6037.8672	-0.002349	684.6174	8.906E+11	-926.4066	15711.	0.000
78.000	0.1699	14120891.	-8810.5766	-0.002302	683.5830	8.906E+11	-922.0663	16280.	0.000
81.000	0.1631	14090652.	-11570.	-0.002254	682.1570	8.906E+11	-917.4291	16876.	0.000
84.000	0.1564	14052148.	-14315.	-0.002207	680.3413	8.906E+11	-912.4901	17504.	0.000
87.000	0.1498	14005425.	-17044.	-0.002159	678.1380	8.906E+11	-907.2444	18164.	0.000
90.000	0.1434	13950530.	-19758.	-0.002112	675.5493	8.906E+11	-901.6862	18859.	0.000
93.000	0.1372	13887513.	-22454.	-0.002065	672.5776	8.906E+11	-895.8096	19592.	0.000
96.000	0.1310	13816426.	-25132.	-0.002019	669.2254	8.906E+11	-889.6079	20366.	0.000
99.000	0.1251	13737326.	-27791.	-0.001972	665.4953	8.906E+11	-883.0738	21184.	0.000
102.000	0.1192	13650272.	-30430.	-0.001926	661.3900	8.906E+11	-876.1991	22050.	0.000
105.000	0.1135	13555324.	-33048.	-0.001880	656.9126	8.906E+11	-868.9750	22968.	0.000
108.000	0.1079	13452549.	-35846.	-0.001835	652.0660	8.906E+11	-996.7781	27707.	0.000
111.000	0.1025	13340796.	-39044.	-0.001790	646.7961	8.906E+11	-1134.6366	33212.	0.000
114.000	0.0972	13218825.	-42430.	-0.001745	641.0443	8.906E+11	-1123.2978	34674.	0.000
117.000	0.0920	13086737.	-45783.	-0.001701	634.8154	8.906E+11	-1111.4412	36235.	0.000
120.000	0.0870	12944640.	-49098.	-0.001657	628.1145	8.906E+11	-1099.0464	37905.	0.000
123.000	0.0821	12792645.	-52376.	-0.001614	620.9469	8.906E+11	-1086.0898	39697.	0.000
126.000	0.0773	12630868.	-55614.	-0.001571	613.3180	8.906E+11	-1072.5451	41624.	0.000
129.000	0.0727	12459433.	-58810.	-0.001529	605.2336	8.906E+11	-1058.3818	43703.	0.000
132.000	0.0681	12278465.	-61963.	-0.001487	596.6997	8.906E+11	-1043.5652	45952.	0.000
135.000	0.0637	12088099.	-65071.	-0.001446	587.7226	8.906E+11	-1028.0552	48393.	0.000

138.000	0.0595	11888475.	-68130.	-0.001405	578.3089	8.906E+11	-1011.8054	51054.	0.000
141.000	0.0553	11679738.	-71140.	-0.001366	568.4655	8.906E+11	-994.7616	53966.	0.000
144.000	0.0513	11462043.	-74098.	-0.001327	558.1997	8.906E+11	-976.8602	57170.	0.000
147.000	0.0473	11235550.	-77000.	-0.001289	547.5189	8.906E+11	-958.0262	60714.	0.000
150.000	0.0435	11000429.	-79844.	-0.001251	536.4314	8.906E+11	-938.1700	64658.	0.000
153.000	0.0398	10756859.	-82627.	-0.001214	524.9453	8.906E+11	-917.1836	69080.	0.000
156.000	0.0362	10505029.	-85346.	-0.001179	513.0698	8.906E+11	-894.9357	74080.	0.000
159.000	0.0328	10245140.	-87995.	-0.001144	500.8141	8.906E+11	-871.2642	79788.	0.000
162.000	0.0294	9977403.	-90571.	-0.001110	488.1885	8.906E+11	-845.9659	86382.	0.000
165.000	0.0261	9702048.	-93068.	-0.001077	475.2036	8.906E+11	-818.7812	94108.	0.000
168.000	0.0229	9419319.	-95480.	-0.001044	461.8709	8.906E+11	-789.3712	103318.	0.000
171.000	0.0198	9129481.	-97800.	-0.001013	448.2030	8.906E+11	-757.2806	114535.	0.000
174.000	0.0168	8832823.	-100019.	-0.000983	434.2135	8.906E+11	-721.8758	128584.	0.000
177.000	0.0139	8529664.	-102125.	-0.000954	419.9174	8.906E+11	-682.2338	146840.	0.000
180.000	0.0111	8220360.	-104104.	-0.000925	405.3315	8.906E+11	-636.9242	171823.	0.000
183.000	0.008386	7905319.	-105934.	-0.000898	390.4752	8.906E+11	-583.5252	208750.	0.000
186.000	0.005731	7585023.	-107586.	-0.000872	375.3710	8.906E+11	-517.3330	270794.	0.000
189.000	0.003153	7260067.	-109002.	-0.000847	360.0470	8.906E+11	-426.6434	405915.	0.000
192.000	0.000648	6931268.	-109894.	-0.000823	344.5418	8.906E+11	-168.1458	777870.	0.000
195.000	-0.001786	6600951.	-109610.	-0.000800	328.9651	8.906E+11	357.5290	600489.	0.000
198.000	-0.004154	6273850.	-108358.	-0.000779	313.5399	8.906E+11	476.6953	344254.	0.000
201.000	-0.006459	5951035.	-106810.	-0.000758	298.3170	8.906E+11	555.7161	258123.	0.000
204.000	-0.008703	5633219.	-105050.	-0.000739	283.3297	8.906E+11	617.6410	212902.	0.000
207.000	-0.0109	5320958.	-103119.	-0.000720	268.6044	8.906E+11	669.7071	184481.	0.000
210.000	-0.0130	5014722.	-101041.	-0.000703	254.1632	8.906E+11	715.2517	164748.	0.000
213.000	-0.0151	4714921.	-98834.	-0.000686	240.0255	8.906E+11	756.1245	150149.	0.000
216.000	-0.0171	4421923.	-96510.	-0.000671	226.2086	8.906E+11	793.4709	138857.	0.000
219.000	-0.0191	4136064.	-94078.	-0.000657	212.7283	8.906E+11	828.0560	129832.	0.000
222.000	-0.0211	3857655.	-91545.	-0.000643	199.5994	8.906E+11	860.4196	122435.	0.000
225.000	-0.0230	3586988.	-88918.	-0.000631	186.8356	8.906E+11	890.9588	116250.	0.000
228.000	-0.0249	3324338.	-86201.	-0.000619	174.4498	8.906E+11	919.9755	110991.	0.000
231.000	-0.0267	3069966.	-83400.	-0.000608	162.4543	8.906E+11	947.7056	106458.	0.000
234.000	-0.0285	2824122.	-80517.	-0.000598	150.8610	8.906E+11	974.3372	102506.	0.000
237.000	-0.0303	2587045.	-77555.	-0.000589	139.6812	8.906E+11	1000.0232	99025.	0.000
240.000	-0.0321	2358967.	-74518.	-0.000581	128.9257	8.906E+11	1024.8900	95932.	0.000
243.000	-0.0338	2140112.	-71407.	-0.000573	118.6052	8.906E+11	1049.0433	93162.	0.000
246.000	-0.0355	1930698.	-68225.	-0.000566	108.7298	8.906E+11	1072.5723	90665.	0.000
249.000	-0.0372	1730935.	-64972.	-0.000560	99.3096	8.906E+11	1095.5534	88400.	0.000
252.000	-0.0389	1541032.	-61652.	-0.000555	90.3544	8.906E+11	1118.0523	86333.	0.000
255.000	-0.0405	1361190.	-58265.	-0.000550	81.8736	8.906E+11	1140.1259	84437.	0.000
258.000	-0.0422	1191609.	-54812.	-0.000546	73.8766	8.906E+11	1161.8240	82691.	0.000
261.000	-0.0438	1032484.	-51294.	-0.000542	66.3727	8.906E+11	1183.1899	81075.	0.000
264.000	-0.0454	884006.	-47713.	-0.000539	59.3710	8.906E+11	1204.2619	79575.	0.000
267.000	-0.0470	746367.	-44069.	-0.000536	52.8803	8.906E+11	1225.0737	78175.	0.000
270.000	-0.0486	619753.	-40363.	-0.000534	46.9096	8.906E+11	1245.6550	76867.	0.000
273.000	-0.0502	504350.	-36595.	-0.000532	41.4675	8.906E+11	1266.0321	75639.	0.000
276.000	-0.0518	400340.	-32767.	-0.000530	36.5627	8.906E+11	1286.2280	74484.	0.000
279.000	-0.0534	307907.	-28878.	-0.000529	32.2038	8.906E+11	1306.2634	73394.	0.000
282.000	-0.0550	227229.	-24930.	-0.000528	28.3993	8.906E+11	1326.1561	72363.	0.000
285.000	-0.0566	158487.	-20922.	-0.000527	25.1577	8.906E+11	1345.9218	71386.	0.000
288.000	-0.0581	101858.	-16854.	-0.000527	22.4872	8.906E+11	1365.5743	70459.	0.000
291.000	-0.0597	57520.	-12728.	-0.000527	20.3963	8.906E+11	1385.1253	69577.	0.000
294.000	-0.0613	25647.	-8543.6560	-0.000527	18.8933	8.906E+11	1404.5849	68736.	0.000
297.000	-0.0629	6415.7141	-4300.8361	-0.000526	17.9864	8.906E+11	1423.9617	67934.	0.000
300.000	-0.0645	0.000	0.000	-0.000526	17.6839	8.906E+11	1443.2624	33584.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =      0.3969681 inches
Computed slope at pile head       =     -0.0034970 radians
Maximum bending moment            =      14161621. inch-lbs
Maximum shear force               =       -109894. lbs
Depth of maximum bending moment   =     69.0000000 inches below pile head
Depth of maximum shear force      =    192.0000000 inches below pile head
Number of iterations              =             27
Number of zero deflection points  =              1
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

```
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians
```

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 29000.	M = 12684000.	50000.	0.39696811	14161621.	-109894.	0.00000000

Summary of Warning Messages

The following warning was reported 2158 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil defined using the soft clay criteria. The input value is greater than 8.68 psi (1,250 psf). You should check your input data for correctness.

Appendix D

CALTRANS REVIEW COMMENTS ON THE FOUNDATION REPORT

AND EMI RESPONSES

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer to complete)
Dist: 04 EA: 0A7101 Project Name: I-880 Operational and Safety Improvement Project OSFP Liaison: Paul Cotter Phone: (916)227-5671 e-mail: paul.cotter@dot.ca.gov	__ PSR/PDS (Review No.___ __ APS/PSR (Review No.___) __ APS/PR (Review No.___) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.___) __ Construction X Other: FOUNDATION REPORT	Reviewer Name: Caroline Chen Functional Unit: GDW Cost Center: 3660 Phone Number: (916)227-5386 e-mail: caroline_chen@dot.ca.gov Date of Review: 05/09/2012 Structure Name*: Overhead Sign Structures Br No*: _____ (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by EMI dated 3/30/2012, responses to Caltrans last review comments dated 2/17/2012, and Plans prepared by URS dated 3/30/2012.		
2			Responses are acceptable.		
3	P	LOTBs	The legend sheets do not need to be included if they are part of Caltrans Standard Plans. If included, they have to show the project information in the tile blocks and to be numbered accordingly.	Will Comply. The wall designer indicates that this project must follow 2006 Standard Plan, so we will include the Legend Sheets in this Foundation Report. The Legend Sheets will show the project information in the title block and will be numbered accordingly in the Project Plans.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved (for Reviewer's use)

Office of Special Funded Projects
Comment & Response Form

(Revised 12/01/09)

General Project Information (OSFP Liaison to complete)	Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer to complete)
Dist: 04 EA: 0A7101 Project Name: I-880 Operational and Safety Improvement Project OSFP Liaison: Yiwei Hu Phone: (916)227-8917 e-mail: yiwei.hu@dot.ca.gov	__ PSR/PDS (Review No.___ __ APS/PSR (Review No.___) __ APS/PR (Review No.___) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.___) __ Construction X Other: FOUNDATION REPORT	Reviewer Name: Caroline Chen Functional Unit: GDW Cost Center: 3660 Phone Number: (916)227-5386 e-mail: caroline_chen@dot.ca.gov Date of Review: 2/17/2012 Structure Name*: Overhead Sign Structures Br No*:_____ (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Geotch Lead (First and Last Name)	Geotech Consultant Firm	Phone Number	e-mail	Response Date
Lino Cheang	Earth Mechanics, Inc.	714-751-3826	l.cheang@earthmech.com	3/16/2012

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR, P		The comments are made based on the review of FR prepared by EMI dated 1/10/2012 and Plans prepared by URS dated 1/10/2012.		
2	FR	Page 10 Section 4.5.2	Please include the response into the report.	Will Comply.	
3	FR	Page 12 Section 4.6.2	Please include the response into the report.	Will Comply.	
4	FR	Page 4 Section 2.1.1 and LOTBs	Drilling method of the top 10 to 15 ft is not reflected in the LOTBs.	We will indicate the drilling methods on the LOTBs by showing the borehole identifications (symbol and hole I.D.) for auger boring and rotary boring at corresponding depths.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved (for Reviewer's use)

OSFP Review Comment & Response Form

General Project Information	Review Phase	Reviewer Information
Dist: 04 EA: 0A7101 Project Name: I-880, 23&29 St. OC OSFP Liaison: Yiwei Hu Phone: 916-227-8917 e-mail:_____	☐ PSR/PDS (Review No. _) ☐ APS/PSR (Review No. _) ☐ APS/PR (Review No. _) ☐ Type Selection ☐ 65% PS&E Unchecked Details ☐ PS&E (Review No. _) ☐ Construction Support ☒ Other: Foundation Report--Overhead Signs **Structure Information** (Use when necessary to document comments by individual structure) Structure Name: Overhead Signs-3rd Review Br No: ____	Reviewer Name: Betty Lee/ (Caroline Chen) /Mahmood Momenzadeh Functional Unit: GS Phone Number: 510-286-4825 e-mail: betty_lee@dot.ca.gov Date of Review: 3/9//2012

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date
Lino Cheang (Geotech)	Earth Mechanics, Inc.	714-751-3826	l.cheang@earthmech.com	3/16/2012

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	
1	FR		The comments are made based on the review of Consultant's responses prepared by EMI dated 2/15/2012. These are comments by Betty Lee only. Caroline Chen will comment on her items.		
325	FR		Looking at the consolidation lab results, it appears that the tests were not run in conformance to ASTM D2435-04. See Fig. 5, page 266 of the test manual. See also Note 12, page 261.	We reviewed Figure 5, Note 12 and Section 11.3 of the ASTM guideline, our consolidation test specimen was inundated at the approximate field overburden in order to simulate specific site condition, which is allowed per Section 11.3 of the ASTM standard. However, Section 11.3 of the ASTM states that the inundation pressure used to simulate specific site condition must be large enough to prevent swelling. Yet, the ASTM also states (last sentence in Section 11.3) that inundation pressure and change in height must be recorded. So, the ASTM is contradicting itself because if swelling is not allowed, there cannot be any change in height.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

				As part of this project, EMI performed a total of 15 consolidation tests on site-specific soil boring samples. Based on the test results, three consolidation test results (Boring R-11-002 Sample D-8, Boring R-11-006 Sample D-7, and Boring R-11-010 Sample D-4) show a significant swelling. We will not use these test results in our analyses and not include them in our report as well. In addition, five consolidation tests were also performed by URS on similar soils obtained from nearby soil borings. Using the consolidation properties obtained from the remaining EMI consolidation tests plus the URS consolidation tests, we re-evaluated our settlement calculations. The resulting settlement values are less than those reported in the foundation report. We will include these revised settlement calculations in the foundation report.	
329	FR		Please also address any down drag forces on the piles.	No fill is placed near the proposed Sign "A" and Sign "G". Therefore, there is no downdrag forces generated on the piles supporting these sign structures. We asked the Civil Engineer to cut more x-sections to support the above. Those x-sections will be included in the foundation report.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Dist-EA:_____ Reviewer:_____ Str Name*:_____

Date of Review:_____ Functional Unit:_____ Br No*.____ *=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
5	LOTBs		Legend sheets should be included in each set of LOTBs and counted together with the boring logs.	Since the legend sheets have already been included in 2010 Caltrans Standard Plans (Sheet Nos. A10F and A10G), we have not included them in our reports.	

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
10/21/2011	322	Betty Lee	23	Foundation Report	Page 3: Description of Sign G is missing.	We will include the Description of Sign G in Section 1.3	A			EMI						
10/21/2011	323	Betty Lee	24	Foundation Report	Is the Standard Caltrans foundation adequate for the fat clay subsoil of Sign G?	Based on the results of pile analyses under site-specific soil condition, the Standard Caltrans foundation is adequate for Sign G. The pile calculation are included in Appendix C.	C			EMI						
10/21/2011	324	Betty Lee	25	Foundation Report	Calculations for Sign A in Appendix C is not legible.	We will replace those illegible calculation sheets in Appendix C.	A			EMI						
10/21/2011	325	Betty Lee		Foundation Report	Consolidation lab test procedures appear incorrect.	The "undisturbed" consolidation test specimen is inserted into the air-tight consolidometer at field moisture. After the seating load is applied and as the vertical load increment reaches the approximate field overburden, the test specimen is inundated for 24 hours before the last sets of load increments are applied to complete the test. During the 24-hour inundation period, the dial gage is monitored to determine the vertical strain. This is a local southern California practice, and it is likely that the same inundation procedure is used by a majority of the local firms. We understand this process deviates slightly from the ASTM protocol, but the measured vertical strain data add more "value" to a consolidation test because: (1) the modified method determines "soil collapse" potential and magnitude of collapse. For example, if the collapsible soil layer is identified to be 10-foot thick and the measured vertical strain during inundation is 10%, then the compression (settlement) of the 10-foot thick collapsible soil layer is 0.1', and (2) for "expansive soils", the measured vertical strain provides a good qualitative indicator of the potential volume change characteristic of the tested soils when subjected to prolonged wetting at the overburden pressure. For example, if a soil specimen shows a significant swelling at the overburden pressure, then mitigations (such as increasing the footing pressure, removal of expansive soils and replacement with non-expansive soils, and designing an anchoring system) can be evaluated to minimize uplift movements. More importantly, we do not believe that the above inundation process will alter the characteristics of the axial strain versus log of vertical pressure curve, it merely shifts a portion of the curve upward (if soil is expanding) or downward (if soil is collapsing). As a result, the impact on the Compression Index value used in settlement calculations is minimal.	C			EMI						

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
10/21/2011	326	Betty Lee	26	Foundation Report	Page 7, Table 3-1: Averaging SPT blow counts over such thick layers appears to lead to inaccurate results.	We will further divide the thicker layers and recalculate the average SPT blowcounts for these subdivided layers.	A			EMI						
10/21/2011	327	Betty Lee	27	Foundation Report	Drawings of Sign A and D are missing from Foundation Report and Plans. Therefore, we are unable to review analyses. Please resubmit with drawings.	RBF will provide the latest plans for Sign A and Sign G (there is no Sign "D").	D			EMI						
10/21/2011	328	Betty Lee	28	Foundation Report	Page 7, Section 4.2, Liquefaction: "These relatively thin soil layers, even if liquefy, will have a minimal impact on the OH sign foundation." Please explain and justify.	There were a few interbedded very thin coarse-grained soil layers encountered within the soil sampler. Even if these coarse-grained soil layers liquefy, the seismic settlement is expected to be less than 0.3 inch, which is not considered to be a design issue for sign foundations.	C			EMI						
10/21/2011	329	Betty Lee	29	Foundation Report	Page 7 and Appendix C: It is stated that liquefaction potential and impact is low. However, the liquefaction analysis (using Borehole R-11-021) show safety factors of less than 1. Please explain.	In Borehole R-11-021, the layers containing the safety factors of less than 1 are fine-grained soil layers (see column to the right), which have a low liquefaction potential.	C			EMI						
10/21/2011	330	Betty Lee	30	Foundation Report	1) Page 9, Section 4.5: Please provide design calculations.	The legible calculation sheets of axial and lateral pile calculations for Sign A will be provided.	A			EMI						
10/21/2011	331	Betty Lee	31	Foundation Report	1) Comment by geologist, Ron Karpowicz: Were the borings left open for a period of at least 24 hours before groundwater was measured? If the borings were not left open for a period of at least 24 hours, conclusions concerning groundwater are inconclusive.	In other projects, we have measured groundwater depth using the procedure described by Reviewer. However at this site, we were unable to secure the boreholes and we were concerned with local residents tampering which could result in injuries and subsequent liabilities. So the top 10 to 15 feet of borings was drilled with a dry auger (see Section 2.2.1) and then drilling is continued using mud-rotary circulation system. Groundwater depths were measured immediately after the dry auger drilling is completed and again after the driller finish setting up the mud-rotary system, which would allow a groundwater stabilization period of 15 to 30 minutes (sometime longer). Therefore, our groundwater measurement is expected to be less influenced by the drilling method and should be a fairly accurate representation of the groundwater condition on the date of drilling.	C			EMI						

FINAL GEOTECHNICAL DESIGN REPORT
(REVISED)

I-880 Operational and Safety Improvements
Alameda County, California
04-ALA-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)
EMI Project No. 10-133
Date: June 25, 2012

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

June 25, 2012

EMI Project No. 10-133

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Attention: Mr. Garrett Gritz, P.E.

Subject: Final Geotechnical Design Report (Revised)
I-880 Operational and Safety Improvements Project
Alameda County, California
04-ALA-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)

Dear Mr. Gritz:

Attached please find the Geotechnical Design Report (GDR) for the Interstate 880 Operational and Safety Improvements Project. This GDR describes the geotechnical conditions at the project site based on information obtained from our field investigation and laboratory soil testing. This report also contains our recommendations for the design and construction of the roadway embankments.

Earlier versions of this report dated April 13, 2012, January 13, 2012 and September 6, 2011 were submitted to Caltrans for review. Caltrans provided their comments on May 3, 2012, February 24, 2012 and October 18, 2011. EMI responses to these Caltrans review comments are included in Appendix D. Our responses to the review comments have been incorporated into this report.

We appreciate the opportunity to provide geotechnical design services for this project.

Sincerely,

EARTH MECHANICS, INC.

6/25/12

(Raja) S. Pirathiviraj, GE 2963
Senior Staff Engineer

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FINAL GEOTECHNICAL DESIGN REPORT
(REVISED)

I-880 OPERATIONAL AND SAFETY IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880, PM 28.4/29.2
CALTRANS PROJECT NO. 04000001601 (EA 04-0A7100)

Prepared for:

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Prepared By:

Earth Mechanics, Inc.
7750 Pardee Lane, Suite 120
Oakland, California 94621

EMI Project No. 10-133

June 25, 2012

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1.0 INTRODUCTION

This Geotechnical Design Report (GDR) presents the findings and conclusions of a geotechnical study conducted by Earth Mechanics, Inc. (EMI) for the Interstate (I) 880 Operational and Safety Improvements Project located in County of Alameda, California. The project location is shown on the Site Location Map in Figure 1-1. The purpose of the geotechnical study was to obtain subsurface information and develop design and construction recommendations to assist RBF Consulting in preparing the Project Plans, Specifications, and Estimates.

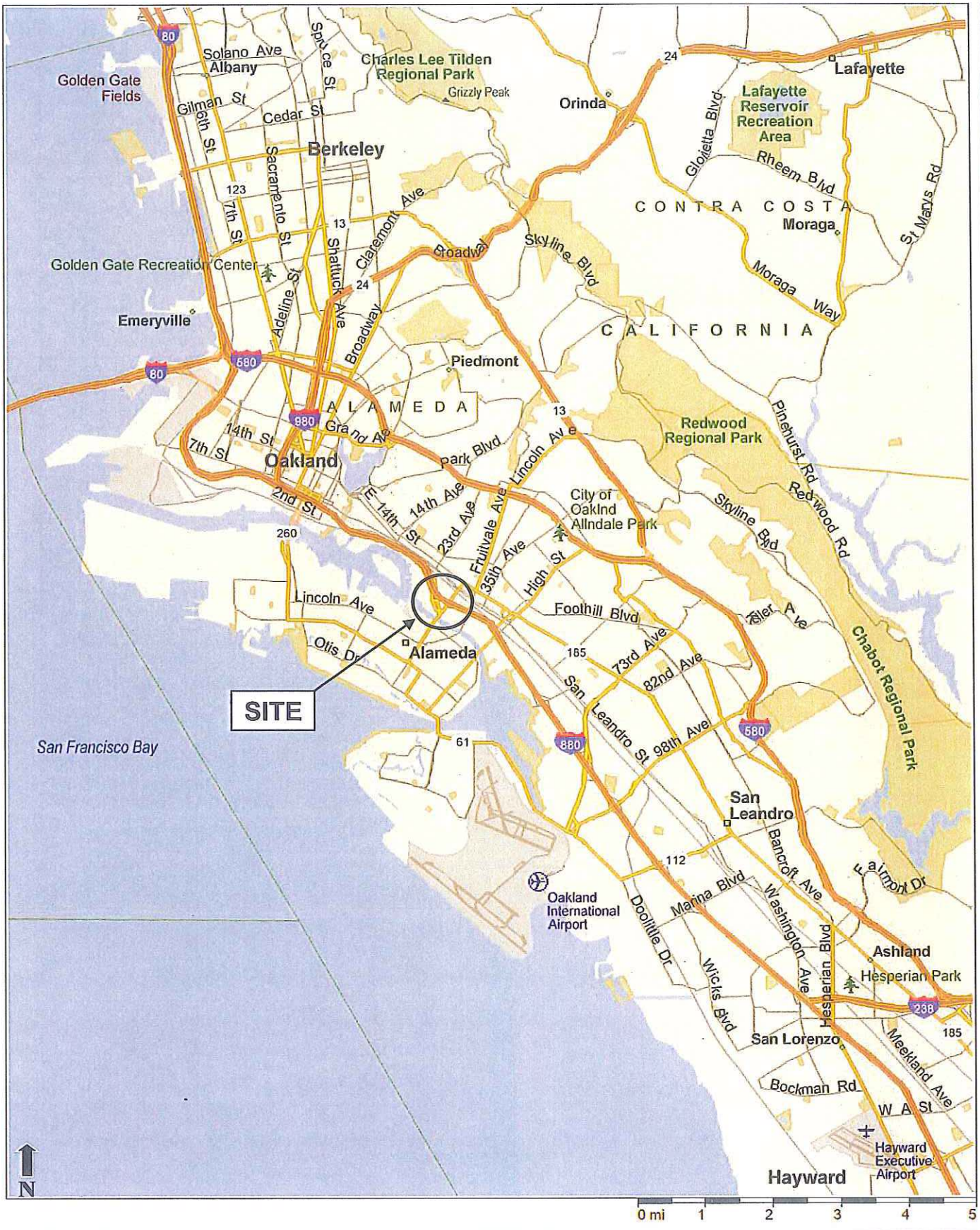
EMI's scope of work included preparing this GDR per Topic 113 of the Caltrans Highway Design Manual (HDM, 2008a). This report was prepared in accordance with the "Guidelines for Preparing Geotechnical Design Reports" (2006a). Recommendations for pavement structural sections and corrosion issues are addressed in the Materials Report (EMI, 2012c) for this project.

The geotechnical scope of work for preparing this GDR included the following tasks:

- Performance of geotechnical field exploration including drilling and logging of 36 exploratory borings;
- Laboratory testing of selected subsurface soil samples;
- Evaluation of slope stability, settlement, and liquefaction potential of subsurface soils;
- Development of recommendations for earthwork; and
- Preparation of this report presenting our findings, conclusions and recommendations.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and recommend design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions.

This report is intended for use by the project roadway design engineer, construction personnel, bidders, and contractors.



I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	Site Location Map	Figure 1-1
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 10-133	Date: 08-25-2011

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 EXISTING FACILITIES

I-880 is a major north-south freeway crossing Alameda, Santa Clara, San Francisco, Contra Costa and San Mateo Counties.

The proposed project is located in the City of Oakland and County of Alameda on I-880. The project limits are from just south of the existing 29th Avenue northbound off ramp to just north of the existing 23rd Avenue northbound on ramp. The interchanges 29th Avenue Overcrossing (OC) (Bridge No. 33-0141) and 23rd Avenue OC (Northern Bridge No. 33-0139 and Southern Bridge No. 33-0149) are located within the project limits.

Many existing utility lines are located within the project limits and these existing utility lines are generally perpendicular to the I-880 mainline. East Bay Municipal Utilities District, Pacific Gas and Electric, Comcast Cable, AT&T, and City of Oakland Sanitary Sewer operate facilities within the project limits.

2.2 PROPOSED IMPROVEMENTS

The subject project is sponsored by the Alameda County Transportation Commission in cooperation and coordination with the California Department of Transportation (Caltrans), and the City of Oakland. The project improves operations and safety at I-880 interchanges at 29th Avenue and 23rd Avenue.

To improve operations and safety, the proposed project will replace the 29th Avenue OC and the two 23rd Avenue OCs, and reconstruct the existing northbound 29th Avenue and 23rd Avenue off- and on-ramps. Replacement of these OCs will also provide room to widen the existing I-880 mainline lanes outside shoulders to the Caltrans standard width and lengthen existing northbound auxiliary lane between the 29th Avenue on-ramp and 23rd Avenue off-ramp. The intersection of East 9th Street / 29th Avenue / northbound 29th Avenue on-ramp will be configured as a roundabout.

To accommodate the bridge replacement and roadway widening, a series of retaining walls including Mechanically Stabilized Embankment (MSE) walls and a Caltrans Standard Type 1 retaining wall are proposed. In addition, a soundwall on barrier or L-shaped wall is also proposed along East 8th Street between 29th Avenue and 23rd Avenue to reduce the noise impacts associated with the I-880 freeway within the Jingletown residential community. Two sign structures are also proposed for this project.

3.0 PERTINENT REPORTS AND INVESTIGATIONS

3.1 PERTINENT PREVIOUS REPORTS AND INVESTIGATIONS

No previous geotechnical studies were performed specifically for the improvements addressed in this report.

3.2 RELATED REPORTS PREPARED FOR THE PROPOSED IMPROVEMENTS

Separate Foundation Reports have been prepared for the 23rd Avenue OC Replacement (URS, 2011a), 29th Avenue OC Replacement (URS, 2011b), 29th Avenue Off-Ramp (URS, 2011c), Retaining Walls and Soundwall (EMI, 2012a), and Sign Structures (EMI, 2012b).

A Materials Report (EMI, 2012c) has also been prepared for this project, which addresses pavement structural section design and soil corrosion issues for buried drainage devices.

4.0 PHYSICAL SETTING

4.1 CLIMATE

Weather in the greater San Francisco Bay Region is typified by a temperate Mediterranean climate with mild, wet winters and dry, warm summers. Oakland, being located slightly inland and across from the Golden Gate, occasionally experiences morning maritime fog. It is far enough inland, though, that the fog often burns off by midday, allowing it to have more sunny days than its neighbor San Francisco. The Oakland hills tend to have more fog than the lower elevation flatlands immediately adjacent to the Bay.

Temperatures in Oakland range from an average annual high of 62°F to an average annual low of 48°F. During the summer, the average highs are in the low 70s and the average lows are in the upper 50s. The warmest month is September. During the winter, the average highs are in the mid- to upper 50s and the average lows are in the mid- to upper 40s. December and January are the coldest months of the year. Extreme high temperatures can reach over 100°F during the summer and extreme low temperatures can dip into the mid-20s overnight during the winter.

Annual precipitation averages about 23 inches, and most rain falls between the months of October and May. The wettest month is January, with an average of 4.85 inches of rain. Rainfall is rare during the summertime, with an average of only 0.07 inches of rain during July. While rare dustings of snowfall can occur on the hills above Oakland during the winter months, measurable snowfall near sea level around San Francisco Bay is extremely unlikely and has not happened since February of 1976.

The prevailing annual wind direction is from the west. In this area, marine air intrusion through the Golden Gate, across San Francisco, and through the San Bruno Gap is a dominant weather factor throughout the year. The Oakland-Berkeley Hills causes a bifurcation of westerly flow in the vicinity of Oakland, with more southerly winds observed over the San Francisco Bay to the north of the Golden Gate and northwesterly winds observed over the bay to the south of the Golden Gate. During the winter months of December and January, the prevailing wind direction shift to the southeast. Wind speeds average about 6-8 miles per hour (mph) during the winter and increase to about 8-10 mph during the summer.

4.2 MAN-MADE AND NATURAL FEATURES OF ENGINEERING AND CONSTRUCTION SIGNIFICANCE

4.2.1 Man Made Features

4.2.1.1 Utilities

Based on the project Utility Plans, many existing utility lines are located within the project limits. These existing utility lines are generally perpendicular to the I-880 mainline. East Bay Municipal Utilities District, Pacific Gas and Electric, Comcast Cable, AT&T, and City of Oakland Sanitary Sewer operate facilities within the project limits

Based on the Utility Plans, most of the existing utility lines will be protected in-place. Some of the existing utilities will need to be relocated to accommodate the proposed improvements.

Based on current plans, fills are proposed throughout the project area; impact of fills at least 5 feet in height should be evaluated for utilities that fall within a 45-degree projection below the footprint of fills.

4.2.1.2 Drainage

Based on the project Drainage Plans, the existing drainage facilities include storm drain systems and cross culverts. There are no major rivers, creeks, or streams within the project limits. The project area lies within the San Antonio Creek watershed. The watershed is drained by Glen Echo Creek (Cemetery Creek), Pleasant Valley Creek, Bushy Dell Creek, Wildwood Creek, Indian Gulch Creek (Trestle Glen Creek), Park Boulevard Creek and 14th Avenue Creek. These creeks originate as natural streams in the Oakland Hills, flow from the northeast to the southwest through more urbanized areas, and follow improved channels with some sections buried in underground culverts. Eventually, they discharge into San Francisco Bay via the Oakland Estuary.

Based on current plans, fills are proposed throughout the project area; impact of fills at least 5 feet in height should be evaluated for drainage structures that fall within a 45-degree projection below the footprint of fills.

4.2.1.3 Fill

The existing 23rd Avenue OC and 29th Avenue OC, and approaches are constructed on top of earthen embankments of varying heights. EMI did not review any documents regarding placement of the existing embankment fills.

Based on the current field investigation, the approach embankment fills at 23rd Avenue OC and 29th Avenue OC predominantly consist of sandy lean clay and lean clay with sand and gravel with interbedded clayey sand and silty sand. Based on CPT correlations and (Robertson and Campanella, 1989) and laboratory test results, the undrained shear strength of these clayey soils in the existing embankment is about 2,000 psf.

4.2.2 Natural Features

No natural features are present that affect the project design or construction. Moderate low-growth vegetation is present on existing unpaved ground and slopes, which must be removed prior to placing compacted fill. Loose, soft, dry, wet, unstable, or otherwise unsuitable materials should be removed from areas to receive fill. Excavation bottoms should be firm and unyielding prior to placement of new fill.

4.3 REGIONAL GEOLOGY AND SEISMICITY

4.3.1 Topography

The interstate is located on the generally level Oakland alluvial plain, with a gentle slope down to the west at an average gradient of about 50 feet per mile. The plain is bounded by the Oakland Estuary and San Francisco Bay which are located about 0.25 miles to the southwest, and the Oakland hills, which are located about 2.5 miles to the northeast. The Oakland alluvial plain extends for approximately 25 miles from north to south and, along its length in east-west direction, varies from 2 to 7 miles in width. The alluvial plain includes all or portions of the cities of Richmond, San Pablo, El Cerrito, Albany, Berkeley, Emeryville, Piedmont, Alameda, Oakland, San Leandro, San Lorenzo and Hayward.

4.3.2 Physiography

The project area is located in the Coast Ranges geomorphic province of California. The Coast Ranges are bounded by the Pacific Ocean on the west and the Great Valley on the east. The ranges extend from the Oregon border south to the Santa Ynez River near Santa Barbara; San Francisco Bay further subdivides the province into the northern and southern sections. The Coast Ranges are characterized by discontinuous, northwest-trending mountain ranges, ridges, and valleys. East of the San Andreas Fault, most of the province bedrock is composed of a heterogeneous mix of marine and volcanic rocks of the Franciscan Assemblage, including chert, greywacke sandstone, altered mafic volcanic rock, shale, serpentinite, and metamorphic rock. Granitic rocks of the Salinian block comprise much of the basement rock of the ranges located west of the San Andreas Fault.

4.3.3 Stratigraphy

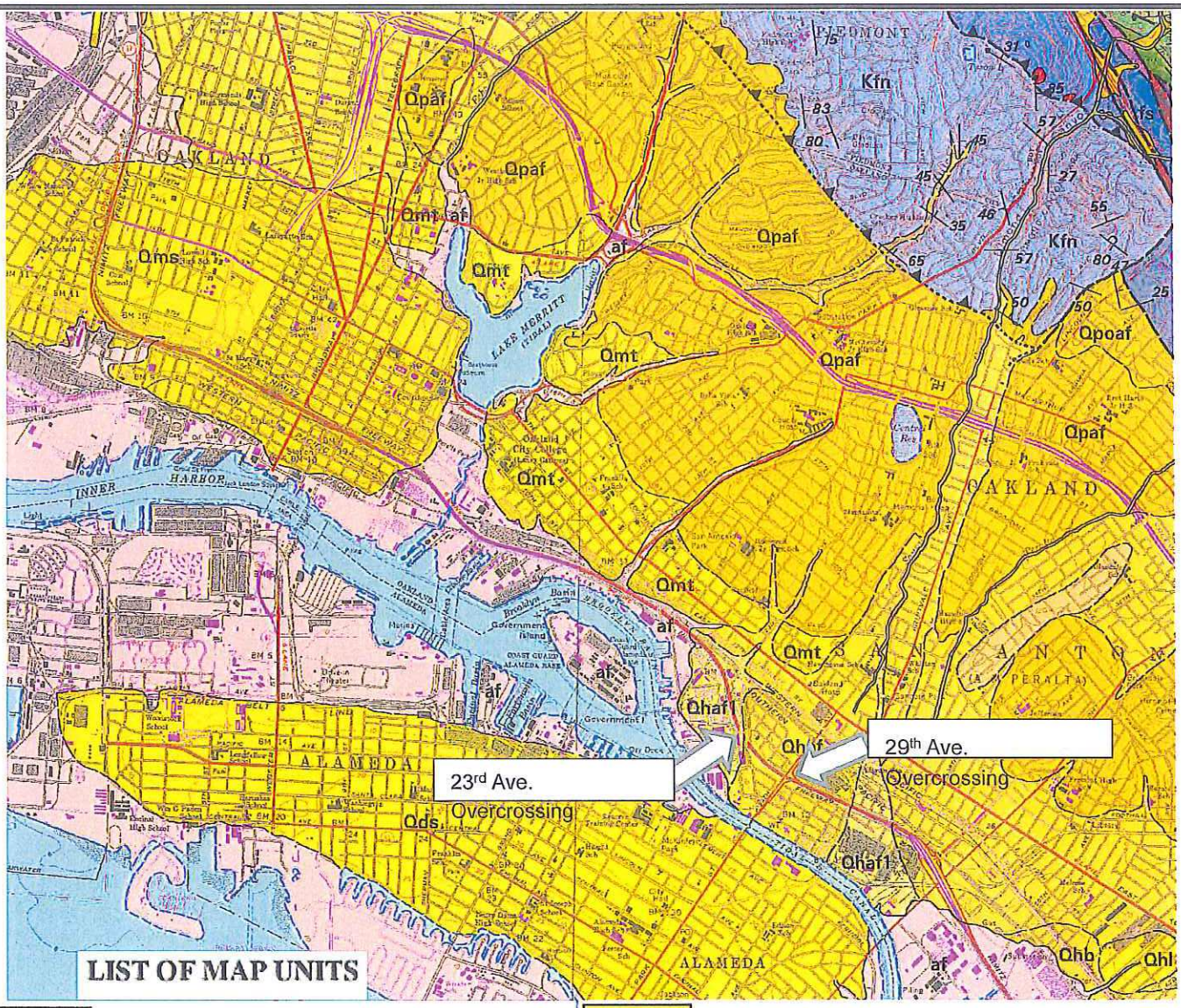
The project area is underlain predominantly by medium stiff to very stiff layers of clay with silt and sandy clay and few interbedded layers of medium dense to very dense sand and gravel. The geologic formations of importance to this project are flat-lying sediments with no notable geologic structures such as faults, folds, or unconformities. The site area is flat, with no natural hills or slopes.

The subsurface soil conditions at the project location consist primarily of unconsolidated Holocene alluvial fan deposits. These materials are typical of late Quaternary-age sediments deposited in a distal alluvial fan environment. As presented in Figure 4-1, the project site is mapped as undifferentiated Holocene alluvial gravel, sand, and clay by Dibblee (2005) and as Holocene alluvial fan sand and sandy gravel upwardly fining to sandy or silty clay by Graymer (2000) and Helley and Graymer (1997). According to Knudsen et al. (2000) and CGS (2003), the site is underlain by Holocene alluvial fan deposits. Regional mapping indicates that elevation of Franciscan bedrock in the vicinity of site is about 800 to 850 feet below MSL.

4.3.4 Geologic Structure

San Francisco Bay is a structural depression formed by down warping and subsidence of the structural block in response to activity along the San Andreas Fault system. The San Andreas Fault system is a right-lateral, strike-slip fault zone that extends from the Gulf of California north to Cape Mendocino and defines the boundary between the North American Plate to the east and the Pacific Plate to the west. The Pacific plate moves about 1.5 inches per year relative to central California across a broad, approximately 60 mile wide zone in northern California. Additional deformation in eastern California and the Basin and Range province contribute to the total relative Pacific-North America motion of 2 inches per year.

Within the San Francisco Bay Area, movement across this plate boundary is distributed across a complex system of primarily northwest-trending, right-lateral, strike-slip faults, including the San Andreas Fault Zone (Peninsula Section), Hayward Fault Zone (Northern Section), and Calaveras Fault Zone (Northern Calaveras Section). Other major regional faults include the Concord Fault (Ygnacio Valley Section), Mount Diablo Thrust, and Greenville Fault Zone (Clayton Section). There is also a significant degree of compression across the greater Bay Area, most prominently evident in the faults and associated folds of the Mount Diablo Thrust and fold belt. These thrust faults generally trend west-northwest, are oblique to the strike-slip faults of the San Andreas system, and exhibit a well-defined right-stepping, en echelon geometry.



LIST OF MAP UNITS

af	Artificial fill (Historic)
Qhaf1	Younger alluvial fan deposits (Holocene)
Qhaf	Alluvial fan and fluvial deposits (Holocene)
Qhb	Basin deposits (Holocene)
Qhl	Natural levee deposits (Holocene)
Qds	Dune sand (Holocene and Pleistocene)
Qms	Merrit sand (Holocene and Pleistocene)
Qpaf	Alluvial fan and fluvial deposits (Pleistocene)
Qpaf1	Alluvial terrace deposits (Pleistocene)
Qmt	Marine terrace deposits (Pleistocene)
Qpoaf	Older alluvial fan deposits (Pleistocene)
Ksh	Siltstone and shale
KJf	Undivided Franciscan complex rocks (Cretaceous and Jurassic)
Kfn	Sandstone of the Novato Quarry terrane of Blake and others (1984) (Late Cretaceous)
fs	Graywacke and meta-graywacke blocks
fs	Serpentinite blocks
Jb	Massive basalt and diabase

I-880 OPERATIONAL AND SAFETY IMPROVEMENTS

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Geological Mapping of the Project Site

Figure 4-1

Project No. 10-133

Date: 12-06-2011

4.3.5 Geologic Hazards

The only significant geologic hazard at the project site is earthquake shaking and perhaps local liquefaction. The site is not located within an Alquist-Priolo Fault Rupture Hazard Zone and no known active faults cross the project site. Therefore, ground rupture is not considered to be a factor. The site is not subject to landslide, tsunami or volcanic hazards. The flat-lying topography of the area is not susceptible to landsliding. While current understanding of tsunami hazards in the San Francisco Bay region is still emerging, the project site lies outside of the California Emergency Management Agency's currently defined Tsunami Inundation Area, as developed for evacuation planning. There are no volcanoes in the region.

As presented in Figure 4-2, the project site is located in a potential liquefaction zone as defined by the California Geological Survey (CGS, 2003). However, findings from the site-specific geotechnical explorations indicate that the subsurface consists primarily of fine-grained, cohesive soils. Liquefaction analyses were conducted for the site-specific geotechnical explorations and are detailed in Section 8.1.2.1. Based on these findings, liquefaction is not considered to be a significant risk at the project site.

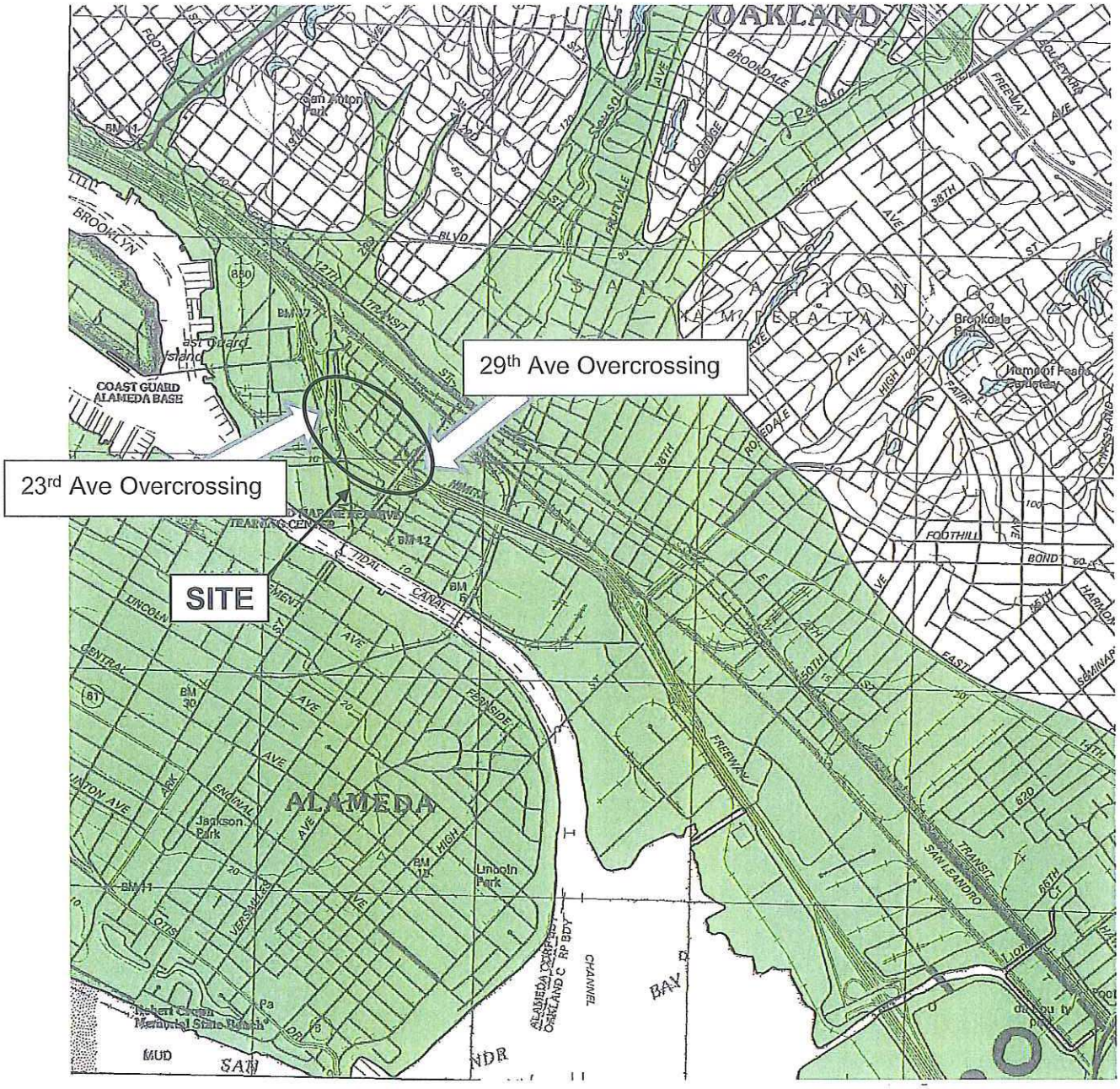
4.3.6 Seismicity

The project site is located within a seismically active region. Historical, ground-rupturing earthquakes have occurred on the nearby Hayward, San Andreas, Calaveras, and Greenville faults. The USGS currently estimates that the probability of a magnitude 6.7 or greater earthquake occurring in the San Francisco Bay area during the next 30 years is 63% and the probability of a larger, magnitude 7.5 earthquake during the next 30 years is 15%. The Hayward-Rodgers Creek fault is considered by the USGS to be the fault most likely to generate a magnitude 6.7 or greater quake in the San Francisco Bay area (Field et al, 2008).

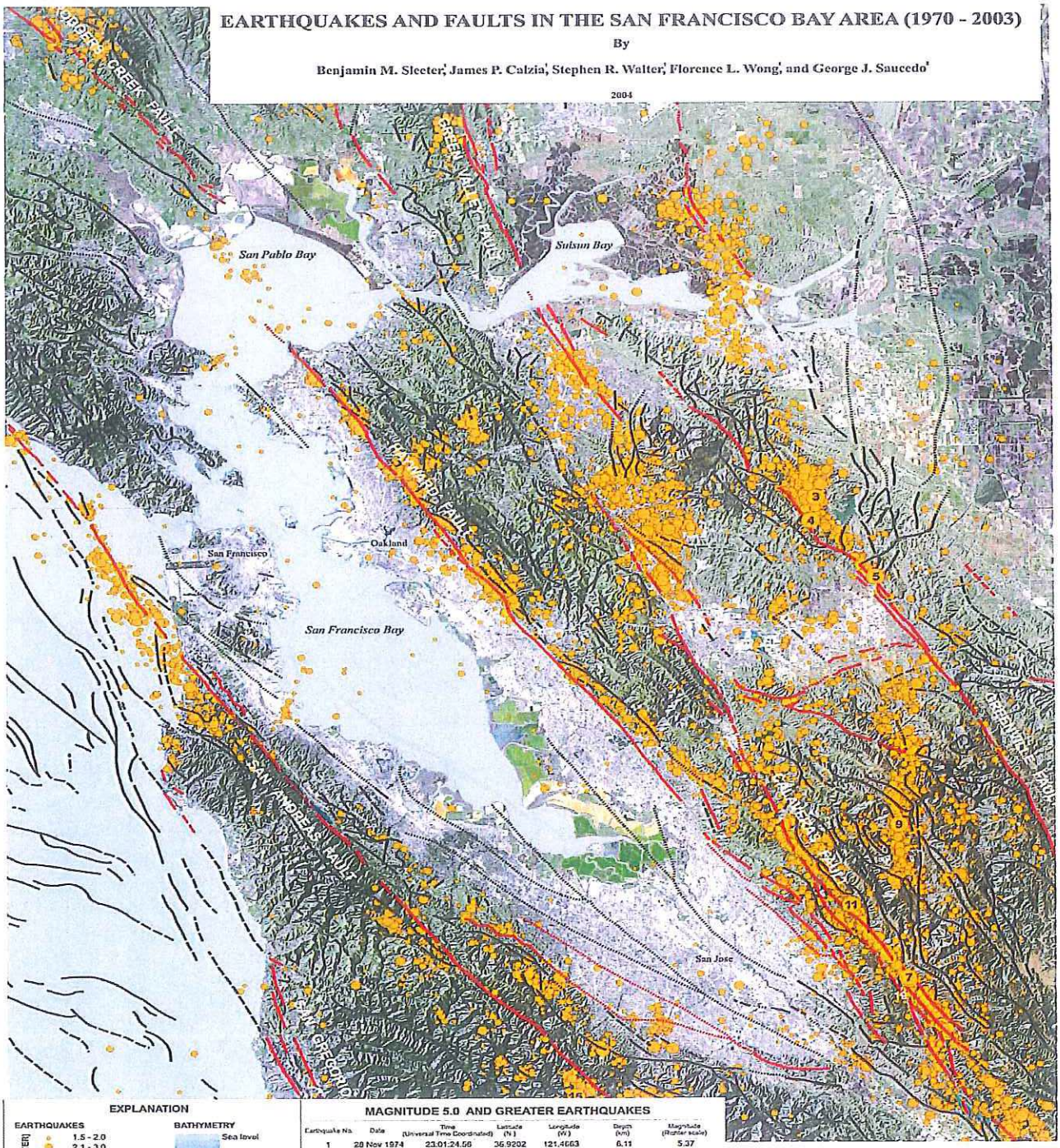
Historical earthquake epicenter maps show seismicity generally clustered along the traces of the major fault zones (Figure 4-3). The majority of earthquakes are predominantly right-lateral, strike-slip quakes with varying degrees of minor reverse-oblique motion. A summary of significant historical regional earthquakes in the San Francisco Bay area (Toppozada, 2000) is presented in Table 4-1.

Table 4-1. Summary of Significant Historical Regional Earthquakes

Fault	Year	Approximate Magnitude	Approximate Epicenter Location
Unknown	1836	6.4	Between Monterey and Santa Clara
San Andreas	1838	7.4	Santa Clara
Unknown	1865	6.5	Santa Cruz Mountains
Hayward	1868	6.8	Hayward
Unknown	1892	6.4	Vacaville
Rodgers Creek	1898	6.3	Mare Island
San Andreas	1906	7.8	Daly City
Calaveras	1911	6.5	Morgan Hill
Calaveras	1984	6.2	Morgan Hill
San Andreas Fault System	1989	6.9	Santa Cruz Mountains



I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	Map of Liquefaction Potential
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Figure 4-2
Project No. 10-133	Date: 08-25-2011



EXPLANATION

EARTHQUAKES

MAGNITUDE (RICHTER)

1.5 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1 - 6.0
6.1 - 7.0

BATHYMETRY

Sea level

3,650 Meters

14 Number refers to earthquake number in table

FAULTS – Dashed where approximately located; dotted where inferred

Active in last 700,000 years

Active prior to 700,000 years ago

MAGNITUDE 5.0 AND GREATER EARTHQUAKES

Earthquake No.	Date	Time (Universal Time Coordinated)	Latitude (N.)	Longitude (W.)	Depth (km)	Magnitude (Richter scale)
1	28 Nov 1974	23:01:24.56	36.9202	121.4663	6.11	5.37
2	6 Aug 1979	17:05:22.91	37.1042	121.5127	8.93	5.80
3	24 Jan 1980	19:00:08.63	37.8367	121.7708	14.72	5.23
4	24 Jan 1980	19:01:01.53	37.8115	121.7772	7.07	5.10
5	27 Jan 1980	02:33:35.32	37.7493	121.7062	14.69	5.18
6	23 Jan 1984	05:40:19.93	36.3650	121.8878	8.19	5.12
7	24 Apr 1984	21:15:18.75	37.3095	121.6787	8.74	5.82
8	26 Jan 1986	19:20:50.03	36.8040	121.2847	8.72	5.50
9	31 Mar 1986	11:55:39.80	37.4789	121.6858	9.17	5.70
10	20 Feb 1988	08:39:57.24	36.7857	121.3117	9.62	5.03
11	13 June 1988	01:45:36.52	37.3923	121.7415	9.71	5.30
12	27 June 1988	18:43:22.32	37.1268	121.6962	13.15	5.30
13	8 Aug 1989	08:13:27.36	37.1458	121.9282	14.23	5.49
14	18 Oct 1989	00:04:15.20	37.0362	121.8802	17.29	7.09
15	18 Oct 1989	00:41:23.70	37.1873	122.0548	16.78	5.10
16	18 Apr 1990	13:53:51.30	36.9320	121.6577	5.68	5.75
17	18 Apr 1990	15:46:03.44	36.9583	121.6848	6.67	5.56
18	16 Jan 1993	06:20:35.00	37.0102	121.4630	7.90	5.10
19	11 Aug 1993	22:33:04.00	37.3120	121.6793	9.35	5.60
20	23 Apr 1995	08:41:36.63	36.6025	121.2015	7.84	5.14
21	12 Aug 1998	14:10:25.12	36.7533	121.4622	9.13	5.35
22	3 Sept 2000	08:30:30.09	38.3788	122.4127	10.12	5.17

I-880 OPERATIONAL AND SAFETY IMPROVEMENTS	Map of Historic Earthquakes and Fault Zones
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Figure 4-3
Project No. 10-133	Date: 08-25-2011

The largest historical earthquake in the San Francisco Bay area was the 7.8 M_w 1906 earthquake on the San Andreas fault. Accepted magnitudes for this event generally range from 7.7 M_s (Wald et al, 1993) to 7.9 M_w (Thatcher et al, 1997). The earthquake ruptured the northernmost 296 miles of the San Andreas Fault, extending from northwest of San Juan Bautista to the triple junction at Cape Mendocino. Measured slip maxima varied from 28.2 feet and 24.6 feet at Shelter Cove and Tomales Bay to 14.8 feet near Mount Tamalpais and 8.9 feet at Loma Prieta.

In terms of damage, the 1868 earthquake on the Hayward fault was the second most significant regional earthquake. The 1868 rupture damaged buildings from Hayward to San Francisco and was referred to as "the great San Francisco earthquake" until the 1906 earthquake occurred. Ground rupture along the Hayward fault was traced for about 20 miles from San Leandro to Warm Springs in Fremont. However, recent modeling of survey data (Yu and Segall, 1996) suggest that the fault moved as far north as Berkeley, with about 32 miles of rupture, the average amount of horizontal movement along the fault is inferred to be about 6 feet.

The 1989 Loma Prieta earthquake occurred not on the main trace of the San Andreas Fault, but on a nearby fault associated with the larger San Andreas Fault system. The rupture occurred about 10.5 miles beneath the Santa Cruz Mountains along a left-stepping, restraining bend in the San Andreas fault system on a steep, southwest-dipping, right-lateral reverse fault that did not rupture to the surface. Six feet of right-lateral strike-slip and 4 feet of reverse-slip were inferred from geodetic data. The most significant effect of the Loma Prieta earthquake was damage and disruption to transportation systems; in Oakland and San Francisco reinforced-concrete viaducts collapsed: the Nimitz Freeway (Interstate 880) in Oakland, and the Embarcadero Freeway, Highway 101, and Interstate 280 in San Francisco.

Ground rupture during the 1838 earthquake was previously believed to have been limited to the 37.5-mile peninsula segment of the San Andreas Fault. However, a reevaluation of the quake by Toppozada and Borchardt (1998) indicate that faulting probably extended almost 100 miles, from San Francisco to San Juan Bautista, indicating a significantly larger earthquake, approximately 7.4 M_w, than previously thought. The northern end of the 1838 faulting was previously assumed to be 15.5 miles south of San Francisco. However, Mission San Francisco Dolores was damaged in 1838 but not in 1906, suggesting that the 1838 faulting extended to San Francisco. Also, the 1838 aftershocks were felt in Oakland as frequently and violently as those following the major 1868 Hayward earthquake, suggesting that the 1838 faulting on the San Andreas extended to the latitude of Oakland. The 1838 fault segment ruptured again 68 years later as part of the overlapping 1906 San Andreas Fault rupture.

The 1971 San Fernando earthquake involves surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 9 miles under the San Gabriel Mountains, and considered part of the Sierra Madre Fault System.

4.4 SOIL SURVEY MAPPING

The project area is underlain by Tierra-Urban soils as shown on the USDA soil survey of Alameda County (Welch, 1981). Tierra-Urban soils are formed in weakly consolidated alluvium on old dissected terraces in which the original soils have likely been mixed or slightly altered during urban development. The Tierra soils are deep and consist of moderately well-drained loam, clay, and sandy clay loam.

5.0 EXPLORATION

5.1 DRILLING AND SAMPLING

A geotechnical field investigation was conducted between March 28 and April 20, 2011. Thirty six exploratory borings were accomplished under the supervision of EMI. Approximate locations of borings are shown on Figure 5-1 through Figure 5-5. Soil exploration information is summarized in Table 5-1 and boring logs and Log of Test Boring (LOTB) sheets are presented in Appendix A.

In addition, URS Corporation recently conducted nine rotary-wash soil borings and three Cone Penetrometer Test (CPT) soundings in April and May 2011 and March 2012 for the replacement of the 23rd and 29th Avenue Overcrossings. The soil data, especially soil compressibility data from the recent URS investigation, was used by EMI. Copies of these URS LOTB sheets are included in Appendix A.

Table 5-1. Soil Exploration Information

Boring	Station [1]	Offset [1] (feet)	Station Line [2]	Top of Boring Elevation (feet)	Bottom of Boring Elevation (feet)	Groundwater Elevation [3] (feet)	Drilling Method [4]
CPT-11-001	224+00	51 Rt	05	+27.0	-23.0	NM	CPT
R-11-002	225+11	72 Rt	05	+26.6	-44.9	+13.6	RW
CPT-11-003	227+44	128 Rt	05	+25.3	-44.7	NM	CPT
HA-11-004	231+30	80 Rt	05	+22.5	+17.5	NE	HA
A-11-005	26+90	30 Rt	A	+24.8	+13.3	NE	HSA
R-11-006	30+15	50 Rt	A	+27.8	-43.7	NM	RW
A-11-007	31+57	4 Lt	A	+30.0	+18.5	NM	HSA
R-11-008	28+70	27 Lt	A	+27.5	-43.8	+14.0	RW
R-11-010	234+20	95 Rt	05	+21.8	-29.7	+14.3	RW
CPT-11-011	236+95	85 Rt	05	+21.7	-28.3	NM	CPT
CPT-11-013	239+55	84 Rt	05	+19.8	-30.2	NM	CPT
R-11-014	242+02	85 Rt	05	+19.5	-52.0	+10.0	RW
A-11-016	43+53	4 Rt	B1	+16.2	+4.7	NE	HSA
CPT-11-017	245+95	113 Rt	05	+17.0	-53.0	NM	CPT
A-11-018	46+64	7 Rt	B1	+19.2	+7.7	NE	HSA
A-11-020	27+93	11 Lt	B	+20.2	+8.7	NE	HSA
R-11-021	28+56	50 Rt	B	+24.2	-27.3	+10.7	RW
A-11-022	250+78	61 Rt	05	+17.8	+6.3	+6.8	HSA
A-11-023	52+98	38 Rt	B2	+19.5	+8.0	NE	HSA
A-11-024	31+32	18 Rt	B	+22.5	+11.0	NE	HSA

Boring	Station [1]	Offset [1] (feet)	Station Line [2]	Top of Boring Elevation (feet)	Bottom of Boring Elevation (feet)	Groundwater Elevation [3] (feet)	Drilling Method [4]
A-11-025	55+08	82 Rt	B2	+21.5	+10.0	NE	HSA
A-11-026	33+82	67 Rt	B	+22.4	+10.9	NE	HSA
A-11-027	57+08	72 Rt	B2	+19.5	+8.0	NE	HSA
A-11-028	32+93	1 Rt	B	+22.6	+11.1	NE	HSA
A-11-029	60+46	7 Rt	B2	+20.0	+8.5	NE	HSA
R-11-030	20+44	28 Lt	B	+15.4	-56.1	+7.9	RW
R-11-031	21+80	45 Rt	B	+19.0	-52.5	+7.2	RW
A-11-032	16+91	53 Lt	B	+15.4	+3.9	+4.9	HSA
CPT-11-033	21+39	28 Rt	A	+18.2	-51.8	NM	CPT
R-11-034	20+33	45 Lt	A	+16.9	-54.1	+9.4	RW
R-11-035	19+21	33 Rt	A	+17.3	-54.2	+9.3	RW
A-11-036	251+37	105 Rt	05	+18.7	-12.8	+7.7	HSA
W-11-037 [5]	251+34	92 Rt	05	+18.7	+11.7	NE	HSA
W-11-038 [5]	251+87	90 Rt	05	+18.7	+11.7	NE	HSA
W-11-039 [5]	251+82	90 Rt	05	+18.7	+11.7	NE	HSA
CPT-11-040	247+00	220 Rt	05	+19.0	-51.0	NM	CPT

Notes:

(1) Stations and offsets are measured relative to the identified Station Lines and are approximate.

(2) 05 = I-880 Mainline; A = 29th Avenue; B = 23rd Avenue; B1 = NB Off-Ramp to 23rd Avenue; B2 = NB On-Ramp from 23rd Avenue.

(3) NE = Not Encountered; NM = Not Measured.

(4) HSA = Hollow-Stem Auger Boring; HA = Hand Auger Boring; CPT = Cone Penetrometer Test; RW = Rotary Wash Boring.

(5) W = Infiltration Wells.

Soil borings designated with a prefix "W" are infiltration wells. They were used for soil infiltration testing only, and boring logs are not prepared for these wells.

The rotary-wash borings were drilled by Pitcher Drilling Co., under a subcontract with EMI, using a truck-mounted drill rig equipped with 5-inch diameter drill bits with a mud-rotary circulation drill system. The samplers were driven into the ground using a 140-lb automatic hammer free falling from a height of 30 inches.

The hollow-stem auger borings were drilled by West Coast Explorations, under a subcontract with EMI, using a truck mounted drill rig equipped with 8-inch diameter hollow-stem augers. The samplers were driven into the ground using a manually operated 140-lb safety hammer free falling from a height of 30 inches.

Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval is generally 5 feet. Relatively undisturbed soil samples were obtained using a 3.25-inch outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1-inch long with a 2.5-inch outside diameter. The SPT sampler (1.4-inch inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18 inches into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30 inches. The numbers of blows to advance the sampler each 6 inches of penetration were recorded. The number of blows for the final 12 inches or shorter of driving was recorded on the boring logs and LOTB sheets. Charts published by Winterkorn and Fang (1975) can be used to determine a reduction factor used to convert blowcounts recorded using the California Drive sampler into SPT blowcounts. Using those charts, we obtained a reduction factor of 0.5 which was used for this project.

Hand-auger borings were drilled using a 3-inch diameter stainless steel hand-auger. Only bulk samples were collected from the hand-auger borings.

The CPT soundings were performed by Middle Earth Geo Testing, Inc. (Middle Earth), under subcontract with EMI, using an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and ASTM D3441). The CPT equipment consisted of a cone penetrometer assembly mounted at the end of a series of hollow sounding rods. The cone penetrometer assembly consisted of a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in^2 (10 cm^2) and a cylindrical friction sleeve with a surface area of 23.25 in^2 (150 cm^2). The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurements of cone tip and friction sleeve resistance during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79 inch per second (20 mm per second) while the cone tip resistance and sleeve friction resistance are recorded every 1.967 inches (50 mm) and stored in digital form. A specially designed all-wheel drive 25-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

5.2 GEOLOGIC MAPPING

Geologic mapping was not necessary and therefore was not performed for the project.

5.3 GEOPHYSICAL STUDIES

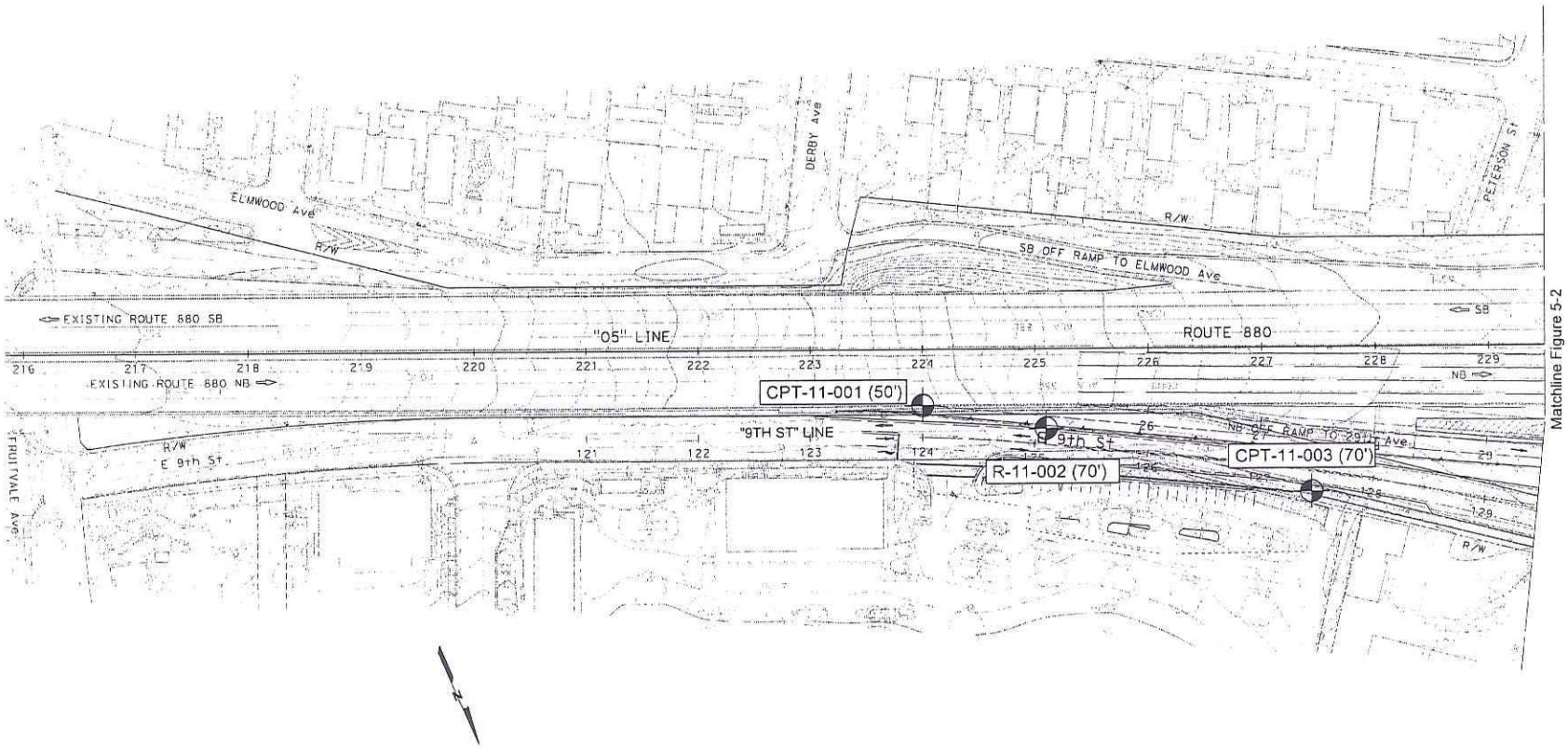
Geophysical studies were not necessary and therefore were not performed for the project.

5.4 INSTRUMENTATION

Instrumentation was not necessary and therefore not installed as part of the field investigation program.

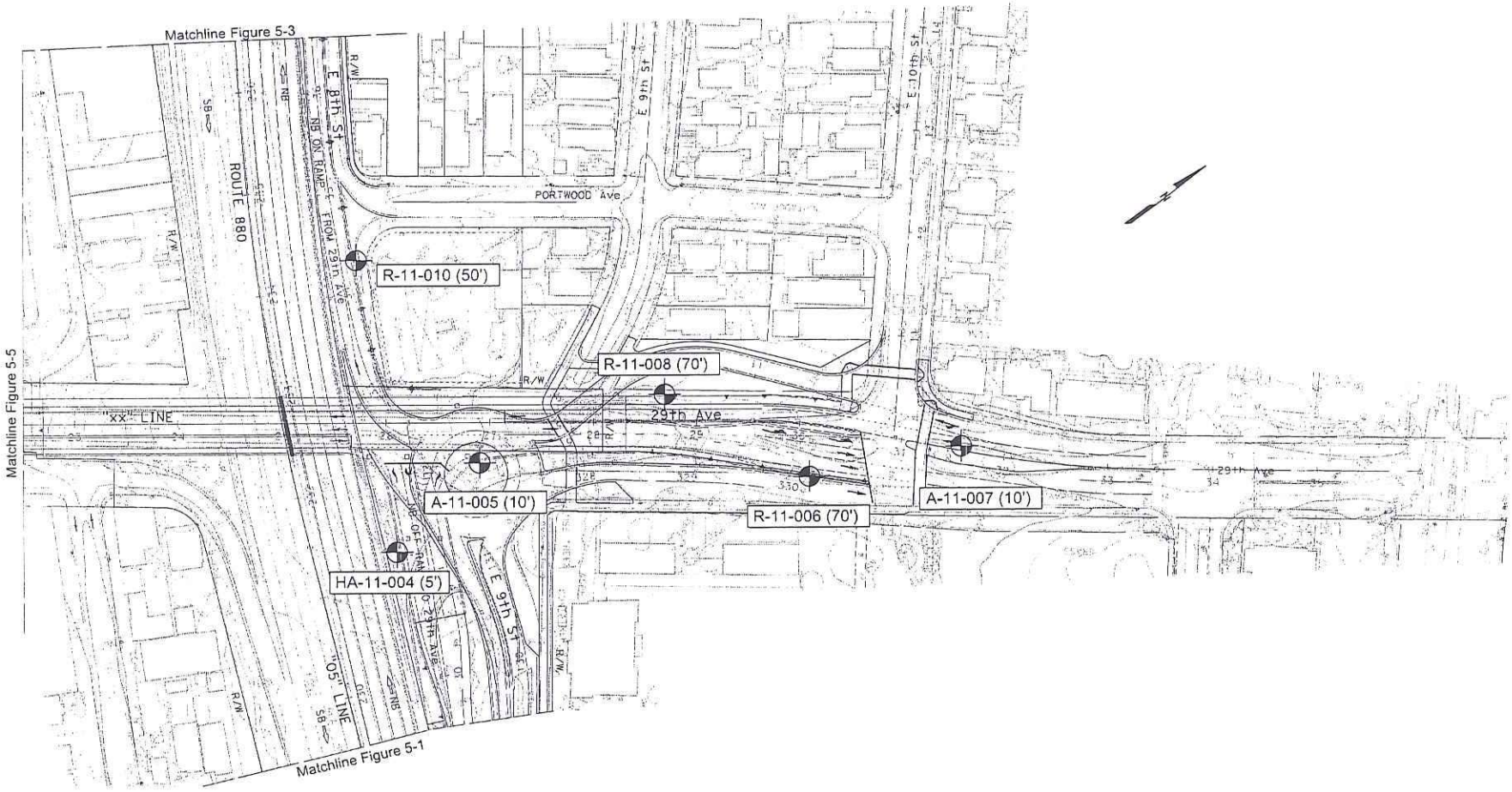
5.5 EXPLORATION NOTES

No unique conditions were encountered or observed during the field exploration.



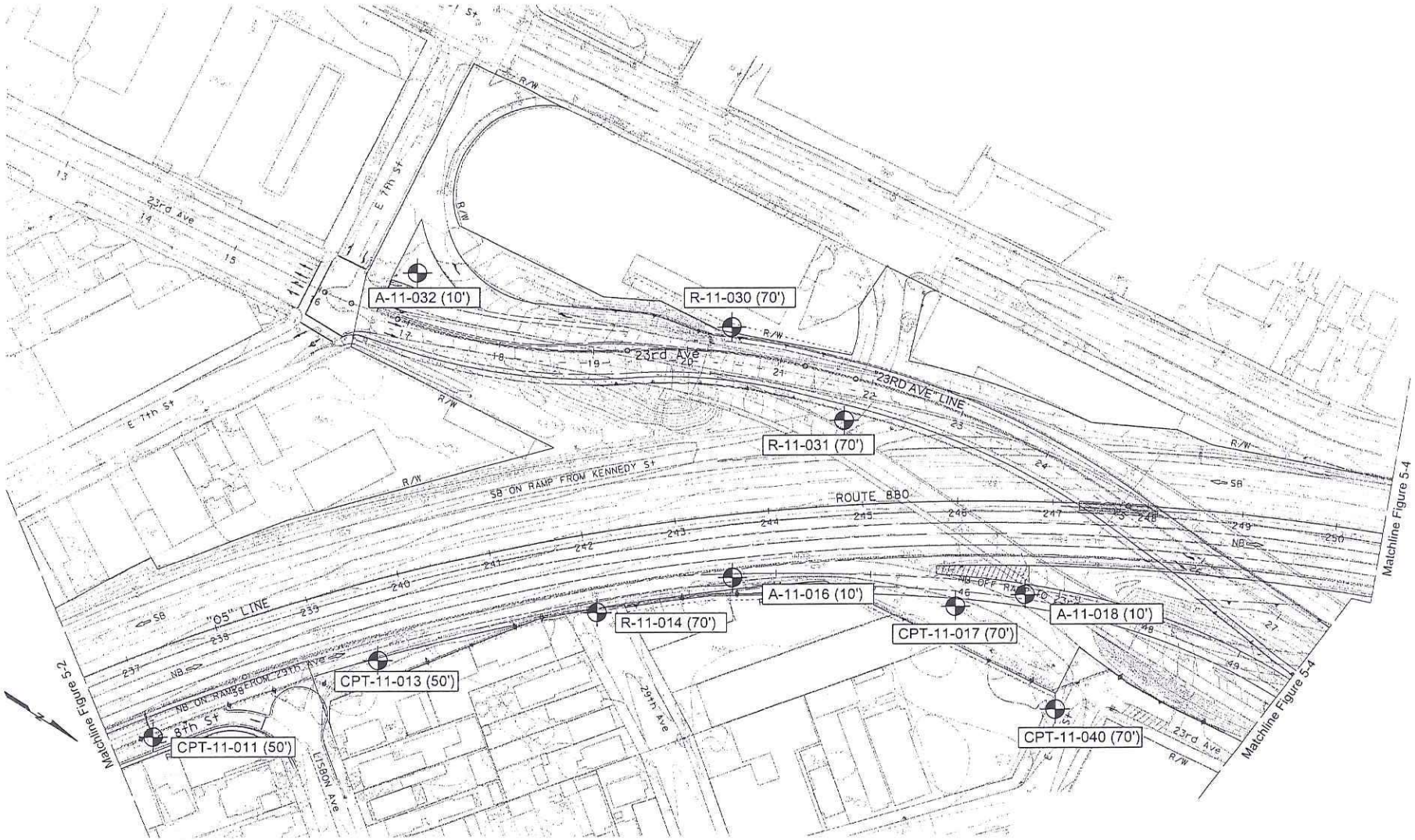
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements		Exploratory Boring Location Plan (1 of 5)
	Project No. 10-133	Date: April 2011	Figure 5-1

0 50 100 FEET

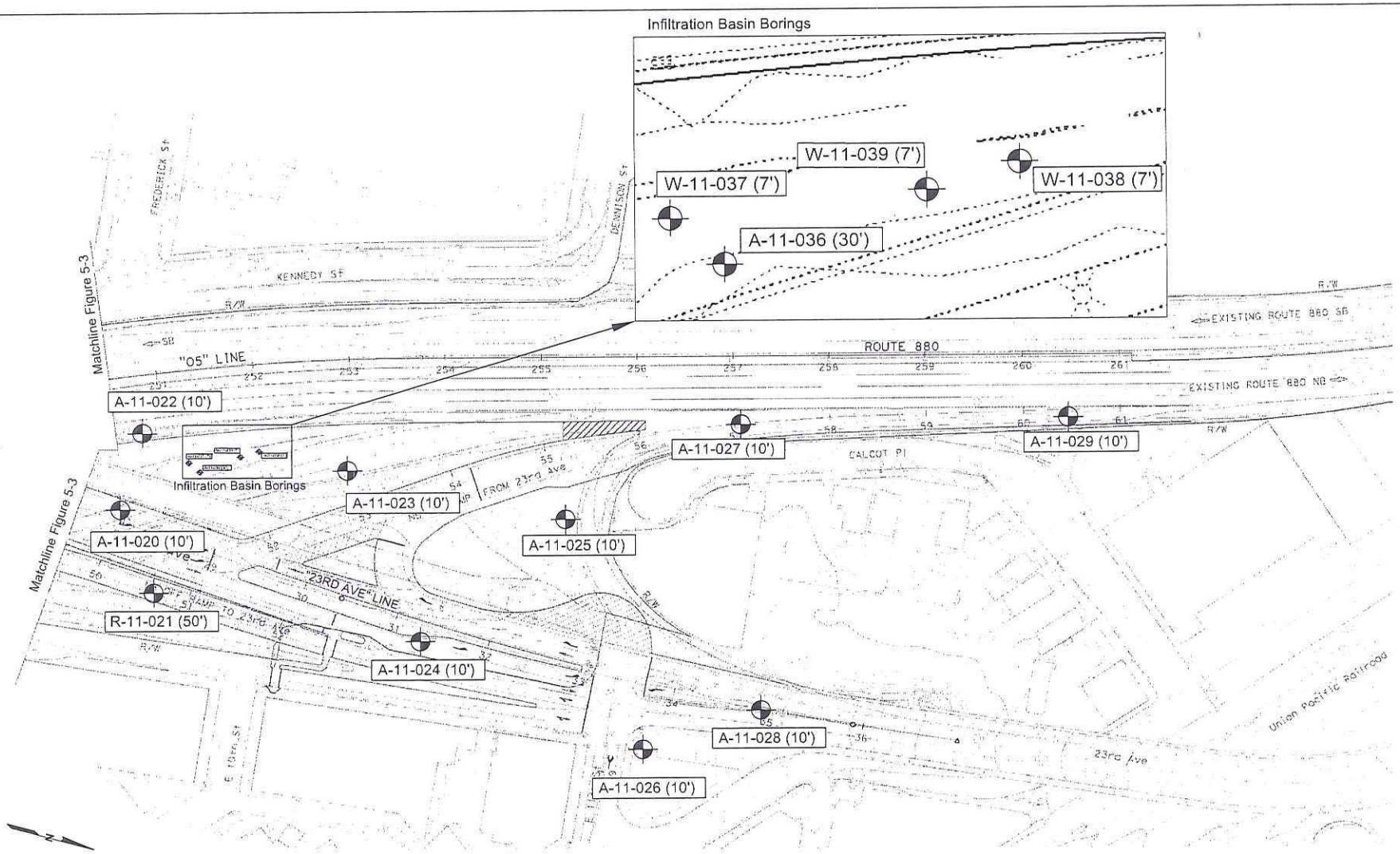


Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements		Exploratory Boring Location Plan (2 of 5)
	Project No. 10-133	Date: April 2011	Figure 5-2

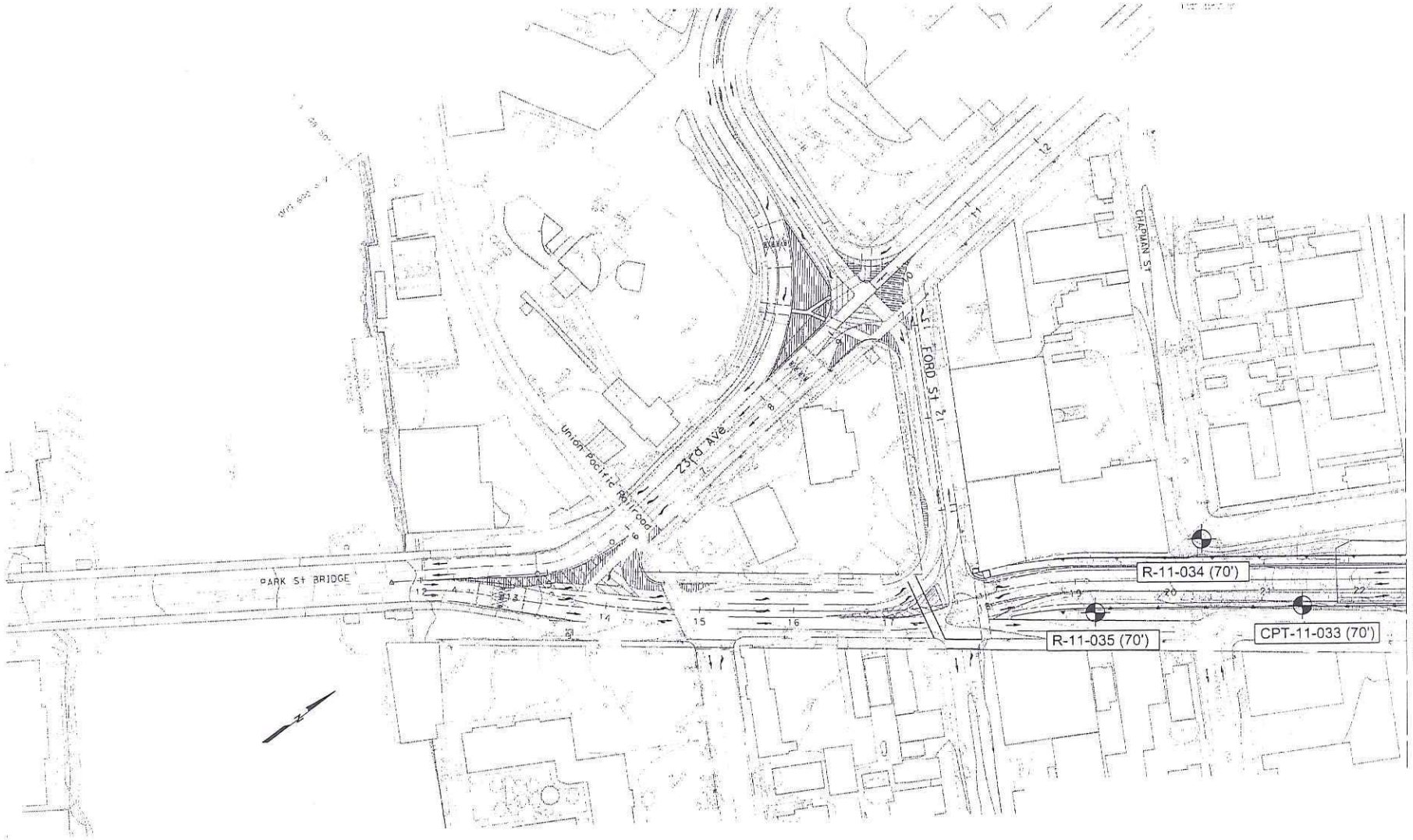
0 50 100 FEET



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements		Exploratory Boring Location Plan (3 of 5)
	Project No. 10-133	Date: April 2011	Figure 5-3



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvements	Exploratory Boring Location Plan (4 of 5)	0 50 100 FEET
	Project No. 10-133	Date: April 2011	Figure 5-4



Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 Operational and Safety Improvements

Project No. 10-133 | Date: April 2011

Exploratory Boring Location Plan (5 of 5)

Figure 5-5

6.0 GEOTECHNICAL TESTING

6.1 IN-SITU TESTING

Blowcounts from the SPT and MCD samplers were recorded during the exploration. The blowcounts are shown on the borings logs and LOTB sheets in Appendix A.

6.2 LABORATORY SOIL TESTING

Soil samples considered representative of the subsurface conditions were tested to obtain or derive relevant physical and engineering soil properties. The following laboratory tests were conducted to supplement the observations recorded during the field investigation.

- In-situ Moisture Content and Unit Weight
- Percent Passing No. 200 Sieve
- Atterberg Limits
- Direct Shear
- Unconsolidated Undrained Triaxial
- Consolidation
- Pocket Penetrometer
- Minimum Resistivity, pH, Sulfate Content and Chloride Content
- Maximum Density and Optimum Moisture Content
- R-Value

The laboratory soil tests were conducted in general accordance with California Test methods or American Society for Testing and Materials standards. Laboratory test results are presented in Appendix B.

R-value tests noted on the boring logs and LOTB sheets in Appendix A were conducted for preparation of the Materials Report (EMI, 2012c). The R-value test results were not used in preparation of the recommendations included in this report and therefore, they were omitted from Appendix B.

7.0 GEOTECHNICAL CONDITIONS

7.1 SITE GEOLOGY

7.1.1 Lithology

The project area is underlain predominantly by medium stiff to very stiff clay with silt and sandy clay, and few interbedded layers of medium dense to very dense sand and gravel.

7.1.2 Geologic Structure

As described in Section 4.3.4, the geologic formations of importance to this project are flat-lying sediments with no notable geologic structures such as faults, folds, or unconformaties.

7.1.3 Natural Slope Stability

There are no natural slopes within the project limits that require stability evaluation.

7.2 SUBSURFACE SOIL CONDITIONS

7.2.1 Material Strength Parameters

Based on the geological mapping, the project area is primarily underlain by unconsolidated Holocene alluvial fan deposits. Recent field investigation indicates that the subsurface materials at the project site consist of predominately medium stiff to very stiff layers of lean clay and fat clay with varying amounts of sand and gravel, and few interbedded layers of medium dense to very dense clayey sand, silty sand, and sand with gravel down to the exploration termination depth. Based on the CPT Correlations (Robertson and Campanella, 1989) and laboratory test results, the undrained shear strengths of the clayey soils vary between 750 psf and 4,000 psf.

7.2.2 Expansion Potential

Lean clay and fat clay layers with various amounts of sand and gravel encountered in all of our borings have a medium to high expansion potential. Expansive soils could impose lateral swell pressure on retaining structures and uplift pressures on pavement. Therefore, on-site native soils and existing fill materials within the project area should not be considered for use as MSE wall and retaining wall backfill. Mitigation measures such as lime treatment for the pavement subgrade and pavement design are presented in the Materials Report (EMI, 2012c).

Lime can be added to fine-grained subgrades to reduce the expansion potential. Soil treated with lime is considered to be Lime Stabilized Soil, and the pavement was designed per Caltrans HDM Topic 614.4 (Caltrans, 2008a). Topic 614.4 also indicates that the minimum treated depth is 0.65 foot and the maximum treated depth is 2 feet. Lime treatment protocols and requirements shall conform to Caltrans Standard Specifications and Special Provisions.

7.2.3 Settlement Potential

Based on consolidation test results, clayey soils at the site are susceptible to consolidation settlement. Settlement due to embankment construction is discussed in detail in Section 8.3.

7.3 WATER

7.3.1 Surface Water

There are no major rivers, creeks, or streams within the project limits. Standing surface water was not observed within the project area during EMI's field investigation. The majority of the water within the project limits is routed through existing storm drains.

7.3.1.1 Scour

This site is located within an area that is presently improved; roadway surfaces are paved and drainage is controlled by engineered facilities. Therefore, scour is not considered a design issue.

7.3.1.2 Erosion

Presently, there is minor to moderate vegetation covering the slopes adjacent to I-880 mainline, 23rd Avenue, 29th Avenue, and on- and off-ramps. Erosion of the existing slope faces was observed to be minimal.

In general, the erosion potential of soils within the project area is considered to be moderate; provisions for site drainage, slope planting and other measures in accordance with Caltrans requirements should be fulfilled to provide adequate protection against erosion. To minimize erosion of slopes, surface water should not be directed to flow over slope faces. Faces of finished slopes should be planted as soon as possible, after grading is completed, to minimize erosion.

7.3.2 Groundwater

Groundwater was encountered between elevations +4.9 feet and +14.3 feet during the recent field investigation for the I-880 Operational and Safety Improvements Project. During the past field investigation conducted in 1993, groundwater was encountered in two explorations at elevations -1.5 feet and -1.7 feet. Based on California Geological Survey (2003), the recorded highest historical groundwater depth varies from about 5 feet to about 10 feet along the project corridor.

Groundwater encountered during construction may be higher or lower than those encountered above due to seasonal rainfall fluctuation and runoff amount, local irrigation practices, extraction and recharge of local and regional aquifers, and other manmade conditions.

7.4 PROJECT SITE SEISMICITY

The regional seismicity was discussed in Section 4.3.6.

7.4.1 Maximum Earthquakes

The principal faults, which might generate earthquakes affecting the project design, are listed in Table 7-1 along with their maximum earthquake magnitude. Fault data is obtained from the Caltrans 2007 Fault Database (Caltrans, 2007a and 2007b), and the distance to the fault is measured from the Caltrans 2007 Deterministic PGA Map (Shantz and Merriam, 2007). Other known faults in the region were also analyzed but were found not to be capable of generating ground motion at the site in excess of the faults listed on Table 7-1.

Table 7-1. Nearby Earthquake Faults

Fault Name	Fault ID	Maximum Magnitude M_{Max}	Distance (Direction) from Site (miles)	Fault Type
Hayward Fault Zone (Northern Section)	353	7.3	2.8 (Northeast)	RLSS
Calaveras Fault Zone (Northern Calaveras Section)	321	7.4	11.5 (Northeast)	RLSS
Mount Diablo Thrust	150	6.6	12.5 (Northeast)	R
San Andreas Fault Zone (Peninsula Section)	309	7.9	15.8 (Southwest)	RLSS
Concord Fault (Ygnacio Valley Section)	341	6.6	15.8 (Northeast)	RLSS
Greenville Fault Zone (Clayton Section)	351	6.6	20.8 (Northeast)	RLSS

*R = Reverse, RLSS = Right Lateral Strike Slip

7.4.2 Ground Rupture

There are no active faults through the project area. Therefore, the potential for ground rupture is remote to nil.

7.4.3 Earthquake-Induced Landslides

There is no mapped landslide at the project site, therefore, evaluation of earthquake-induced landslide is not necessary.

8.0 GEOTECHNICAL ANALYSES AND DESIGN

8.1 DYNAMIC ANALYSES

8.1.1 Parameter Selection

The peak ground acceleration (PGA) is the zero-period spectral acceleration in the ARS curve. Based on the ARS curve presented in the Foundation Reports for 23rd Avenue OC Replacement (URS, 2011a) and 29th Avenue OC Replacement (URS, 2011b), a PGA of 0.71g is obtained.

For analyzing global slope stability, Section 3.10 of the Caltrans Guidelines for Structures Foundation Reports (Caltrans, 2009) recommends using a horizontal seismic coefficient equal to one-third of the peak acceleration but not exceeding 0.2. Therefore, a horizontal seismic coefficient of 0.2 was used in the slope stability analysis. As presented in Section 11.8.6 of AASHTO (2007), the seismic earth pressures can be computed using a seismic coefficient equal to half of the peak acceleration.

8.1.2 Evaluation

Liquefaction potential and seismically-induced settlement are discussed below.

8.1.2.1 Liquefaction

Liquefaction analysis was performed using the available site-specific subsurface information and the historical high groundwater elevation of 5 feet below the ground surface. Analyses were performed on soil borings and CPTs with a termination depth of at least 15 feet. The liquefaction potential of the saturated, granular materials below the historical high groundwater table was evaluated using the procedures outlined by Seed et al. (1983), Seed and Harder (1990), and updated by NCEER (1997). Results of the liquefaction analyses are included in Appendix C and summarized in Table 8-1. Table 8-1 presents the approximate elevations of liquefiable layers, thickness of liquefiable layers, and approximate seismically-induced settlement for seven CPTs and eleven soil borings.

Table 8-1. Summary of Liquefaction Analyses

Boring/ CPT	Location (Station Line)	Top of Boring Elevation (feet)	Approximate Elevations of Liquefiable Layers (feet)	Thickness of Liquefiable Layer (feet)	Approximate Seismically Induced Settlement (inches)
CPT-11-001	224+00, 51 Rt (5-Line)	+27.0	< 0.3 feet Layers	< 0.3 feet Layers	0.7
R-11-002	225+11, 72 Rt (5-Line)	+26.6	No Liquefaction	-	-
CPT-11-003	227+44, 128 Rt (5-Line)	+25.3	-26.5 to -27.2 < 0.3 feet Layers	0.7 < 0.3 feet Layers	0.1 1.5
R-11-006	30+15, 50 Rt (A-Line)	+27.8	No Liquefaction	-	-
R-11-008	28+70, 27 Lt (A-Line)	+27.5	+7.5 to +2.5	5.0	1.4

Boring/ CPT	Location (Station Line)	Top of Boring Elevation (feet)	Approximate Elevations of Liquefiable Layers (feet)	Thickness of Liquefiable Layer (feet)	Approximate Seismically Induced Settlement (inches)
R-11-010	234+20, 95 Rt (5-Line)	+21.8	No Liquefaction	-	-
CPT-11-011	236+95, 85 Rt (5-Line)	+21.7	+10.4 to +8.6 < 0.3 feet Layers	1.8 < 0.3 feet Layers	0.4 0.2
CPT-11-013	239+55, 84 Rt (5-Line)	+19.8	+14.7 to +13.9 +11.1 to +10.5 < 0.3 feet Layers	0.8 0.6 < 0.3 feet Layers	0.2 0.1 0.3
R-11-014	242+02, 85 Rt (5-Line)	+19.5	No Liquefaction	-	-
CPT-11-017	245+95, 113 Rt (5-Line)	+17.0	-27.3 to -28.0 < 0.3 feet Layers	0.7 < 0.3 feet Layers	0.1 0.4
R-11-021	28+56, 50 Rt (B-Line)	+24.2	No Liquefaction	-	-
R-11-030	20+44, 28 Lt (B-Line)	+15.4	No Liquefaction	-	-
R-11-031	21+80, 45 Rt (B-Line)	+19.0	No Liquefaction	-	-
CPT-11-033	21+39, 28 Rt (A-Line)	+18.2	+11.0 to +10.2 +2.8 to +2.0 < 0.3 feet Layers	0.8 0.8 < 0.3 feet Layers	0.2 0.2 1.6
R-11-034	20+33, 45 Lt (A-Line)	+16.9	No Liquefaction	-	-
R-11-035	19+21, 33 Rt (A-Line)	+17.3	No Liquefaction	-	-
A-11-036	251+37, 105 Rt (5-Line)	+18.7	No Liquefaction	-	-
CPT-11-040	247+00, 220 Rt (5-Line)	+19.0	+13.9 to +12.4 < 0.3 feet Layers	1.5 < 0.3 feet Layers	0.6 0.8

We have the following observations based on the data presented in from Table 8-1:

- Granular materials susceptible to liquefaction were encountered in one boring and seven CPTs.
- The liquefiable layer in the boring is 5.0 feet thick. The 5-foot thick layers coincide with the soil sampling interval. Therefore, actual thickness of the liquefiable layers can be less than 5 feet.
- The liquefiable layers in the CPTs are up to 1.8 feet thick. Majority of the liquefiable layers in CPTs are less than 0.3 feet thick isolated layers.

Based on the above observations, the liquefiable layers are relatively thin, isolated and discontinuous, and are not anticipated to impact the proposed improvements. Therefore, the liquefaction potential is concluded to be low.

8.1.2.2 Seismically-Induced Settlement

The seismically-induced settlements are presented in Appendix C and summarized in Table 8-1. In the liquefiable layers (layer thickness > 0.6 feet), seismically-induced settlements are expected to be up to 1.4 inches. However, the liquefiable layers are relatively thin, isolated and discontinuous. Therefore, the seismically-induced settlement is not expected to adversely impact this project.

8.2 CUTS AND EXCAVATIONS

Based on the Profile Sheets and cross-sections provided by RBF, most of the excavations are relatively minor (less than about 5 feet). However, up to 10 feet of cut is expected for construction of the 23rd Avenue Northbound (NB) Off-Ramp between "B1" Line Stations 47+00 and 49+00. But the finished grade will be near the existing surrounding grade elevation and will be relatively flat.

Per Caltrans HDM Topic 304 (Caltrans, 2008a), side slopes, if any, should be constructed no steeper than 4H:1V where possible. Design exception will be required for side slopes with gradients steeper than 4H:1V.

8.2.1 Slope Stability

We do not anticipate any slope stability issues for minor cuts and excavations. Based on the profile sheets and the cross-sections, the finished grade after the 10 feet of cut at 23rd Avenue NB Off-Ramp is proposed to be near the existing surrounding grade elevation. Therefore, we don't anticipate any slope stability issues due to this proposed cut. The remaining cut slopes are also globally stable with side slopes at a 2H:1V gradient or flatter and a maximum height of 5 feet.

Surficial stability analysis was performed using the infinite slope method. Based on laboratory strength test results of the onsite soils, the calculated factor of safety is at least 1.5 provided the slope gradient is 2H:1V or flatter. Proper maintenance with erosion protection and drainage control in accordance with Section 20 of Caltrans Standard Specifications (2006b) are recommended.

8.2.2 Rippability

Minor excavations are anticipated for the project. The on-site materials can be excavated using conventional heavy-duty earth-moving equipment and the materials are not expected to pose a rippability problem.

8.2.3 Earthwork Factors

The volume change of on-site materials upon excavation and compaction will vary with soil type and soil density. Although accurate grading factors cannot be determined, the volume change of near-surface soils (upper 5 feet) after compaction is estimated to be on the order of +5 percent to -5 percent for determining preliminary earthwork quantities. Excavated materials may be assumed to bulk 3 to 10 percent for hauling purposes.

8.3 EMBANKMENTS

8.3.1 Description

Based on the Profile Sheets and cross-sections provided by RBF, embankment fill will need to be placed to construct the approaches to 23rd Avenue OC bridge replacement, 29th Avenue OC bridge replacement, and 29th Avenue NB Off-Ramp bridge. The following major embankment fills will be placed to construct the approaches and off-ramp:

- Up to 27.5 feet of embankment fill at southern approach to 23rd Avenue OC Replacement.
- Up to 15.0 feet of embankment fill at northern approach to 23rd Avenue OC Replacement.
- Up to 20.0 feet of embankment fill at southern approach to 29th Avenue OC Replacement.
- Up to 15.0 feet of embankment fill at northern approach to 29th Avenue OC Replacement.
- Up to 17.5 feet of embankment fill at western approach to 29th Avenue NB Off-Ramp bridge.

Retaining walls will be constructed at each approach to retain the above embankment fill. These retaining walls are mostly Mechanically Stabilized Embankment (MSE) walls. To construct the proposed MSE walls, cut will be made into the existing embankment side slopes at each approach. Fill will need to be placed behind the MSE walls and on top of the existing approach embankments to construct new approaches.

The relatively tall portion of the embankment at the southern approach to 23rd Avenue OC Replacement will be constructed with Light Weight Fill (LWF). LWF is required to minimize the impact of the new embankment fill on existing facilities including supports of the existing 23rd Avenue OC. The LWF is specified to be Expanded Polystyrene (EPS) blocks. Design of the EPS blocks and the curtain walls are performed by RBF and URS Corporation, respectively. Soil parameters and foundation recommendations supporting the RBF design is included in the wall foundation report (EMI, 2012a).

At the 29th Avenue Off-Ramp where the approach embankment is confined by MSE Walls 228 and 230, the construction schedule cannot accommodate the calculated settlement period of about 4.5 months (EMI, 2012a). As a result, wick drains are recommended to accelerate the settlement period. Wick drains have been used successfully at a nearby project on 5th Avenue (04-ALA-880, PM 48.4/50.0, EA1706U1) for the same application (i.e., accelerate the settlement period). Hayward-Baker (H-B) designed the wick drains at 5th Avenue and we contacted H-B to coordinate the wick drains design at 29th Avenue Off-Ramp.

The wick drain design performed by H-B is presented in Appendix C. The recommended wick drains layout is 3 feet on-center spacing down to a depth of 37.5 feet. The foot-print of the wick drain installation area should extend a minimum of 10 feet from (1) the outside edge of MSE Walls 228 and 230 in the south and north side, respectively, (2) the face of the 29th Avenue Off-Ramp bridge abutment in the west side, and (3) an imaginary line joining the "Beginning" of the MSE Wall 228 and "Beginning" of MSE Wall 230 in the east side. A surcharge of 8 feet high shall be installed at the high end of the embankment (adjacent to the bridge abutment) and the height of surcharge can gradually reduce to 1 foot at the low end of the embankment (i.e., eastern limit of the wick drain installation area). With this wick drain and surcharge loading plan, the settlement period can be reduced to about 30 days.

In addition, about 218-foot long Caltrans Standard Type 1 retaining wall is located at the beginning of the 29th Avenue Off-Ramp, and this wall retains 4 to 10 feet of embankment fill. The width of the embankment fill varies between 10 and 24 feet. Foundation design recommendation for this Type 1 retaining wall is included in Section 0.

Per Caltrans HDM Topic 304 (Caltrans, 2008a), side slopes, if any, should be constructed no steeper than 4H:1V where possible. Design exception will be required for side slopes with gradients steeper than 4H:1V.

8.3.2 Stability and Settlement

Stability of bridge approach fill embankments retained by non-standard walls is addressed in the foundation report for walls (EMI, 2012a) and summarized in Table 8-2. The temporary and local slope stability analyses were performed for the southern and northern approaches to 23rd Avenue OC and 29th Avenue OC, and western approach to 29th Avenue Off-Ramp. The stability analyses are presented in Appendix C.

Table 8-2. Summary of Slope Stability Analyses for Approach Embankment Slopes

Embankment Location	Maximum Embankment Height (feet)	Factor of Safety			
		Global Slope Stability	Pseudo Static Slope Stability	Local Slope Stability	Temporary Slope Stability
Southern Approach to 23rd Avenue OC Replacement	27.5	4.4	3.5	3.9	3.9
Northern Approach to 23rd Avenue OC Replacement	15.0	4.9	2.1	3.7	3.7
Southern Approach to 29th Avenue OC Replacement	20.0	4.7	3.4	2.8	2.8
Northern Approach to 29th Avenue OC Replacement	15.0	4.8	3.5	6.3	6.3
Western Approach to 29th Avenue NB Off-Ramp	17.5	5.6	3.9	6.5	6.5

Settlement of the bridge approach embankments retained by non-standard walls is also included in the foundation report for walls (EMI, 2012a). For reference purposes, these settlement calculations are included in Appendix C.

Settlement calculations were also performed for the embankment fills along the 29th Avenue NB Off-Ramp retained by the Caltrans Standard Type 1 Retaining Wall 224. Between 29th Avenue NB Off-Ramp ("L" Line) Stations 124+40 and 125+75, the maximum calculated settlement is about 1.2 inches provided at least 2 feet of overexcavation and recompaction are performed below the bottom of the embankment fill. Further, 29th Avenue NB Off-Ramp ("L" Line) Stations 125+75 and 128+75, overexcavation and recompaction of 1.5 feet are recommended below the bottom of the embankment fill. The horizontal limits of the overexcavation should extend a minimum distance of 18 inches from edges of new fill. Unless specified on the contract plans or specifications, the excavated soils may be reused as fill compacted to a minimum 95% of maximum density as determined by Caltrans Test Method 216. The overexcavation bottom should be proof rolled prior to backfilling. Further, the overexcavation bottom should be

inspected by a qualified geotechnical engineer or technician to confirm the presence of an unyielding and competent surface.

Fill embankments at other locations are globally stable for a maximum slope gradient of 2H:1V and a maximum height of 5 feet.

Surficial stability analysis was performed using the infinite slope method. The results indicates that the factor of safety is greater than 1.5 for 2H:1V or flatter slopes provided the outer 4 feet of the slope face is composed of soil possessing a minimum internal friction angle of 20 degrees and a minimum cohesion of 225 psf. This select material should be properly keyed and benched into the sloping ground. In all cases, proper maintenance with erosion protection and drainage control in accordance with Section 20 of Caltrans Standard Specifications (2006b) are also recommended.

Based on the plans provided by the structural and civil designers, the following structures and utilities are located in the vicinity of the new approach fill embankments.

- A building located just west of southern approach to 23rd Avenue OC Replacement adjacent to Wall 17;
- A building located just west of southern approach to 29th Avenue OC Replacement adjacent to Wall 19;
- An existing 12-inch diameter sewer line located East of southern approach to 29th Avenue OC Replacement adjacent to Wall 18;
- A proposed 18-inch diameter storm drain located at southern approach to 29th Avenue OC Replacement underneath Walls 18 and 19;
- An existing 15-inch diameter sewer located at northern approach to 29th Avenue OC Replacement underneath Wall 28; and
- A proposed 18-inch diameter storm drain located south of western approach to 29th Avenue NB Off-Ramp Bridge adjacent to Wall 228.

The approach fill will induce settlement on the above facilities. Summary of settlement estimates for the two buildings due to new embankment fill placement are provided in Table 8-3 and Table 8-4. Intermediate settlement values can be obtained using linear interpolation.

RBF has compared the distance to the buildings from the embankments and the estimated settlements provided in Table 8-3 and Table 8-4. At the building located West of the Southern Approach to 23rd Avenue OC Replacement, the settlement varies from 0 to ¾ inch over an approximate building length of 54 feet. At the building located West of the Southern Approach to 29th Avenue OC Replacement, the settlement varies from 0 to 1 inch over an approximate building length of 137 feet. Several references indicate an upper bound of differential settlement of 0.0004 (or 1 inch over 50 feet) can be tolerated. In addition, the worst case of ¾ inch over 50 feet is equivalent to a deflection ratio of 1/800, which is within the limit of 1/500 as indicated by Bjerrum (1963) as the safe limit for no cracking.

Based on the information provided by the structural designers, settlement monitoring and photographic documentation before, during and after construction are recommended for the buildings and is included in specifications. The monitoring should include pre-construction, during-construction and post-construction surveys performed by personnel experienced in this

type of survey and monitoring. Further, construction will be stopped, if settlement at the buildings exceeds ½ inch.

Table 8-3. Settlement Estimates for Building Located West of Southern Approach to 23rd Avenue OC Replacement

Selected Location	Horizontal Distance Measured Normal From the Face of Wall 17 (feet)	Calculated Settlement (inch)
At approximate Station 20+20 ("B" Line) where the proposed Light Weight Fill ends and MSE with soil backfill begins	0	2.1
	10	0.9
	20	0.5
	30	0.3
	40	0.2
At approximate Station 19+20 ("B" Line)	0	2.0
	10	0.8
	20	0.5
	30	0.3
	40	0.2
At approximate Station 18+65 ("B" Line) where the proposed MSE ends	0	0
	10	
	20	
	30	
	40	

Table 8-4. Settlement Estimates for Building Located West of Southern Approach to 29th Avenue OC Replacement

Selected Location	Horizontal Distance Measured Normal From the Face of Wall 19 (feet)	Calculated Settlement (inch)
At approximate Station 20+50 ("A" Line)	0	2.2
	5	1.2
	10	0.9
	20	0.5
	30	0.3
At approximate Station 18+65 ("A" Line) where the proposed MSE ends	0	0
	5	
	10	
	20	
	30	

Settlements of the sewer lines and storm drains due to new embankment fill placement at selected locations are summarized in Table 8-5. Intermediate settlement values can be obtained using linear interpolation. The civil designers, utility and drainage specialists and pipe designers can use these settlement estimates to evaluate the impact on existing and proposed buried utilities

and drainage devices. It should be noted that the calculated settlements are not always representative of the actual site conditions. The pipe conditions and local variation of subsurface conditions could result in settlements exceeding the tabulated values. Therefore, flexible joints and encasement should be considered for new buried lines. For existing buried lines, settlement monitoring should be considered, particularly for sensitive and life-line systems that are in close proximity to fill embankments.

Based on the information provided by the civil designers, mitigation measures are not required for the existing 12-inch diameter sewer line located east of southern approach to 29th Avenue OC Replacement and the proposed 18-inch diameter storm drain located south of western approach to 29th Avenue NB Off-Ramp bridge. The following mitigation measures are recommended by the civil designer based on the settlement estimates presented in Table 8-5 for other two lines:

- An encasement will be added to protect the existing 15-inch sewer line that is crossing the northern approach to 29th Ave OC Replacement.
- A 48-inch steel casing will be added to protect the proposed 18-inch storm drain that is crossing under the southern approach to 29th Ave OC Replacement.

Table 8-5. Settlement Estimates for Utility Lines

Selected Location	Calculated Settlement (inch)
Existing 12-inch Diameter Sewer Line Located East of Southern Approach to 29th Avenue OC Replacement (Stations Along "A" Line)	
18+00	0.0
19+00	0.6
20+00	1.1
21+00	1.5
22+00	2.0
22+80	0.1
Proposed 18-inch Diameter Storm Drain Located Underneath the Southern Approach to 29th Avenue OC Replacement (Stations Along "A" Line)	
18+00	0.0
19+00	1.2
20+40	1.4
20+56	1.4
22+00	3.1
22+72	0.2
22+85	0.1
Existing 15-inch Diameter Sewer Located Underneath the Northern Approach to 29th Avenue OC Replacement (Stations Along "A" Line)	
28+40	0.1
29+00	1.1
29+80	1.5
30+50	0.9
31+00	0.1

Selected Location	Calculated Settlement (inch)
Proposed 18-inch Diameter Storm Drain Located South of Western Approach to 29th Avenue NB Off-Ramp Bridge (Stations Along "05" Line)	
228+17	0.0
228+30	0.0
228+70	0.5
229+35	0.7
230+10	1.0
230+65	0.0

8.4 EARTH RETAINING STRUCTURES

Earth retaining structures consisting of non-standard MSE walls and a Caltrans Standard Type 1 cantilevered retaining wall are proposed to retain the proposed embankment fills for the I-880 Operational and Safety Improvement Project. In addition to the earth retaining structures, one soundwall on barrier or on a L-shaped wall is proposed for the project.

8.4.1 Non-Standard Retaining Walls and Soundwall

A separate foundation report has been prepared for the non-standard earth retaining structures and soundwall (EMI, 2012a). For reference purposes, pertinent non-standard retaining structures and soundwall information is summarized in Table 8-6.

Table 8-6. Non-Standard Retaining Structures and Soundwall Pertinent Data

Wall No.	Wall Type	Cut or Fill Wall	Wall Location	Approx. Length (feet)	Retaining Wall / Barrier Height (feet)	Approx. Bottom of Footing / Top of Leveling Pad Elevation (feet)	Backfill Slope Condition
17	MSE	Fill	West side of southern approach embankment of 23rd Ave. OC	159.5	10 to 20	+12.91 to +15.41	Level
18	MSE	Fill	East side of southern approach embankment of 29th Ave. OC	275.0	7.5 to 20	+15.00 to +17.50	Level
19	MSE	Fill	West side of southern approach embankment of 29th Ave. OC	287.9	7.5 to 22.5	+15.41 to +17.91	Level
26	MSE	Fill	East side of northern approach embankment of 23rd Ave. OC	95.0	12.5 to 15	+19.54	Level
28	MSE	Fill	East side of northern approach embankment of 29th Ave. OC	150.0	7.5 to 15	+25.00	Level

Wall No.	Wall Type	Cut or Fill Wall	Wall Location	Approx. Length (feet)	Retaining Wall / Barrier Height (feet)	Approx. Bottom of Footing / Top of Leveling Pad Elevation (feet)	Backfill Slope Condition
29	MSE	Fill	West side of northern approach embankment of 29th Ave. OC	113.0	7.5 to 17.5	+25.44	Level
230	MSE	Fill	North side of approach embankment of 29th Ave. off-ramp	77.5	7.5 to 12.5	+23.50	Level
228	MSE	Fill	South side of approach embankment of 29th Ave. off-ramp	125.0	7.5 to 17.5	+20.70	Level
232	Type 736SV 7SWBP	Fill	North side of I-880 between 29th and 23rd Avenues	1,058.5 560.0	2 to 4 5 and 6	+13.25 to +17.00 +8.50 to +12.50	Level

8.4.2 Caltrans Standard Type 1 Retaining Wall

The pertinent Caltrans Standard Type 1 Retaining Wall 224 information is summarized in Table 8-7.

Table 8-7. Caltrans Standard Type 1 Retaining Wall 224 Pertinent Data

Wall Location	Approx. Length (feet)	Retaining Wall Height (feet)	Approx. Bottom of Footing Elevation (feet)	Backfill Slope Condition
North side of approach embankment at 29th Ave. off-ramp	218.2	6 to 12	+23.08 to +24.00	Level

Sign Structure "A" is situated at the beginning of Wall 224. In order to support the sign post, the footprint of the Wall 224 is enlarged to 10.0 feet by 17.6 feet in the Plan View. The sign and enlarged retaining wall are supported on five 24-inch diameter Cast-in-Drilled-Hole (CIDH) piles connected to a pile cap. Foundation design of Sign Structure "A" is addressed in the Foundation Report for Sign Structures (EMI, 2012b).

Recent field investigation indicates that the subsurface materials at the project site consist predominately of medium stiff to hard layers of lean clay and fat clay with varying amounts of sand and few interbedded layers of medium dense to very dense clayey sand, silty sand, and sand with silt down to the exploration termination depth. The idealized soil profile and design strength parameters for foundation design of the wall are presented in Table 8-8.

Table 8-8. Idealized Soil Profile and Strength Parameters

Approximate Elevation (feet)	Predominant Soil Type	Equivalent SPT Blowcount* (blows/foot)	Friction Angle (degree)	Cohesion / Undrained Shear Strength (psf)
+27 to +14	Lean Clay and Lean Clay with Sand	(11) to 17 Average = 13	-	2,500
+14 to 0	Lean Clay and Lean Clay with Sand	(5) to 18 Average = 10	-	2,000
0 to -15	Lean Clay and Fat Clay	(9) to 34 Average = 16	-	3,000
-15 to -20	Clayey Sand and Silty Sand	22 to 35 Average = 29	34	100
-20 to -40	Lean Clay with Sand and Sandy Lean Clay	(13) to (22) Average = 18	-	4,000
-40 to -53	Silty Sand and Sand with Silt	(19) to 50 Average = 35	36	100
-53 to -80	Lean Clay with Sand and Sandy Lean Clay	(9) to (14) Average = 12	-	3,000

* Values in ( ) are converted SPT blowcounts corrected for sampler size; correction factor from Modified California Drive sampler blowcounts to SPT blowcounts is 0.5.

In Table 8-8, the soil strength parameters for sandy soils are based on the correlations with SPT blowcounts (Lam and Martin, 1986) and laboratory direct shear test results; and soil strength parameters for clayey soils are based on CPT sounding data (Robertson and Campanella, 1989) and laboratory unconsolidated undrained triaxial compression test results.

Bearing Capacity: Maximum bearing pressures for Type 1 retaining wall were computed by the structural designers and they are provided in Table 8-9.

Table 8-9. Summary of Maximum Bearing Pressures for Type 1 Retaining Wall 224

Wall Heights (feet)	Maximum Bearing Pressures (ksf)		
	Service-I Limit State	Strength Limit State	Extreme Event Limit State
6	1.5	2.0	3.3
8	1.9	2.6	5.2
10	2.8	3.9	6.7
12	2.8	3.8	6.6

Per Caltrans LRFD design guidelines provided in the latest Caltrans Memo To Designers (Caltrans, 2008b), the Service-I Limit State bearing pressures must be less than the allowable bearing capacity of the foundation soils; the Service-I Limit State bearing pressures were also used to calculate the anticipated settlement. The Strength Limit State and Extreme Event Limit State bearing pressures were used to compare with the factored bearing capacity and ultimate bearing capacity of the foundation soils, respectively. Bearing capacity and settlement

calculations are provided in Appendix C. Minimum overexcavation depth and resulting settlement estimates are presented in Table 8-10.

Table 8-10. Recommended Minimum Overexcavation Depths and Settlement Estimates for Type 1 Retaining Wall 224

Approximate Wall 224 LOL Stations	Wall Height (feet)	Minimum Overexcavation Depth Below Bottom of Wall Footing (feet)	Calculated Settlement Without Overexcavation (inch)	Calculated Settlement With Overexcavation (inch)
Begin Wall to 10+43	12	3.5	1.8	1.0
10+43 to 10+99	10	3.5	1.8	1.0
10+99 to 11+63	8	2.5	1.4	1.0
11+63 to End Wall	6	2.0	1.3	1.0

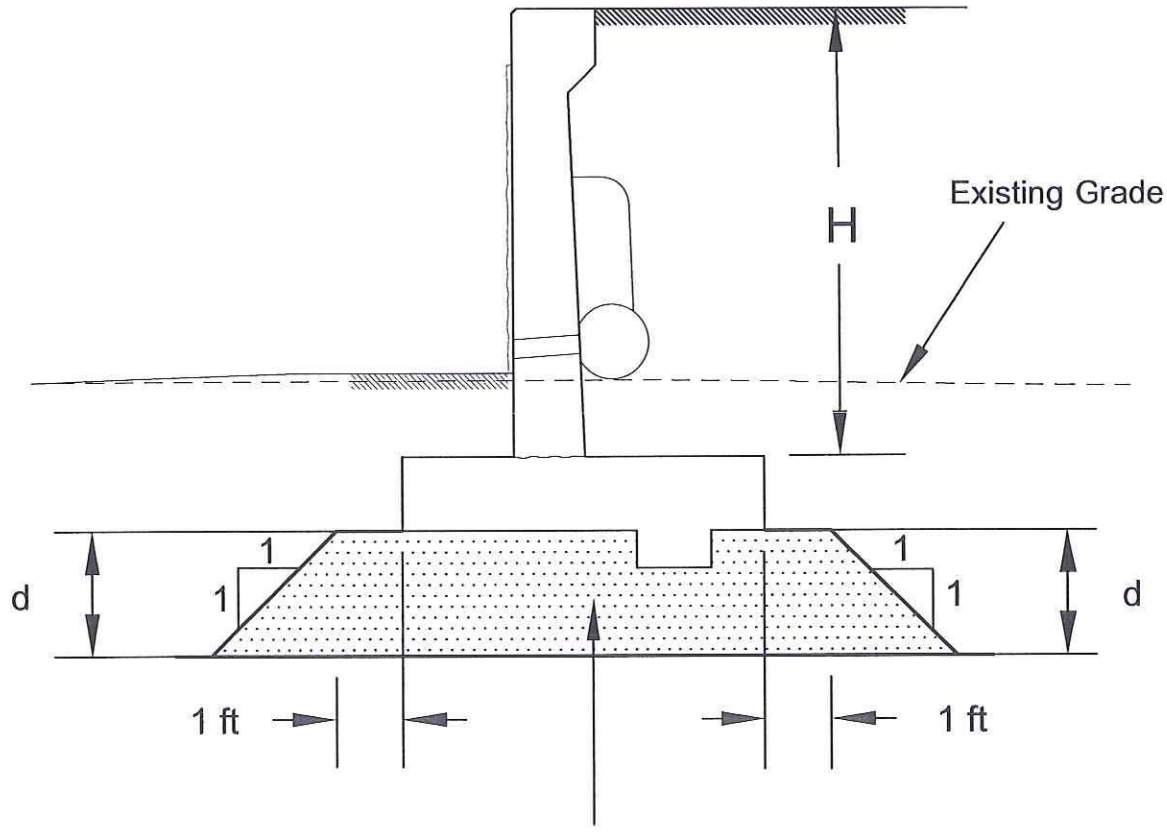
Minimum footing embedment should be based on Section 4.4.5.1 of Caltrans BDS (Caltrans, 2003a).

The horizontal limits of the overexcavation should begin one foot from each edge of the footing bottom and extending downward at a 45-degree imaginary plane until the plane intersects the recommended minimum excavation depth. In some areas, the 45-degree imaginary plane could intersect temporary shoring. In this case only, the horizontal limit of the overexcavation should begin from the edge of the footing bottom and extending out a minimum of 1 foot and down until the plane intersects the recommended excavation depths. A sketch showing the limits of the overexcavation is included in Figure 8-1. Caltrans Structure Backfill should be used for backfilling with a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. The overexcavation bottom should be proof rolled prior to backfilling. Further, the overexcavation bottom should be inspected by a qualified geotechnical engineer or technician to confirm the presence of an unyielding and competent surface. The excavated material contains aerially deposited lead (Ninyo and Moore, 2009) and must be either capped or transported to a Class-I landfill.

Slope Stability: Global stability analyses were performed for a cross section with maximum wall height of 12 feet at approximate "05" line Station 223+68 using the computer program SLIDE 5.0 (Rocscience, 2006) for both static and pseudostatic conditions and the results are presented in Appendix C.

The material used for the retaining wall backfill is assumed to have a friction angle of 32 degrees and a cohesion of 150 psf. Shear strengths of existing fill material and in-situ native soils are provided in Table 8-8.

Slope stability analyses conducted for the static condition include a 2 feet soil surcharge (i.e., 250 psf) to represent traffic loading. Results of the analyses indicate that the global stability for the proposed Type 1 retaining wall meet the required minimum factor-of-safety of 1.5 for a deep-seated failure. Slope stability analysis under pseudo-static condition was performed using a seismic coefficient equal to 0.2g. Analysis indicates that the calculated factor of safety is greater than the required minimum of 1.1.



Note: The backfill material should be compacted to a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216.

d = Minimum overexcavation depth below retaining wall footing
(See Table 8-8 for magnitudes of "d").

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Retaining Wall Backfill: Onsite soils are predominantly clays with medium to high expansion potential. These materials are not suitable for use as wall backfill. Materials placed behind the retaining wall should be Structure Backfill per Section 19-3.06 (Caltrans, 2006b). The Structure Backfill requirement should be supplemental to the pervious backfill requirement as described in Caltrans Standard Plans (Caltrans, 2010) and Caltrans Standard Specifications (Caltrans, 2006b) under Section 19-3.065. The horizontal limits of the Structure Backfill should begin one-foot from edge of the footing bottom and extending upward at a 45-degree imaginary plane until the plane intersects the ground surface. If the 45-degree imaginary plane intersects temporary shoring, then the horizontal limit can be altered to follow the vertical face of the shoring. Backfill should be placed in loose lifts not exceeding 8 inches in thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 % of maximum density as determined by California Test Method 216. Jetting or flooding to compact backfill is not recommended. Heavy compaction equipment, such as vibratory rollers, dozers, or loaders, should not be used adjacent to the retaining walls in order to avoid damaging the walls due to large lateral earth pressures.

Lateral Earth Pressure and Resistance: Using the backfill configuration described above, a static active lateral earth pressure of 36 psf per foot of depth is recommended for a free draining, level and compacted backfill. If applicable, a uniform lateral pressure of at least 72 psf due to vehicle loads, equivalent to a vertical pressure produced by at least 2 feet of earth, should be added to the above lateral earth pressure.

Resistance to lateral loads may be developed by a combination of friction acting at the base of the retaining wall footings and passive earth pressure. Since onsite soils are used as compacted fill below the footing, a frictional coefficient of 0.45 is recommended. A maximum passive equivalent fluid pressure of 360 psf per foot can also be used for the design. We recommend 100% of the base friction only for static loading. For seismic loading, we recommend combining 100% of the passive resistance and 100% of the base friction.

8.5 CULVERT FOUNDATIONS

Based on current plans, alternate pipe culverts (APCs) with diameters up to 36 inches are proposed at various locations and fills are proposed throughout the project area. Impact of fills at least 5 feet in height should be evaluated for drainage structures that fall within a 45-degree projection below the footprint of fills. In addition, the existing culverts that will remain in-place should be inspected, then rehabilitated or replaced (if necessary).

Based on the information provided by the project drainage and utility plans preparer, there are 5 drainage and utility lines identified within the project limits that will be affected by the proposed fill placements. One of these locations is a utility corridor located in front of the proposed Abutment 1 of the 29th Avenue OC. The calculated settlement at this utility corridor is less than 0.1 inch, and mitigation is not required. Settlement calculations and mitigation measures for the other 4 lines are presented in Table 8-5 and Section 8.3.2.

There are no special foundation preparation and design requirements for the proposed culverts. The foundation and bedding requirements presented in the Caltrans Standard Plans (2010) and Standard Specifications (2006b) are sufficient for these proposed culverts.

8.6 SOIL INFILTRATION TESTS

Field tests were performed to determine the soil infiltration rates and to confirm groundwater separation requirements for evaluation and design of a detention basin. The location of the detention basin, boring, and infiltration test wells are shown on Figure 5-4. The detention basin is proposed at an area between north of NB I-880, west of NB 23rd Avenue, and south of 23rd Avenue NB On-Ramp. Boring A-11-036 and Infiltration Test Wells W-11-037 through W-11-039 were drilled for the detention basin. The pertinent boring and infiltration test wells information have been presented in Table 5-1. Log of Boring A-11-036 drilled at the proposed basin site is presented in Appendix A.

Groundwater was encountered at elevation +7.7 feet in Boring A-11-036. Groundwater was not encountered in all three Infiltration Test Wells to the maximum depth explored at elevation +11.7 feet.

The Infiltration Test Wells were drilled to a depth of about 7 feet and the lower 2 feet were backfilled with loosely poured pea gravel. The pea gravel is commercially available Quikrete All-Purpose pea gravel with maximum size of ¾-inch, meeting ASTM Standard C-33. An open 4-inch diameter PVC pipe (ID=4") was placed on the top of the gravel section.

Groundwater was not present in any of the wells prior to testing. At each well, imported clean water was introduced to the PVC pipes to pre-saturate the filter material and the surrounding soil in the vadose zone about 24 hours prior to conducting the well tests.

Permeability tests were conducted in all the wells on April 19, 2011 in accordance with the US Bureau of Reclamation Method 7300 (1985). A floating device fitted with a needle valve was set on the gravel and attached to a ¼-inch diameter feed line connected to a 55-gallon drum. Water was placed in each well and the flow quantities were monitored over a four-hour period. Each test consisted of a series of water flow readings taken at various time intervals. The incremental flow rates were plotted over time to determine the rate of infiltration. Based on this evaluation, the resulting infiltration rate of the test site is about 0.015 inches per hour.

Based on the field and test data, the designated detention basin area is predominantly underlain by lean clay with sand and sandy lean clay. According to the Hydrologic Soil Group (HSG) System (Caltrans, 2007c) the soil is HSG Type D.

The groundwater table is at elevation +7.7 feet at the basin site. Based on the information provided by RBF, the invert of the detention basin is at elevation +13.5 feet. Therefore, the groundwater separation is about 5.8 feet at the time of testing.

8.7 SOIL CORROSIVITY

Nine soil samples were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are presented in Table 8-11. Minimum resistivities ranged from 1,200 to 5,900 ohm-cm. The pH ranged from 6.5 to 7.6. The soluble sulfate contents ranged from 55 to 252 parts per million (ppm), and the soluble chloride contents ranged from 158 to 231 ppm.

Based on the Caltrans Corrosion Guidelines (2003b), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is

2,000 ppm or greater. Based on the test results and the Caltrans criteria, the on-site soils are considered to be non-corrosive to bare metals and concrete.

Table 8-11. Summary of Soil Corrosion Test Results

Boring	Station (Offset) / Station Line	Sample Depth (feet)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
R-11-002	225+11 (72 Rt) / "05" Line	5	CL	1,300	7.3	65	219
R-11-006	30+15 (50 Rt) / "A" Line	5	CL	1,600	7.6	65	164
R-11-010	234+20 (95 Rt) / "05" Line	10	SC	5,900	6.7	55	185
R-11-014	242+02 (85 Rt) / "05" Line	5	CH	1,300	6.6	70	158
R-11-021	28+56 (50 Rt) / "B" Line	5	CL	1,500	6.5	65	197
R-11-030	20+44 (28 Lt) / "B" Line	10	CL	1,200	6.6	80	231
R-11-031	21+80 (45 Rt) / "B" Line	5	CH	1,300	6.9	170	221
R-11-034	20+33 (45 Lt) / "A" Line	15	CL	2,500	7.1	252	160
R-11-035	19+21 (33 Rt) / "A" Line	5	CH	1,400	7.3	90	158

9.0 MATERIAL SOURCES

The Materials Report (EMI, 2012c) provides a list of potential commercial suppliers for sand, gravel, aggregate base, and concrete. Pulverizing existing pavement, during construction, might be performed. Pulverized AC material (or Reclaimed Asphalt Pavement – RAP) can be used as aggregate base (AB) provided the material meets the quality requirements of AB specified in Section 26 (Aggregate Bases) of the Caltrans Standard Specifications (2006b). Pulverized AC material may also be used within certain Hot Mix Asphalt (HMA) mixes, such as HMA Type A, if pulverized AC material and its processing complies with Standard Special Provision (SSP) # S1-020H.

10.0 MATERIAL DISPOSAL

Based on information provided by the civil designer, the project requires import material to achieve proposed grades. Therefore, no soil or only minor amounts of on-site soil are anticipated to require disposal. Disposal of onsite soils containing aerially deposited lead shall confirm to Caltrans requirements.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 CONSTRUCTION ADVISORIES

All work should be performed in accordance with the Caltrans Standard Specifications (2006b) except as indicated in the Special Provisions prepared for the project improvements. The following Construction Advisories are also applicable:

- Onsite subsurface materials are primarily compressible and expansive clayey soils. Overexcavation and recompaction of the onsite soils are required for this project and contractor should be prepared to handle this type of materials, particularly under a wet condition.
- Groundwater is relatively shallow. Contractor should be prepared for a wet construction when bidding and selecting construction equipment and methods.
- New fill embankments close to 30 feet high will be placed on saturated and compressible clayey soils. Thus, settlement and settlement periods are critical construction issues. Special designs to mitigate settlement include but are not limited to remedial overexcavation and recompaction, use of select backfill materials, placement of wick drains, settlement monitoring and use of settlement-tolerant earth retaining structures. Contractor must be cognizant of the above recommendations and any deviations should be consulted with and approved by the designers. Request for Information (RFI) prepared by contractor specifically to address settlement and settlement periods shall be clear, precise and complete.
- Settlement monitoring is required for this project and locations of the settlement monitoring devices are prescribed in the Special Provisions. Contractor shall protect all settlement monitoring devices, and any damage to these devices could impact the construction schedule. Contractor is required to make accurate measurements of settlement at time intervals described in the Special Provisions. These measurements shall be submitted to the Designer or Resident Engineer prior to releasing the embankments/walls for final construction.

11.2 CONSTRUCTION CONSIDERATIONS THAT INFLUENCE DESIGN

Lime is used to treat the pavement subgrade to mitigate soil expansion. Other options to mitigate soil expansion were considered but deemed not applicable due to cost, site and schedule constraints. In addition, due to schedule constraints and site conditions, MSE with segmental or full-height wall panels, and EPS blocks confined laterally by full-height curtain walls are used to retain roadway embankments. This type of retaining structures is suitable for sites underlain by compressible and saturated soils.

11.3 CONSTRUCTION CONSIDERATIONS THAT INFLUENCE SPECIFICATIONS

EPS blocks are used to reduce settlement and settlement periods. To mitigate soil settlement, a pair of geosynthatic wrap-around MSE walls with full-height wall panels installed after completion of the settlement period is also recommended. In order to accelerate the settlement period, wick drains are proposed at the 29th Avenue Off-Ramp.

Special Provisions that are influenced by other geotechnical factors include shoring requirements, dewatering requirements, and corrosion protection specifications. Temporary construction slopes, bracing, and shoring should be made the contractor's responsibility. Also if

required, specific activities for dewatering including preparing a dewatering plan are the responsibility of the contractor.

Based on the information provided by the structural designers, settlement monitoring is recommended for the buildings presented in Table 8-3 and Table 8-4.

Remedial removals and recompaction requirements for embankments and a Caltrans Standard Type-1 Retaining Wall 224 are presented in Section 12.0. For embankments confined by non-standard retaining structures, remedial removals and recompaction requirements are presented in the wall foundation report (EMI, 2012a). Bottoms of overexcavations should be firm and unyielding prior to placing compacted fill. Remedial excavations, in areas where new pavement is proposed, are addressed in the Materials report (EMI, 2012c).

11.4 CONSTRUCTION MONITORING AND INSTRUMENTATION

Qualified geotechnical personnel should perform inspections and materials testing during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill.
- Excavations for drainage structures and utility trenches.
- Removal or support of buried structures or utilities.
- Shoring installation, if necessary.
- When any unusual conditions are encountered.

Temporary backcuts and shoring, if used during earthwork or construction, should be monitored by the contractor and qualified geotechnical personnel. Settlement monitoring devices are also recommended at the embankment approaches.

11.5 HAZARDOUS WASTE CONSIDERATIONS

Evaluating the presence and concentration of hazardous contaminants is beyond EMI's scope of work and therefore is not addressed herein. EMI has assumed that no hazardous or contaminated materials exist within the project area other than aerially deposited lead; therefore, no hazardous waste considerations are provided. If for any reason hazardous or toxic materials are believed to exist within the project area, an environmental consultant should be retained.

11.6 DIFFERING SITE CONDITIONS

The analyses and recommendations contained in this report are based on the data obtained from the review of available geologic references, our site reconnaissance, soil borings, cone penetration tests and laboratory testing. The soil boring and cone penetration test logs indicate subsurface conditions only at specific locations and times drilled, and only to the depths penetrated. Borings and cone penetration soundings do not necessarily reflect subsurface variations that may exist between such locations. If variations in subsurface conditions from those described in this report are noted during construction, the recommendations presented in this report must be re-evaluated. In the event that any changes in the nature, design, or location of the proposed facilities occur, the conclusions and recommendations in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing by the designer. Therefore, upon encountering any site conditions that are perceived to differ materially from those conditions anticipated in this report, the resident engineer should contact the geotechnical designer immediately.

12.0 RECOMMENDATIONS AND SPECIFICATIONS

Below are recommendations for the proposed improvement project. If designers have questions or disagree with the recommendations, or, if variations in subsurface conditions from those described herein are observed during construction, the geotechnical designer should be contacted to verify the applicability of the recommendations. Recommendations in this report may require modification based on actual subsurface conditions encountered during construction.

- The recommended overexcavation and recompaction for Caltrans Standard Type 1 retaining wall 224 is presented in Table 8-10. The overexcavation depth is measured from the bottom of the footing elevations. The horizontal limits of the overexcavation should begin one foot from each edge of the footing bottom and extending downward at a 45-degree imaginary plane until the plane intersects the recommended minimum excavation depth. In some areas, the 45-degree imaginary plane could intersect temporary shoring. In this case only, the horizontal limit of the overexcavation should begin from the edge of the footing bottom and extending out a minimum of 1 foot and down until the plane intersects the recommended excavation depths. A sketch showing the limits of the overexcavation is included in Figure 8-1. Caltrans Structure Backfill should be used for backfilling with a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. Actual depths and extent of remedial removals should be determined in the field by qualified geotechnical personnel during earthwork activities.
- For the construction of embankment for 29th Avenue NB Off-Ramp, an overexcavation and recompaction of 2-feet is recommended between 29th Avenue NB Off-Ramp ("L" Line) Stations 124+40 and 125+75 within the areas to receive compacted fill. Between 29th Avenue NB Off-Ramp ("L" Line) Stations 125+75 and 128+75, overexcavation and recompaction of 1.5 feet are recommended within the areas to receive compacted fill. The overexcavation depth is measured from the bottom of the embankment fill. The horizontal limits of the overexcavation should extend a minimum distance of 18 inches from edges of new fill. Unless specified on the contract plans or specifications, the excavated soils may be reused as fill compacted to a minimum 95% relative compaction. Actual depths and extent of remedial removals should be determined in the field by qualified geotechnical personnel during earthwork activities.
- The site is underlain by saturated and compressible clayey soil. Fill embankments will undergo settlement during construction. Therefore, any "hard" improvements, such as buried pipes, pavements, and other above-ground structures should not be constructed until remaining settlement is determined to be within tolerable limits. It is likely that contractor will be required to re-establish the finish subgrade surface prior to constructing pavement. Settlement periods for roadway embankment areas adjacent to non-standard retaining wall foundations are presented in the wall foundation report (EMI, 2012a).
- In addition to the 29th Avenue NB Off-Ramp, minor to significant amounts of earthwork, depending on the area of improvement, are expected. In areas where compacted fill will be placed, complete removal of compressible surficial materials including topsoil, loose or soft alluvium or fill soil, dry or saturated soil, or otherwise unsuitable material is required prior to fill placement. A minimum overexcavation and recompaction of 18 inches is recommended within all areas to receive compacted fill, and the overexcavation depth is measured from the existing grade. The overexcavation should extend horizontally a minimum distance of 18

inches from edges of new fills. In cut areas, the minimum overexcavation and recompaction depth is 12 inches if the difference between the finished and existing grade is 2 feet or less, and overexcavation is not required if the difference between the finished and existing grade is greater than 2 feet. In cut areas, the overexcavation depth is measured from the finished grade. Unless specified on the contract plans or specifications, the excavated soils (in both fill and cut areas) may be reused as compacted fill. Actual depths and extent of remedial removals should be determined in the field by qualified geotechnical personnel during earthwork activities. Remedial excavations, in areas where new earth retaining structures and pavements are proposed, are addressed in the wall foundation report (EMI, 2012a) and the Materials report (EMI, 2012c), respectively.

- All overexcavations should be observed by qualified geotechnical personnel to verify that firm and unyielding bottoms are exposed. Overexcavated areas should be cleaned of loose soils and debris and should be observed to be firm and unyielding before receiving fill.
- Fills placed against sloping ground shall be keyed and benched into the sloping ground and placed as specified in Section 19-6 of the Caltrans Standard Specifications (Caltrans, 2006b).
- The maximum calculated settlement due to the approach embankment construction is presented in foundation reports for the retaining wall and soundwall (EMI, 2012a). For reference, the same calculations are presented in Appendix C.
- Settlement estimates at nearby buildings, and existing and proposed buried lines in close proximity of fill embankments have been summarized in this report. The structural, civil, utility, drainage and pipe designers should review these settlement estimates and develop mitigations, if necessary. Precautions including distress and settlement monitoring and in-place protections such as steel casing and concrete encasement were recommended in this report.
- On-site soils affected by the proposed construction are expected to have medium to high expansion potential. On-site native soil and existing fill material within the project area should not be considered for use as backfill for walls. Additional laboratory tests may be required during earthwork operations to verify the expansion potential of soils used in specific areas.
- To mitigate possible uneven movements of buried drainage devices, we recommend surrounding the bottom of these drainage lines using Sand Bedding. Limits and configurations of the Sand Bedding should conform to Caltrans Standard Plan Sheet A62D (2010). Material properties of the Sand Bedding should conform to Caltrans Standard Specifications, Section 19-3.025B (2006b).
- The outer 4 feet of proposed 2H:1V slope faces, if any, should compose of soil possessing a minimum friction angle of 20 degrees and a minimum cohesion of 225 psf. This select material should be properly keyed and benched into the sloping ground.
- In general, the erosion potential at this site is expected to be minor considering the provisions for site drainage, slope planting and other measures required by Caltrans. In order to minimize potential erosion, all finish slopes should be planted as soon as practical after grading. Local areas may require additional measures at the discretion of the geotechnical personnel present on-site during construction.
- Design of temporary construction slopes and shoring is the contractor's responsibility during construction.

- It shall be made the contractor's responsibility to control subsurface and surface water. The contractor should dewater the site as necessary, if groundwater is encountered. However, dewatering could induce excessive settlement of existing surface and subsurface structures and utilities. Water should not be allowed to stand in any excavations. If excavations become flooded, at least the bottom 8 inches of soil should be removed and replaced, and re-compacted to a minimum 95% relative compaction. Additional removals may be required at the discretion of the Resident Engineer or geotechnical personnel.
- If wet subgrade conditions are encountered during construction, the soft bottom will require stabilization prior to any earthwork. Subgrade stabilization can be accomplished by using a combination of geotextile, geogrid, gravel, or aggregate base. In addition, low ground pressure earthmoving equipment may be necessary during excavation and relatively lightweight equipment may be needed to compact the select material to minimize the potential for soil pumping.

13.0 LIMITATIONS

This report is intended for the use of Alameda County Transportation Commission, RBF Consulting and Caltrans for the I-880 Operational and Safety Improvements Project. This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings and cone penetration tests are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings and cone penetration soundings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained herein are applicable to the specific design elements and locations which are the subject of this report. Data, opinions, and recommendations herein have no applicability to any other design elements or to any other locations, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI is not responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction. EMI is not responsible for the acts or omissions of the Contractor, or any other person performing any construction, or for the failure of any worker to carry out construction in accordance with the Final construction drawings and specifications.

Services performed by EMI were conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

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Appendix A

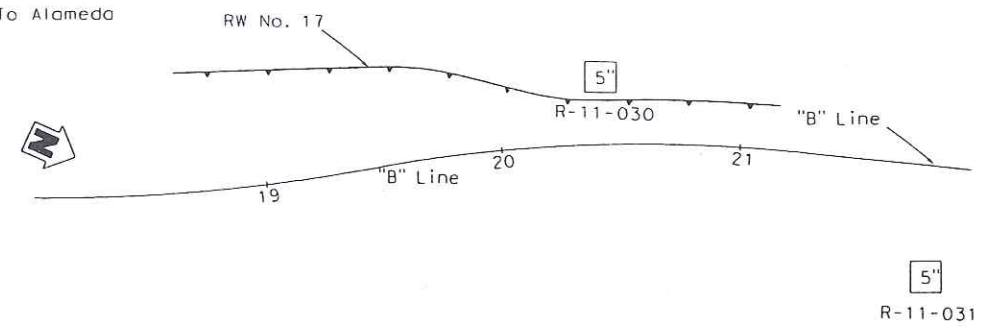
Log of Test Boring Sheets

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.
DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.
DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF
HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

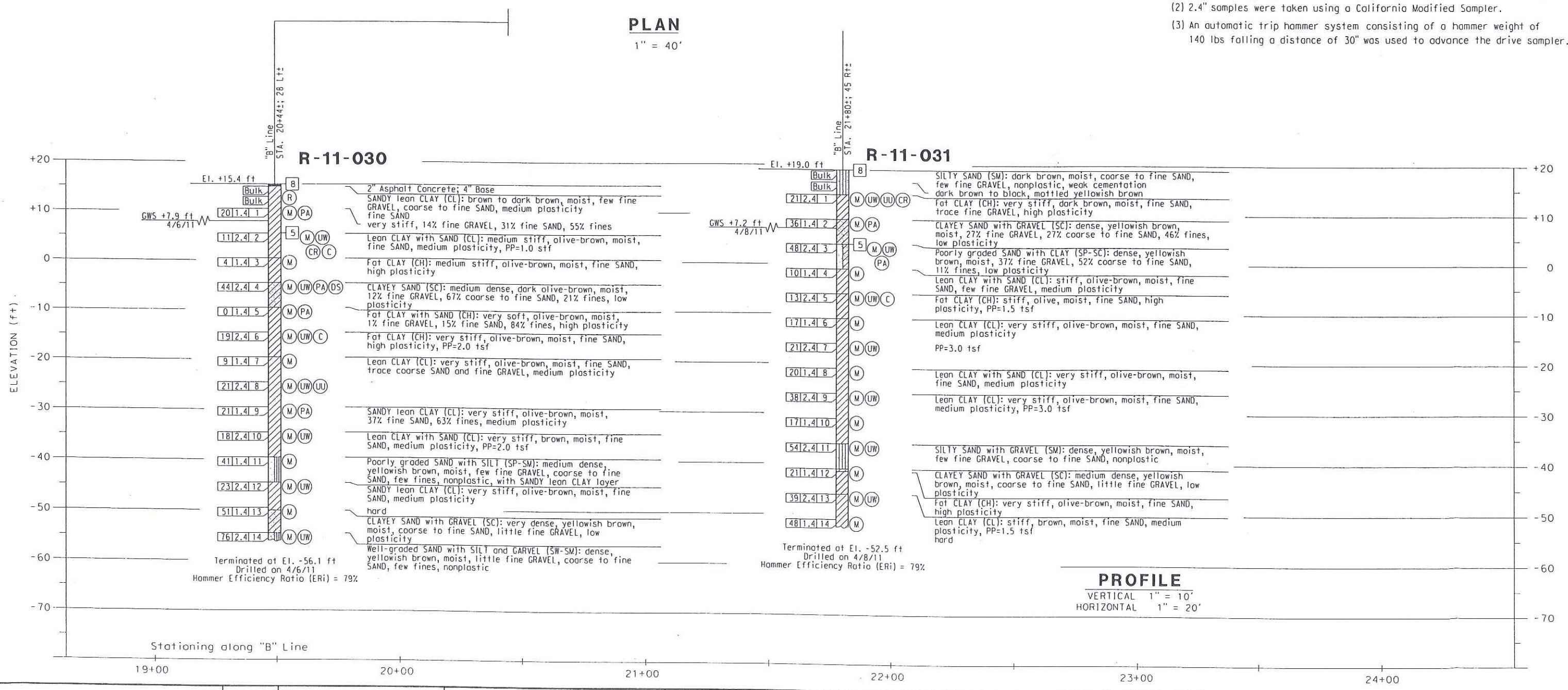
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

PLAN

1" = 40'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fong	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011				POST MILES Varies

RETAINING WALL No. 17

LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	A10			

Philip J Meymand — REGISTERED CIVIL ENGINEER — 3/30/12 DATE

PLANS APPROVAL DATE

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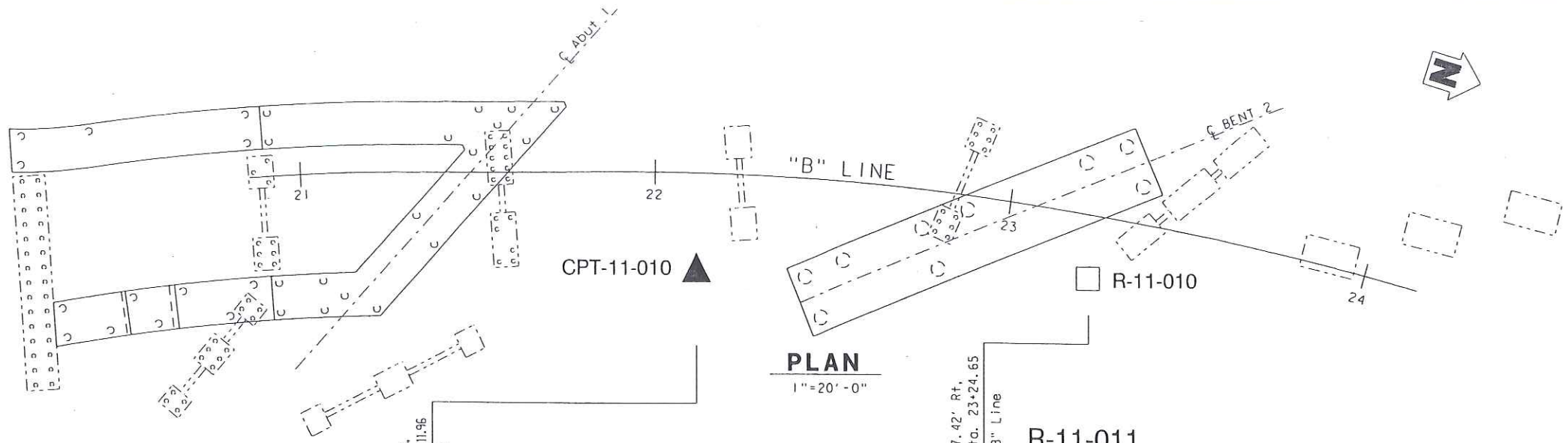
REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

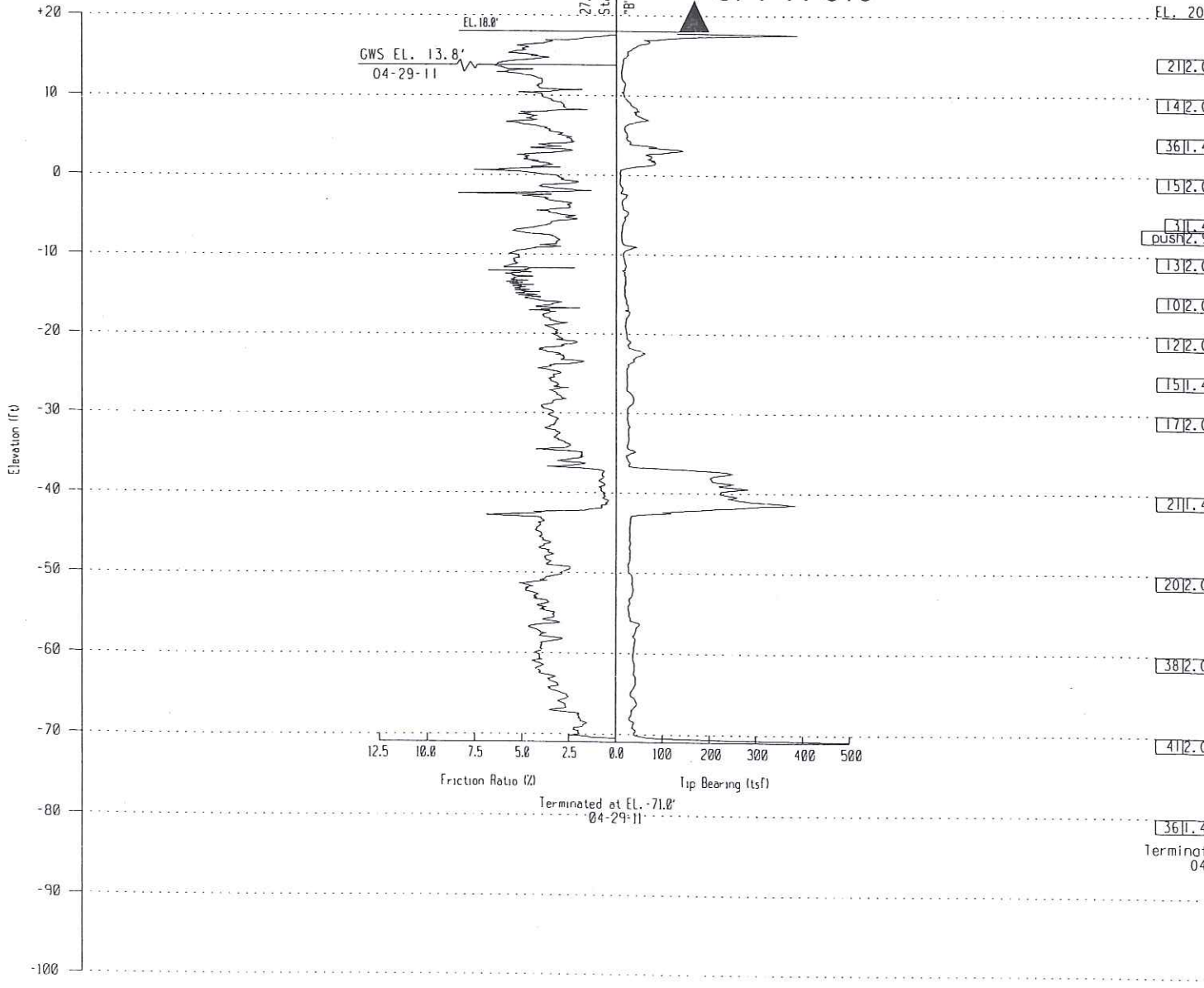
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

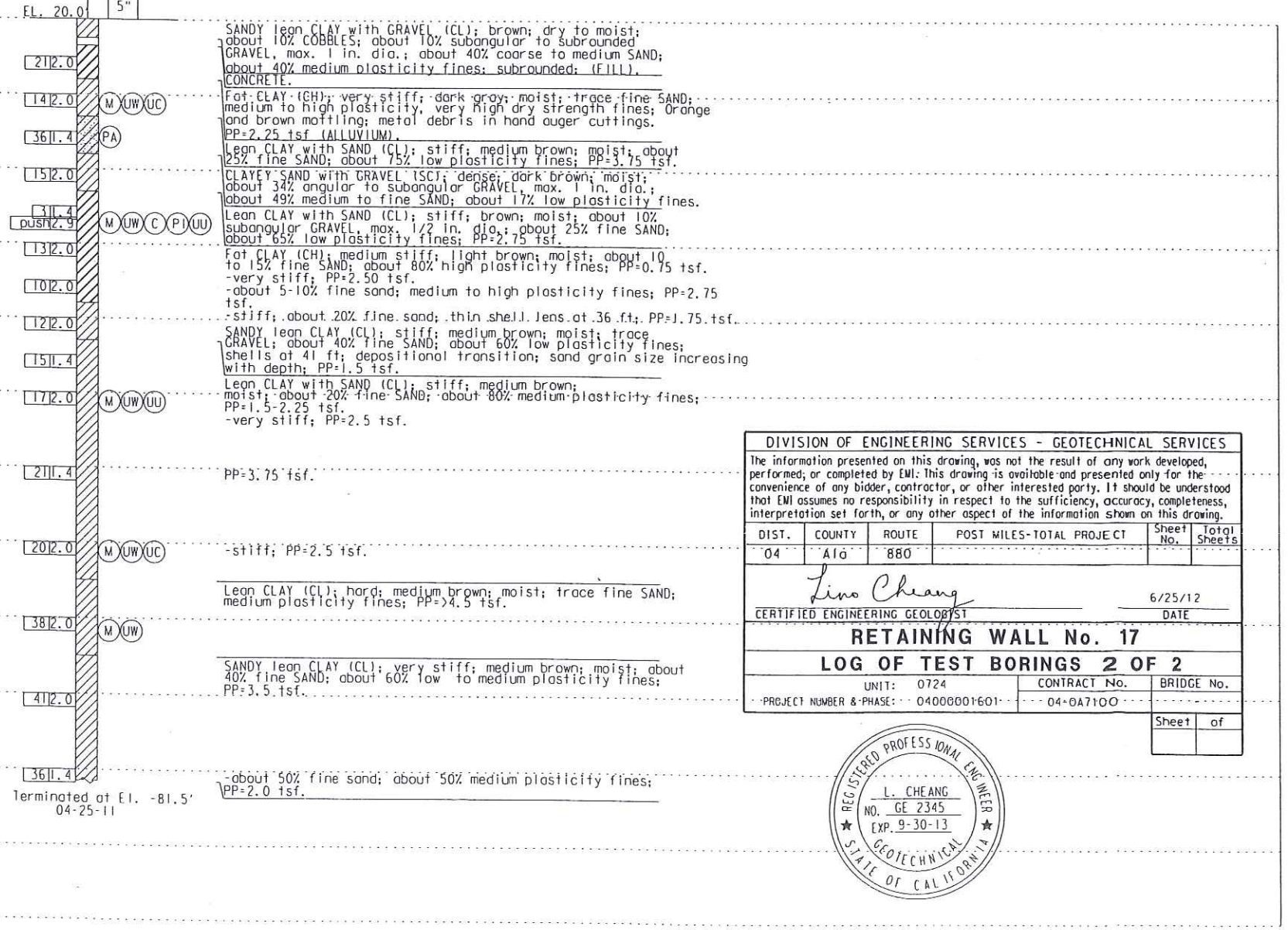


PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.





SANDY lean CLAY with GRAVEL (CL); brown; dry to moist; about 10% COBBLES; about 10% subangular to subrounded GRAVEL, max. 1 in. dia.; about 40% coarse to medium SAND; about 40% medium plasticity fines; subrounded; (FILL).
CONCRETE.
Fat CLAY (CH); very stiff; dark gray; moist; trace fine SAND; medium to high plasticity, very high dry strength fines; Orange and brown mottling; metal debris in hand auger cuttings.
PP=2.25 tsf (ALLUVIUM).
Lean CLAY with SAND (CL); stiff; medium brown; moist; about 25% fine SAND; about 75% low plasticity fines; PP=3.75 tsf.
CLAYEY SAND with GRAVEL (SC); dense; dark brown; moist; about 34% angular to subangular GRAVEL, max. 1 in. dia.; about 49% medium to fine SAND; about 17% low plasticity fines.
Lean CLAY with SAND (CL); stiff; brown; moist; about 10% subangular GRAVEL, max. 1/2 in. dia.; about 25% fine SAND; about 65% low plasticity fines; PP=2.75 tsf.
Fat CLAY (CH); medium stiff; light brown; moist; about 10 to 15% fine SAND; about 80% high plasticity fines; PP=0.75 tsf.
-very stiff; PP=2.50 tsf.
-about 5-10% fine sand; medium to high plasticity fines; PP=2.75 tsf.
-stiff; about 20% fine sand; thin shell lens at 36 ft; PP=1.75 tsf.
SANDY lean CLAY (CL); stiff; medium brown; moist; trace GRAVEL; about 40% fine SAND; about 60% low plasticity fines; shells at 41 ft; depositional transition; sand grain size increasing with depth; PP=1.5 tsf.
Lean CLAY with SAND (CL); stiff; medium brown; moist; about 20% fine SAND; about 80% medium plasticity fines; PP=1.5-2.25 tsf.
-very stiff; PP=2.5 tsf.
PP=3.75 tsf.
-stiff; PP=2.5 tsf.
Lean CLAY (CL); hard; medium brown; moist; trace fine SAND; medium plasticity fines; PP=>4.5 tsf.
SANDY lean CLAY (CL); very stiff; medium brown; moist; about 40% fine SAND; about 60% low to medium plasticity fines; PP=3.5 tsf.
-about 50% fine sand; about 50% medium plasticity fines; PP=2.0 tsf.

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880			

Lino Cheang — CERTIFIED ENGINEERING GEOLOGIST — 6/25/12 DATE

RETAINING WALL No. 17

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-

Sheet	of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 4 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
8-3-11	1-30-12	3-30-12	6-25-12	47	51

BENCH MARK:

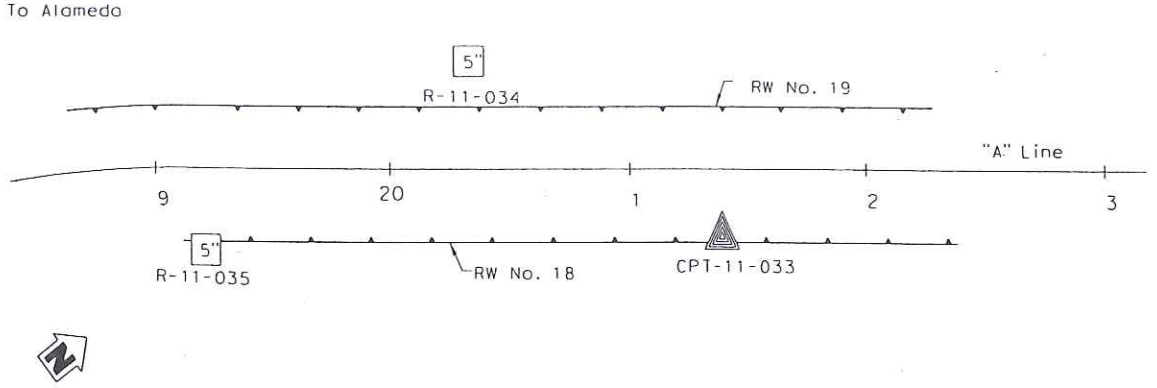
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

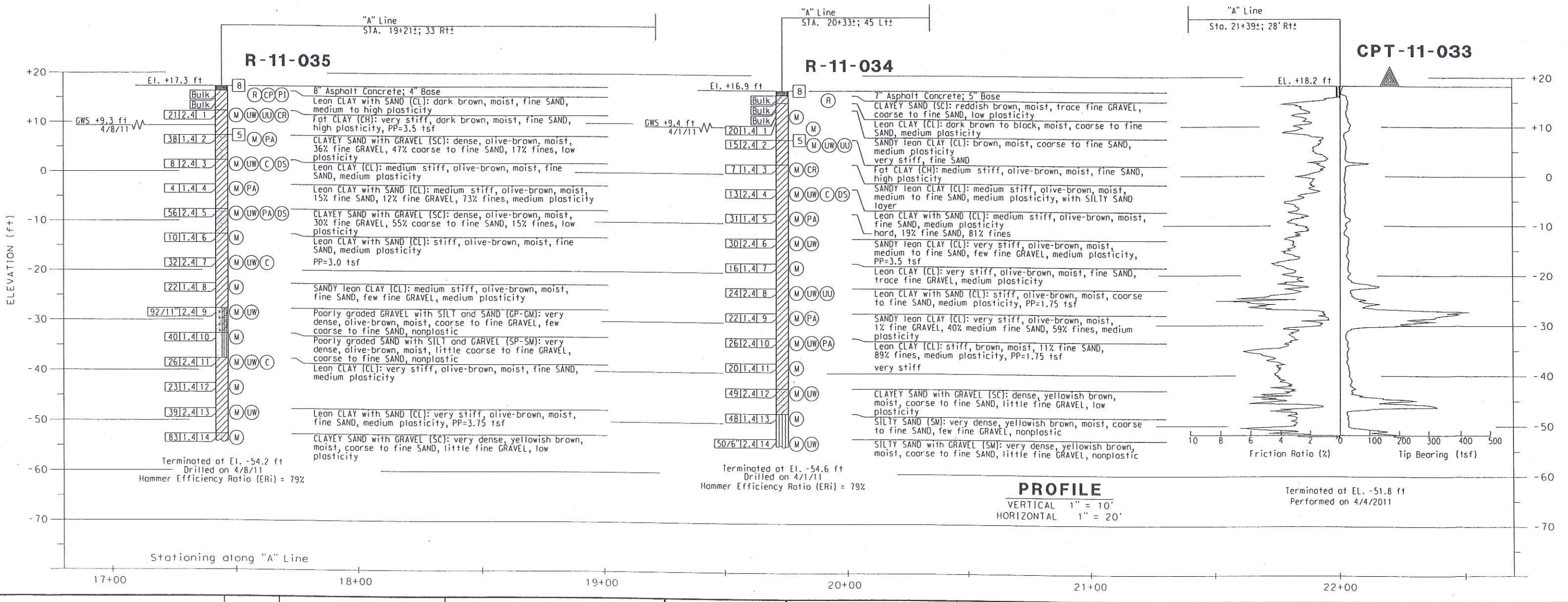
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO.	RETAINING WALL No. 18 and 19
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 2
GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)			ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES / SHEET / OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

Philip J Meyand — 6/25/12
REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meyand — No. 2596 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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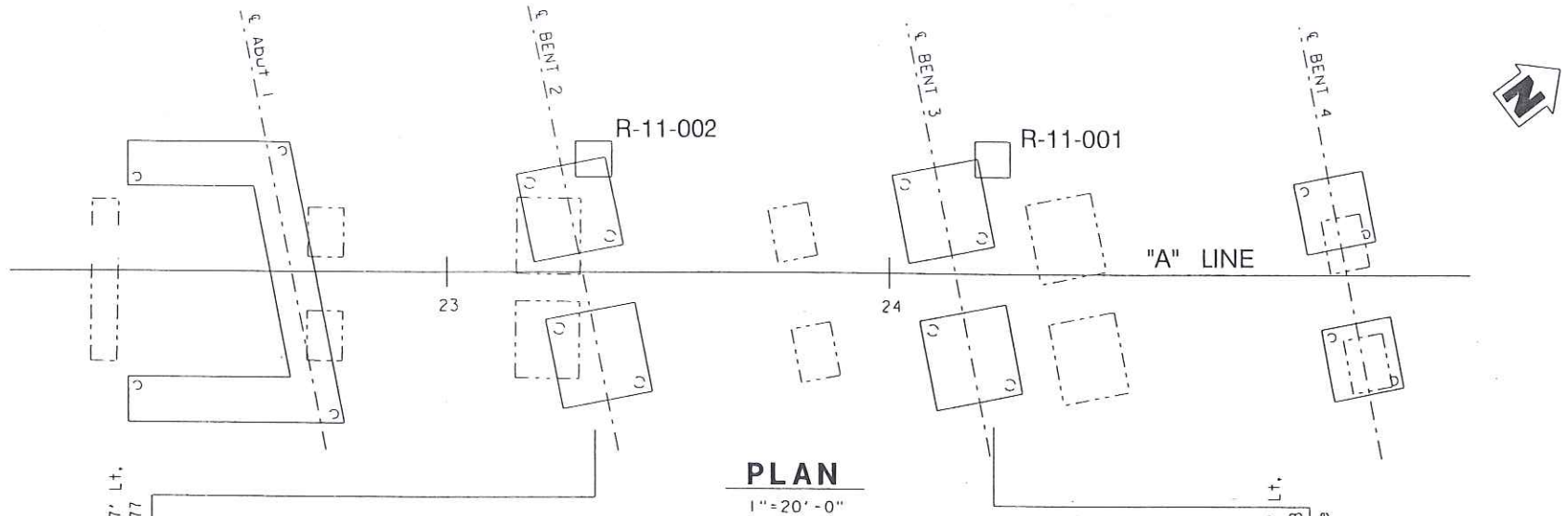
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

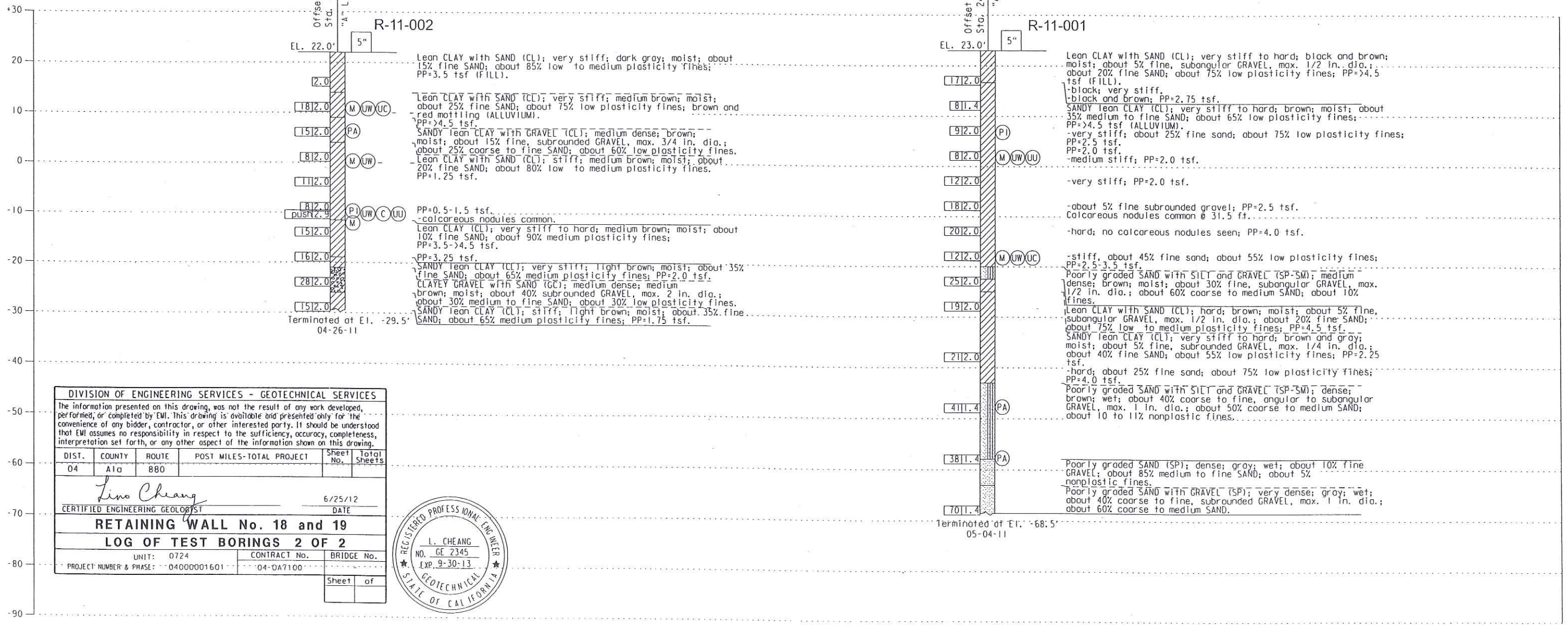
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

Lino Cheang — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

RETAINING WALL No. 18 and 19

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	
		Sheet / of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI FIELD INVESTIGATION BY:		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser PROJECT ENGINEER	BRIDGE NO. 33-0751
SIGN OFF DATE	CHECKED BY	C. TSAI	DATE: 04-25-11 TO 05-04-11				POST MILES 28.69

29TH AVENUE OC (REPLACE)

LOG OF TEST BORINGS 4 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
8-1-11	1-30-12	2-29-12	4-25-12	55	60

BENCH MARK:

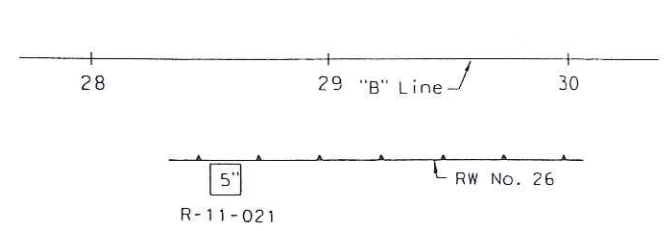
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

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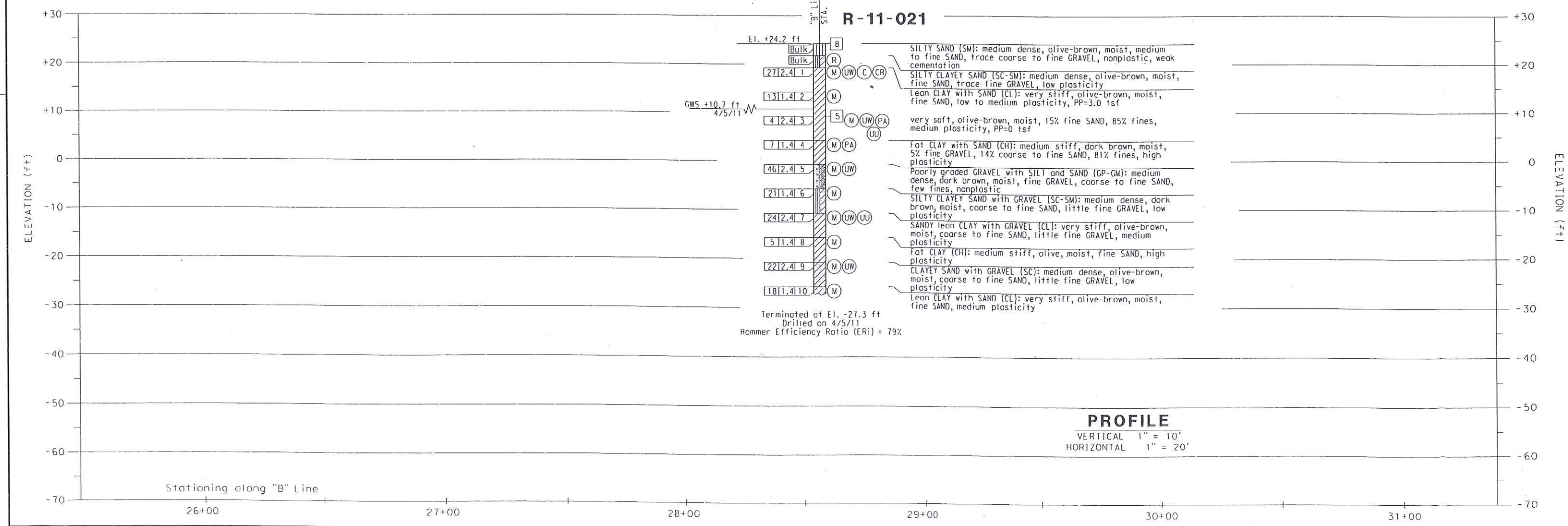
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 26
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORING 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880			

Lino Cheang — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

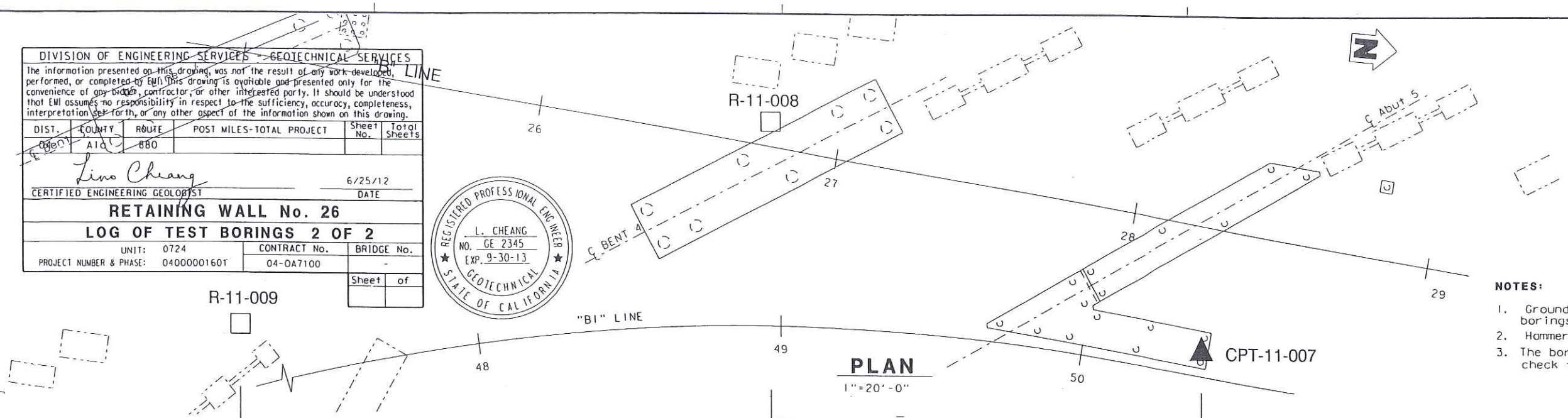
RETAINING WALL No. 26

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-

Sheet ___ of ___

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA



PLAN
1"=20'-0"

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala.			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 3/30/12 DATE

PLANS APPROVAL DATE

Philip Meymand — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
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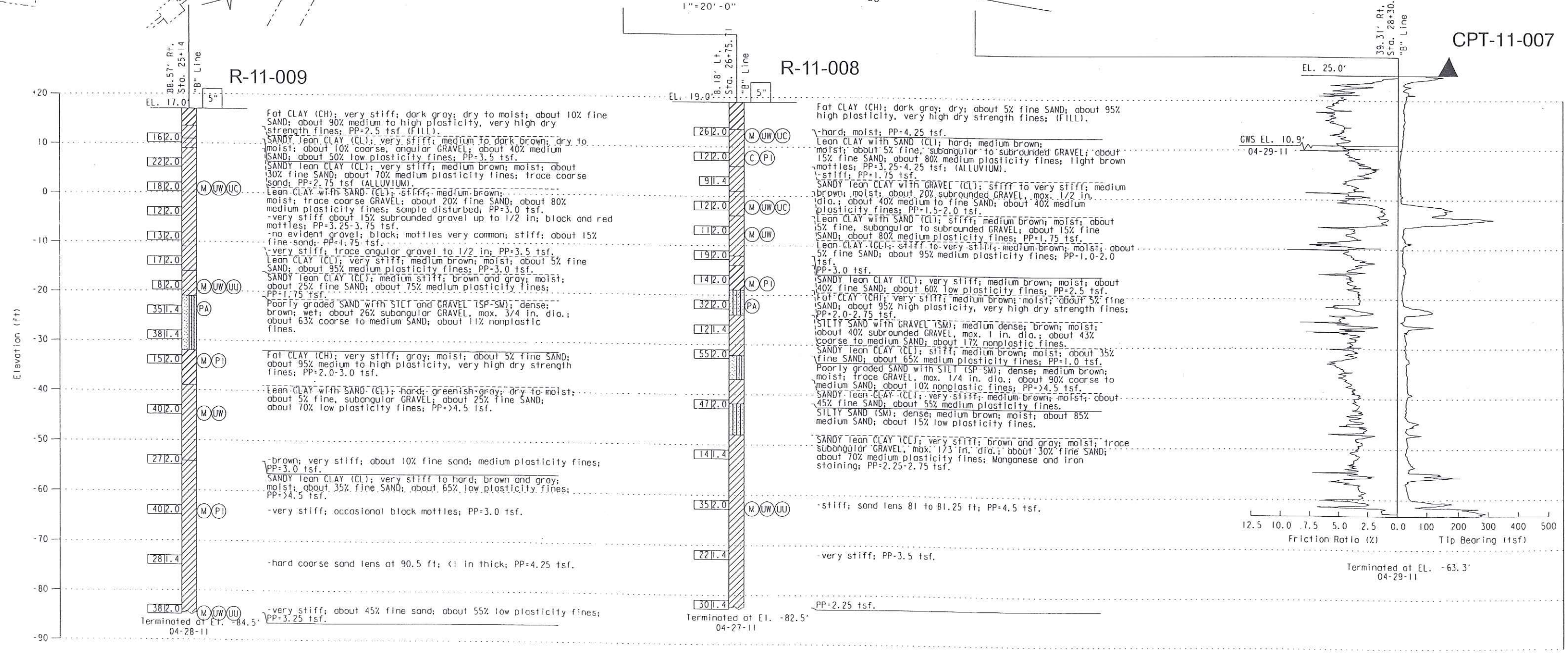


DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser	BRIDGE NO. 33-0753	23RD AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95	LOG OF TEST BORINGS 5 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
8-8-11	1-18-12	3-30-12	6-25-12	48	51

BENCH MARK:

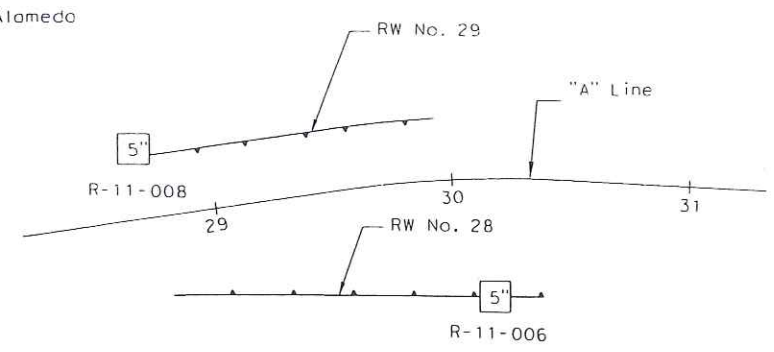
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET,
56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

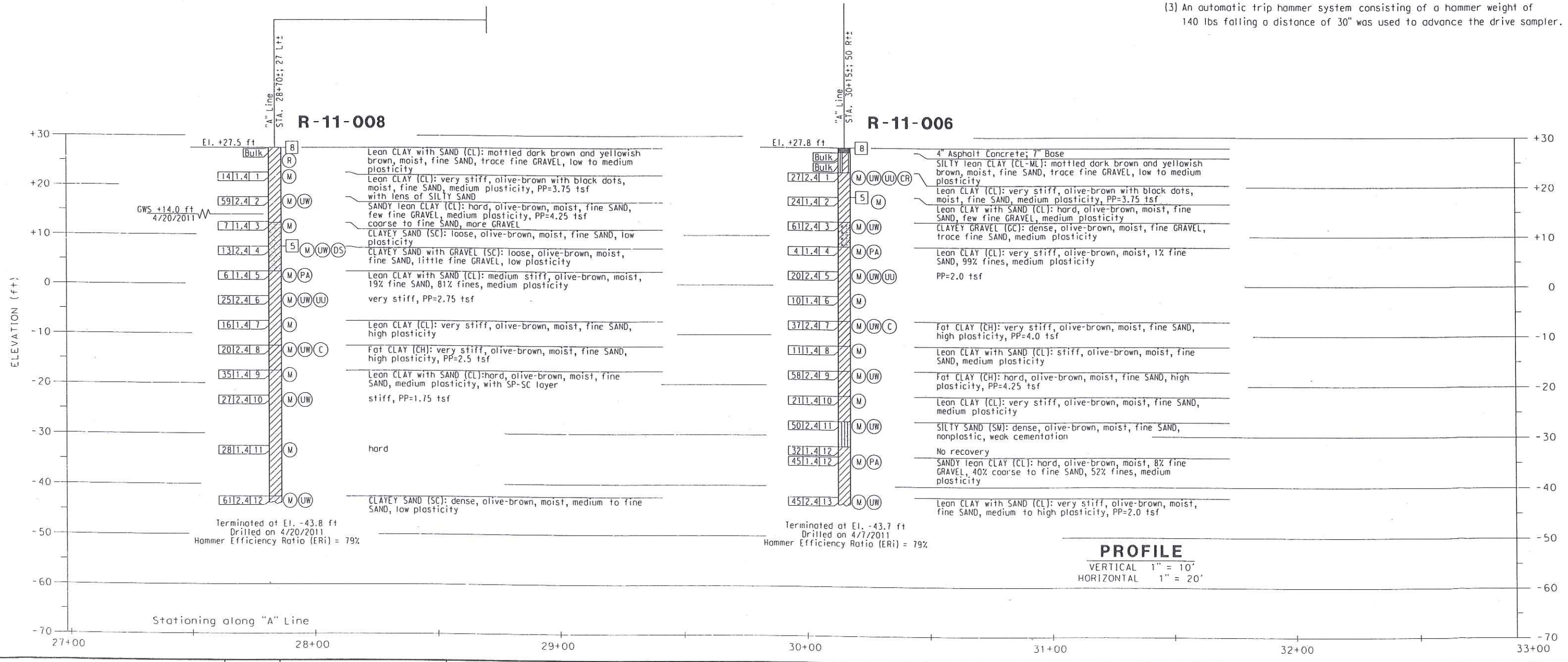
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fong	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	RETAINING WALL No. 28 and 29
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Alo			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 6/25/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymand — No. 2596 — EXP. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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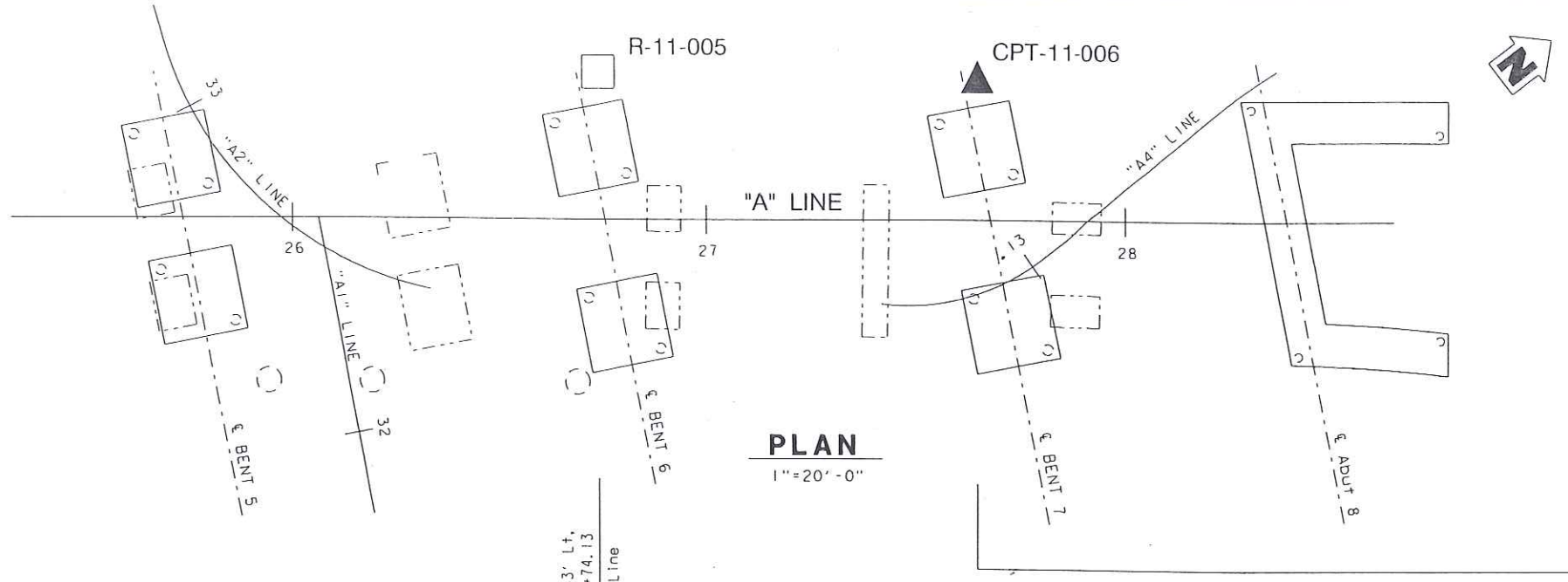
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

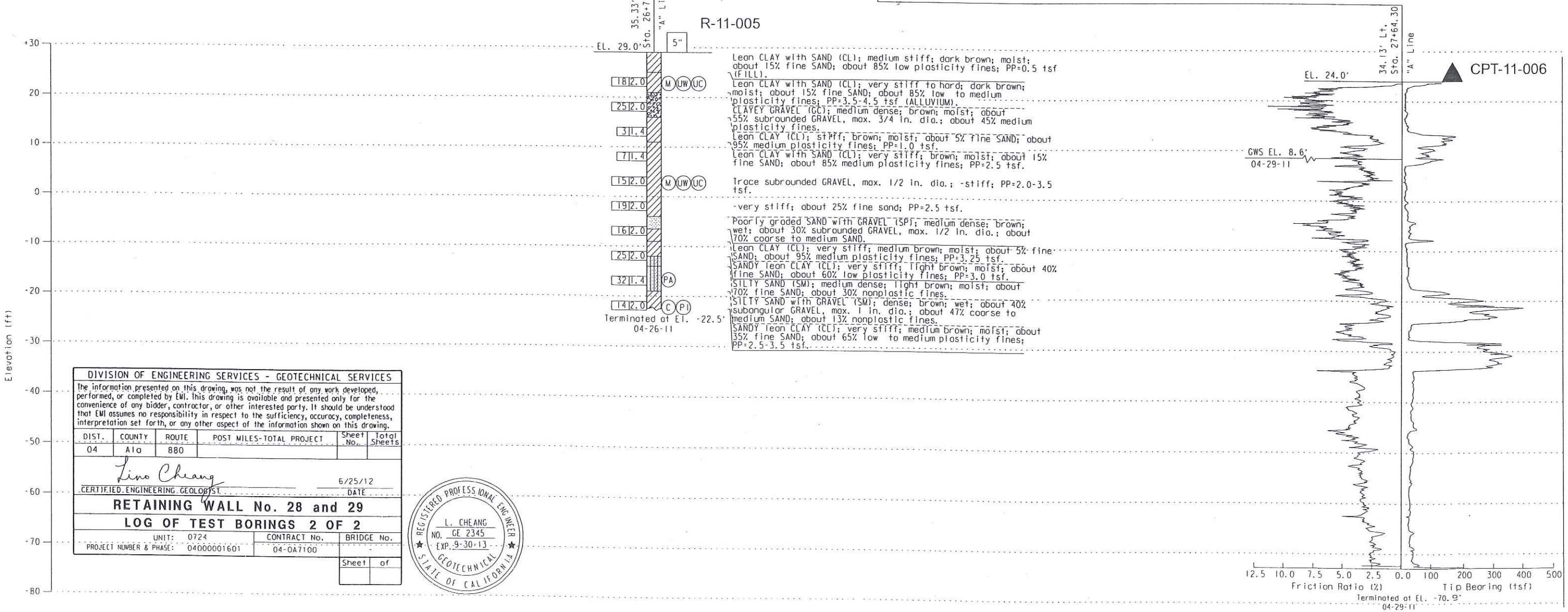
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Alo	880			

Lino Cheang — CERTIFIED ENGINEERING GEOLOGIST — 6/25/12 DATE

RETAINING WALL No. 28 and 29

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-
		Sheet / of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jon Hueser PROJECT ENGINEER	BRIDGE NO. 33-0751	29TH AVENUE OC (REPLACE)
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11			POST MILES 28.69	LOG OF TEST BORINGS 5 OF 9

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
5-11-11	1-30-12	3-20-12	6-25-12	56	60

PLOT PLOTTED ON 6/25/12

BENCH MARK:

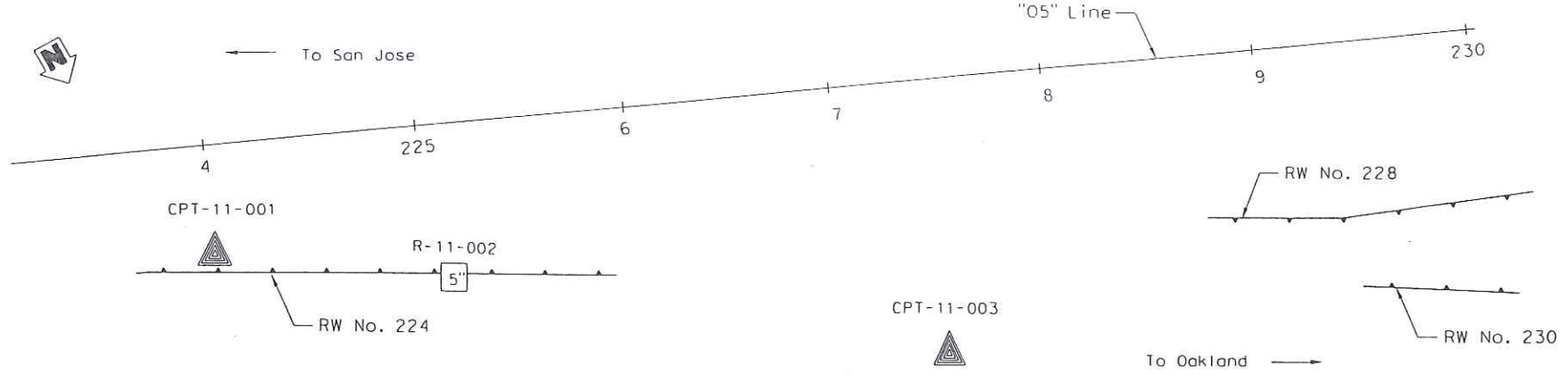
DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

DESIGNATION: ALA13 ELEV=15.318
FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

DESIGNATION: KA121 ELEV=15.768
FOUND 1 INCH IRON PIPE WITH RED PLASTIC PLUG AND TACK STAMPED "CALTRANS" ALONG THE EAST SIDE OF OAKPORT STREET ABOUT 230 FEET SOUTH OF THE SOUTH SIDE OF HIGH STREET, ACROSS FROM 4401 OAKPORT STREET, 6.92 FEET NORTH OF THE FLOWLINE OF THE CURB.



PLAN
1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/27/12

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

L. CHEANG NO. GE 2345 EXP. 9-30-13 GEOTECHNICAL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

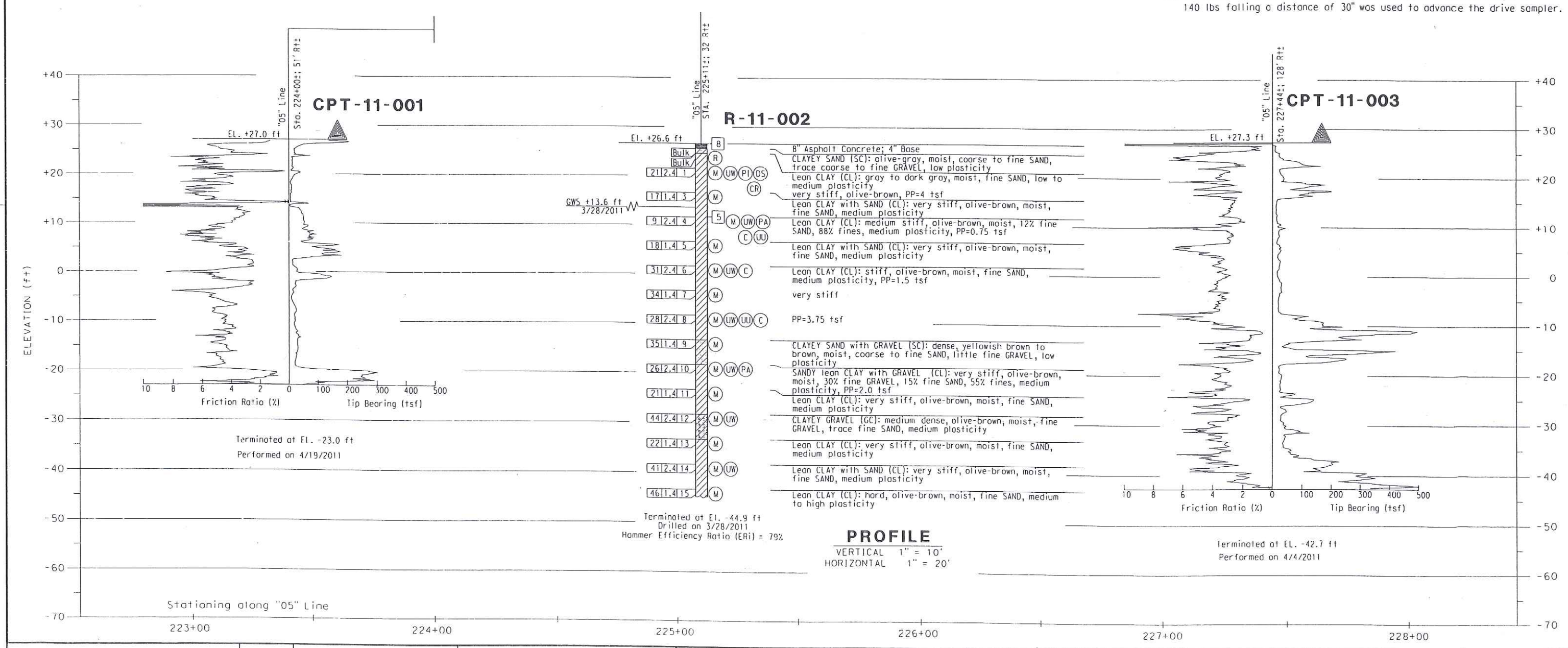
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011			POST MILES Varies

RETAINING WALL No. 224, 228 and 230

LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880			

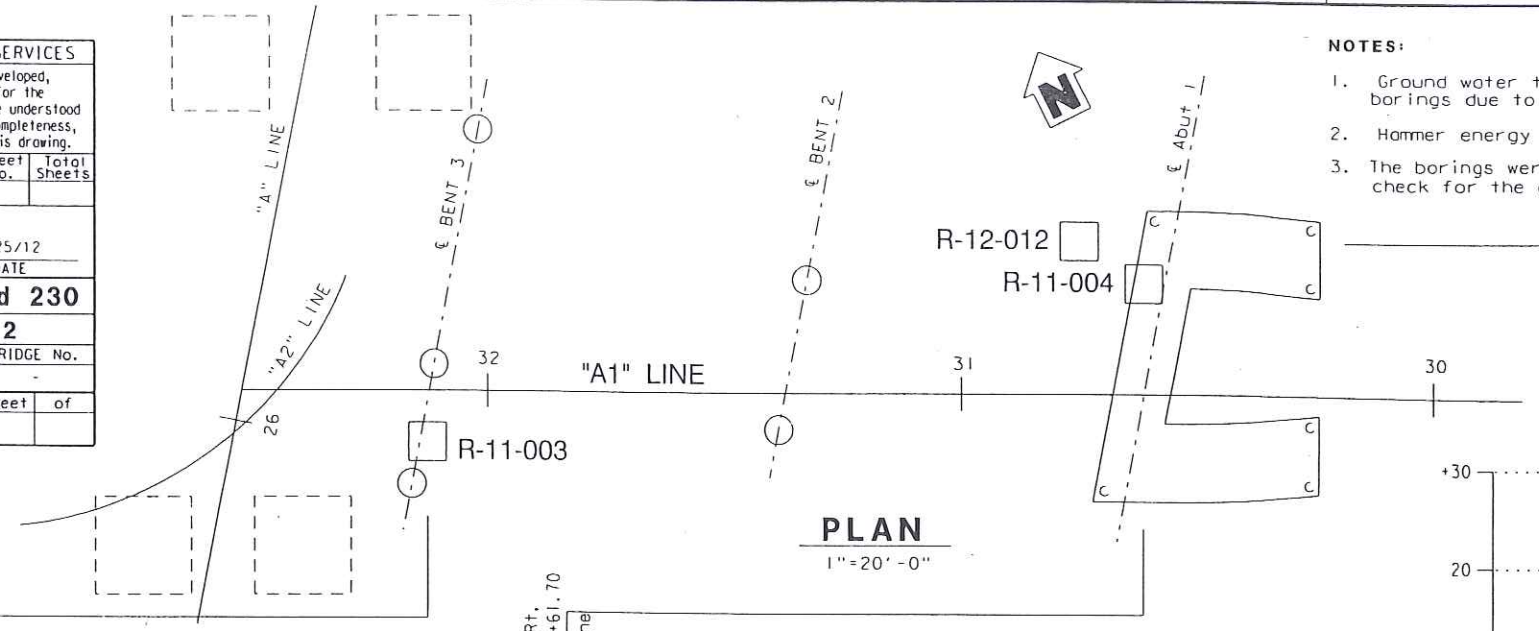
Lino Cheang — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

RETAINING WALL No. 224, 228 and 230

LOG OF TEST BORINGS 2 OF 2

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-
	Sheet	of

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	Ala			

Philip J Meymaris — 6/25/12
REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Philip Meymaris — No. 2596 — Exp. 6/30/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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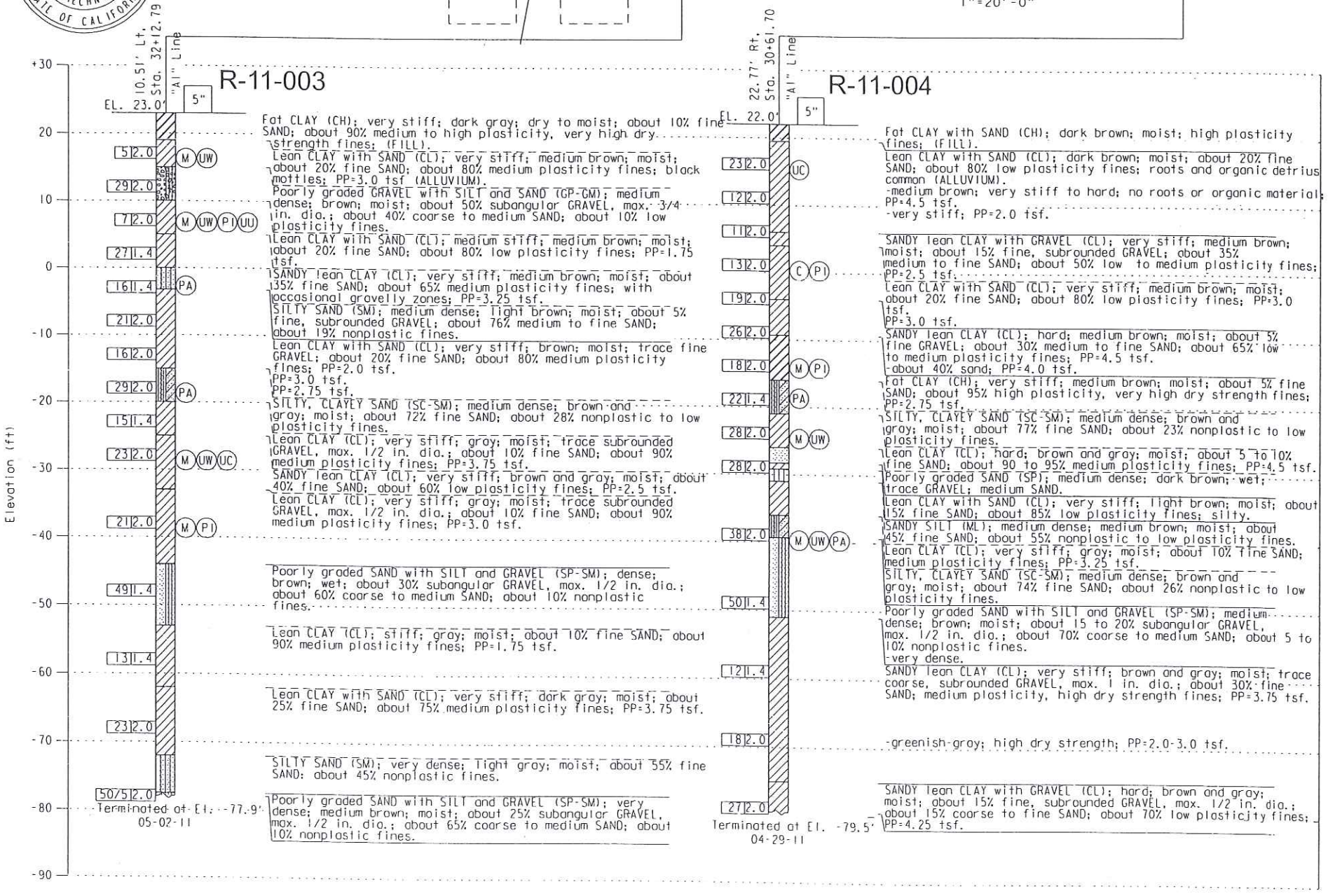
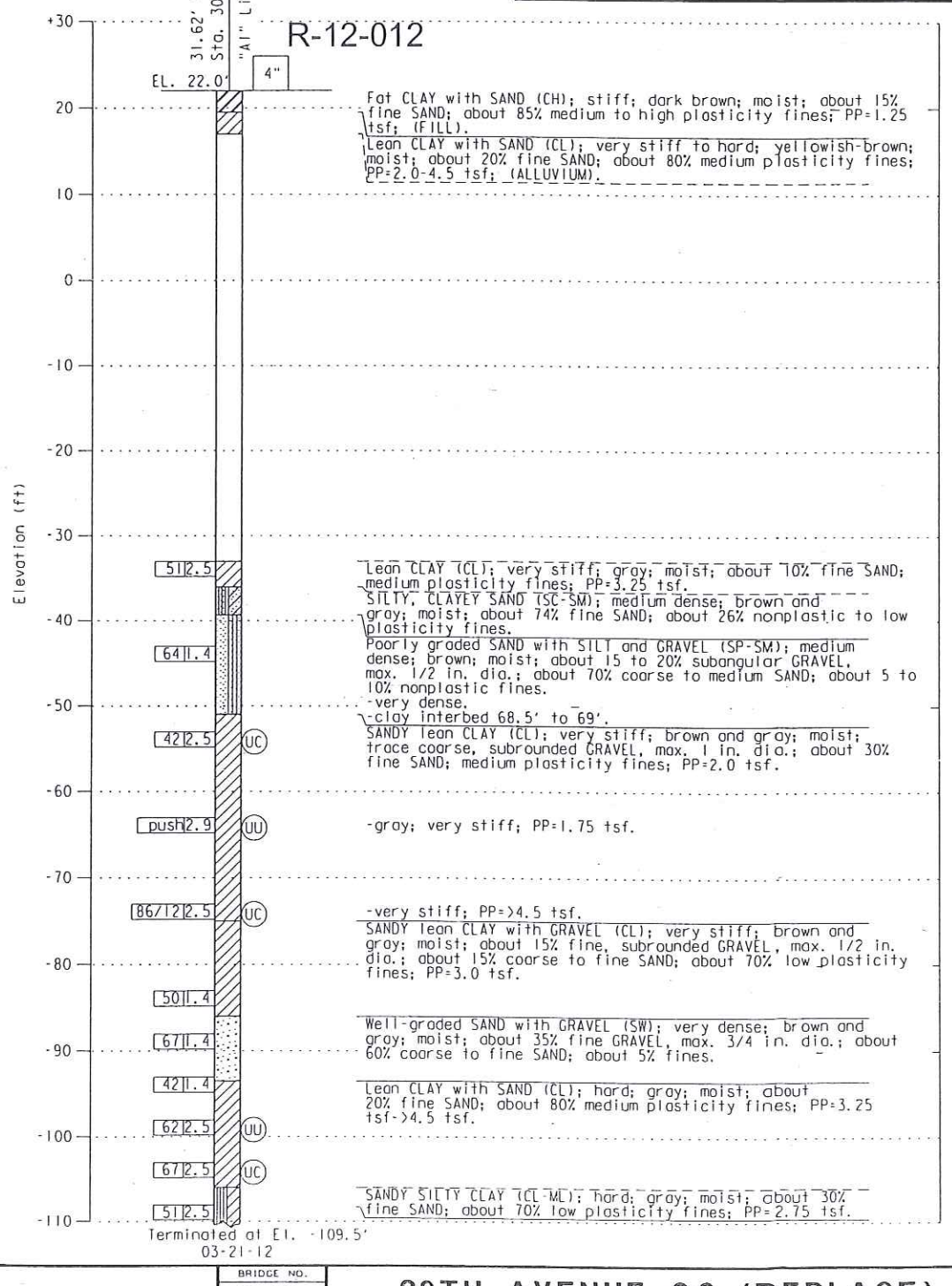
ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612





DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

Jan Hueser — PROJECT ENGINEER

BRIDGE NO.	33-0751
POST MILES	28.69

29TH AVENUE OC (REPLACE)

LOG OF TEST BORINGS 6 OF 9

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
3-1-11	1-30-12	3-30-12	6-25-12	57	60

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
FOUND BRASS DISK STAMPED "ALA8" IN THE SIDEWALK AT THE WEST CORNER OF EAST 8TH STREET AND 5TH AVENUE.

DESIGNATION: ALA7 ELEV=15.591
FOUND BRASS DISK STAMPED "ALA7" IN THE SIDEWALK AT THE WEST SIDE OF 7TH STREET ALONG THE NORTH SIDE OF LAKE MERRITT CHANNEL.

DESIGNATION: 8TH/37TH ELEV=20.262
FOUND A CITY OF OAKLAND PIN IN CONCRETE IN A MONUMENT WELL AT THE INTERSECTION OF EAST 8TH STREET AND 37TH AVENUE.

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FOUND BRASS DISK STAMPED "ALA13" INSIDE A 1 INCH IRON PIPE WITH A CONCRETE COLLAR 24.6 FEET NORTH OF THE NORTH SIDE OF HIGH STREET, 56 FEET WEST OF THE WEST SIDE OF THE OFFRAMP FROM SOUTHBOUND STATE ROUTE 880 AND 4.99 FEET SOUTH OF THE SOUTH RAIL OF THE RAILROAD TRACKS.

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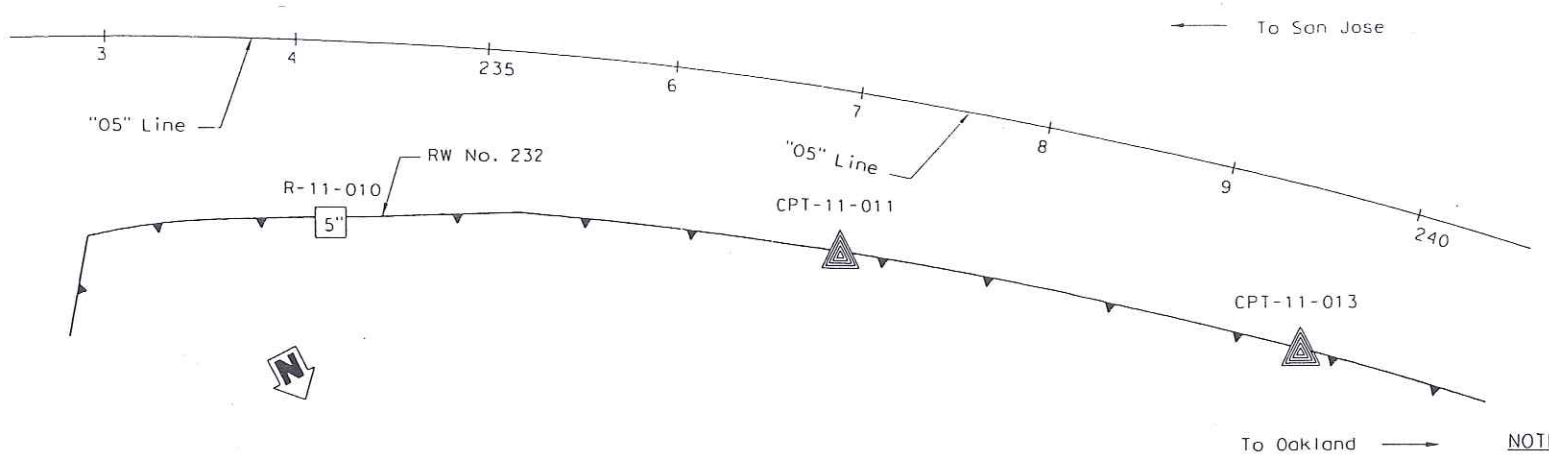

PLAN

1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/15/11

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

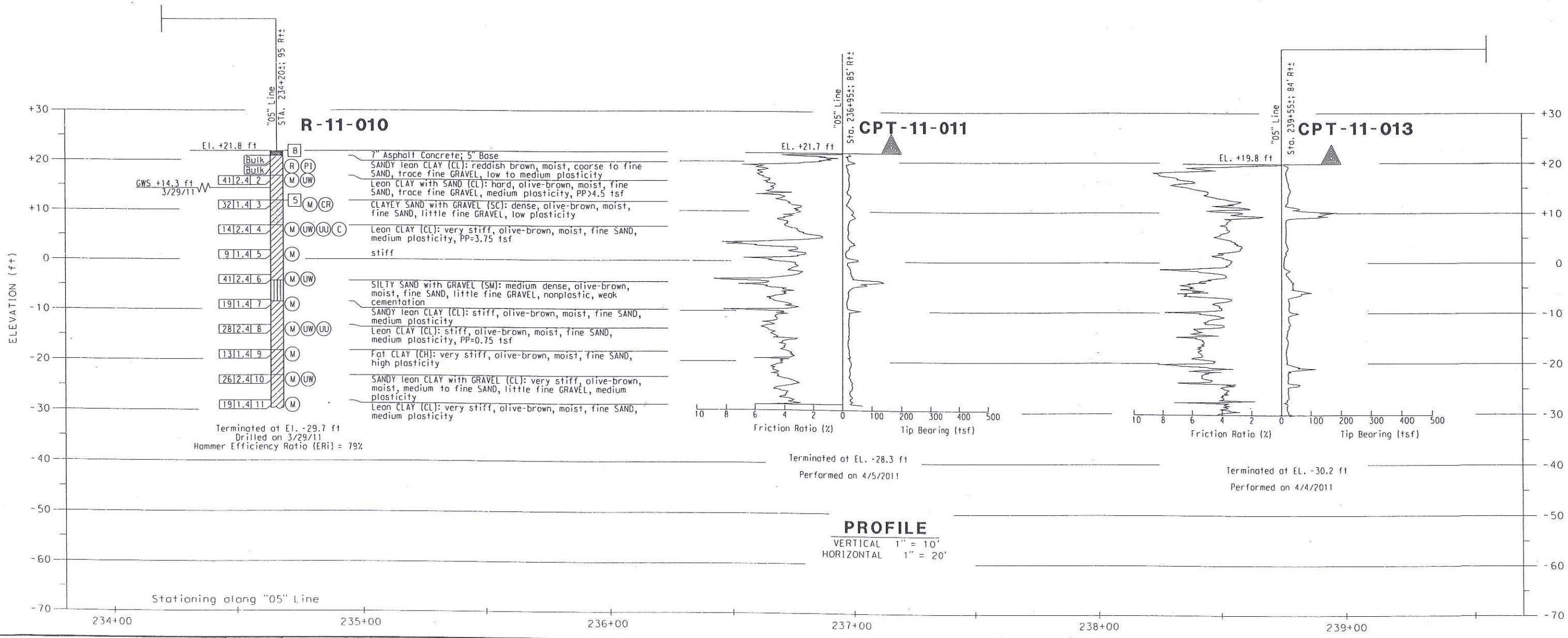
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO. -	RETAINING WALL No. 232
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		L. Cheang PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 3
GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3	UNIT: 0724 PROJECT NUMBER & PHASE: 04000001601	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES / SHEET / OF

BENCH MARK:

DESIGNATION: ALA8 ELEV=14.521
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DESIGNATION: KA121 ELEV=15.768
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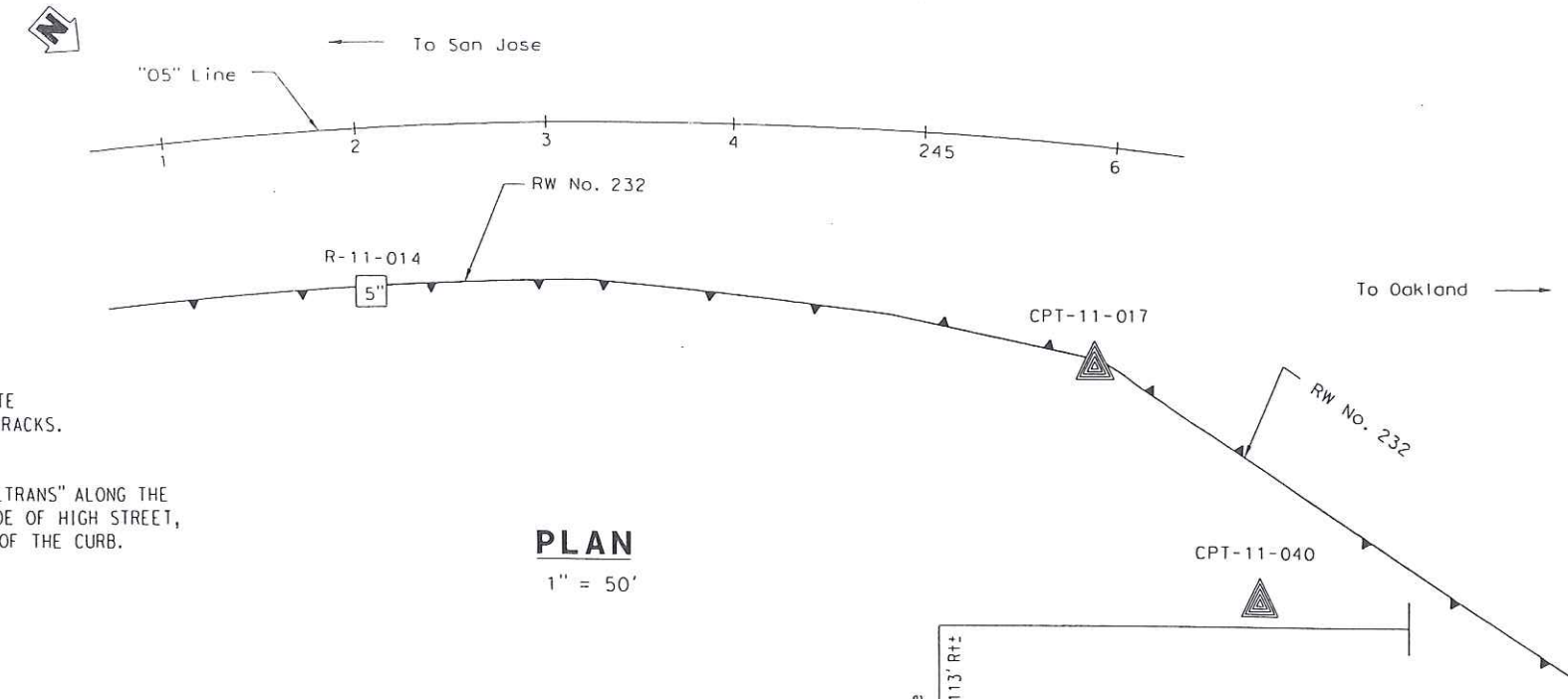

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/25/12

L. CHEANG NO. GE 2345 EXP. 9-30-13 GEOTECHNICAL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

NOTES:

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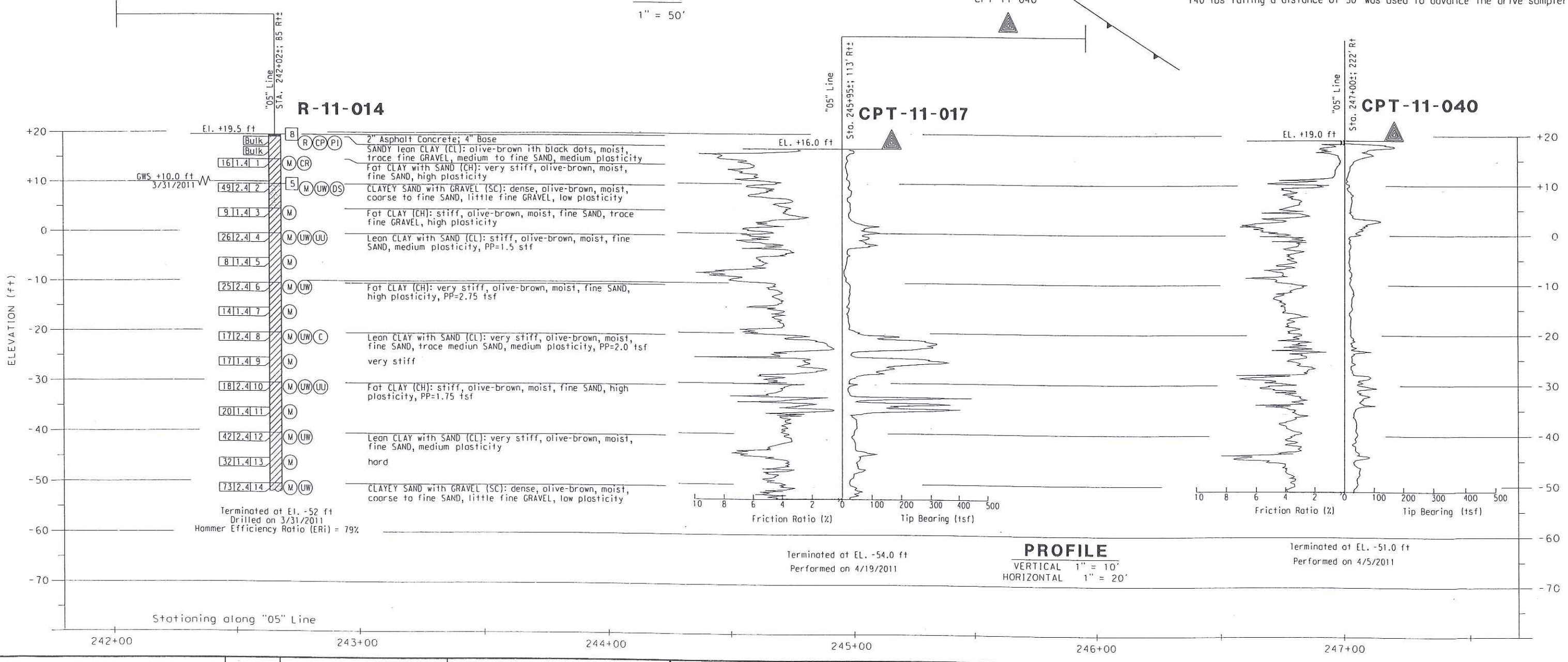

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. Fang	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L.Cheang	BRIDGE NO. -	RETAINING WALL No. 232
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 2 OF 3

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880			

Lino Cheang — 6/25/12
CERTIFIED ENGINEERING GEOLOGIST — DATE

RETAINING WALL No. 232

LOG OF TEST BORINGS 3 OF 3

UNIT: 0724	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04000001601	04-0A7100	-

Sheet ___ of ___

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	880	A10			

Philip J. Meymand — REGISTERED CIVIL ENGINEER — 3/30/12 DATE

PLANS APPROVAL DATE

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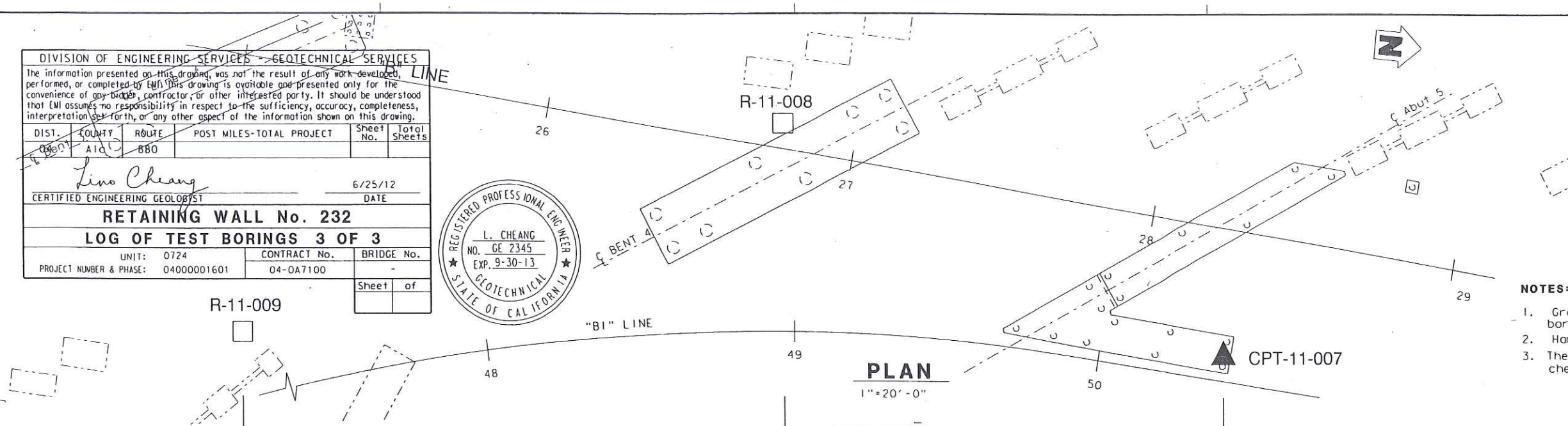
Philip Meymand — No. 2596 — Exp. 6/30/13 — REGISTERED PROFESSIONAL ENGINEER — GEOTECHNICAL — STATE OF CALIFORNIA

ALAMEDA COUNTY TRANSPORTATION
1333 BROADWAY
OAKLAND, CA 94612

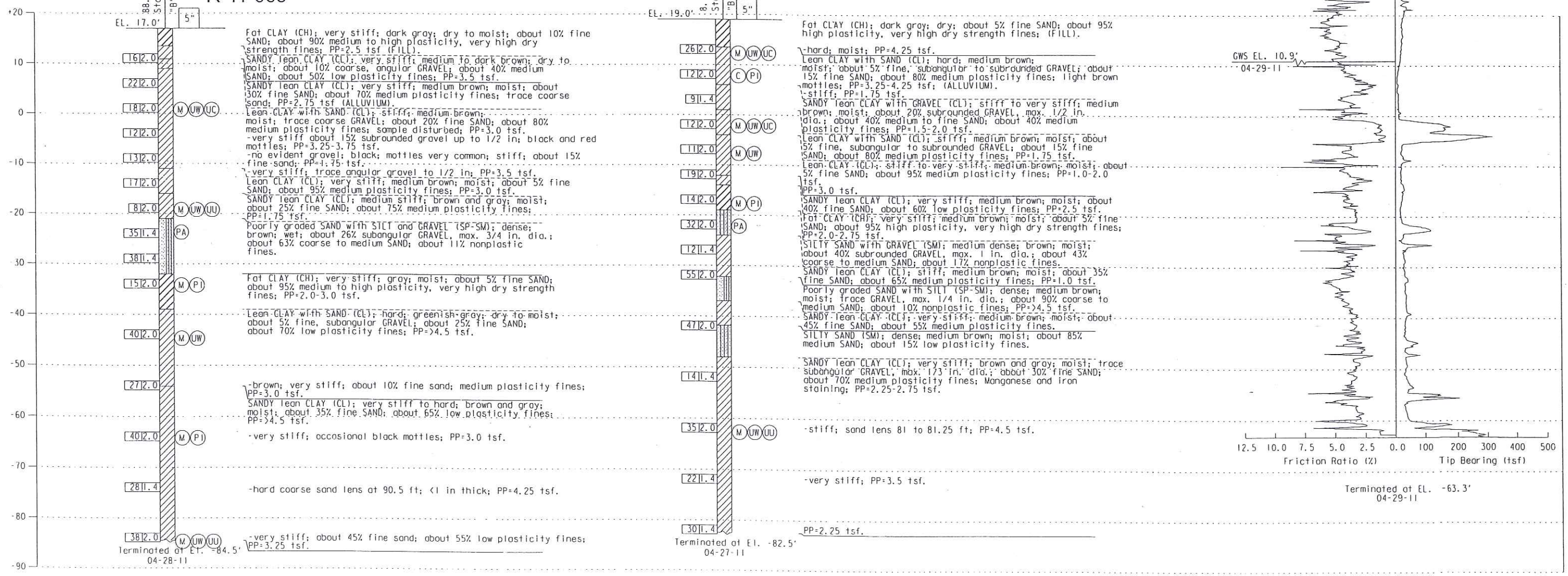
URS CORPORATION
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612



PLAN
1"=20'-0"

NOTES:

1. Ground water table was not measured in the borings due to rotary wash drilling.
2. Hammer energy ratio calibration not performed.
3. The borings were hand augered in the top 5 ft to check for the existence of underground utilities.



DESIGN OVERSIGHT	DRAWN BY	N. HUTTON	S. JANOWSKI	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jan Hueser	BRIDGE NO. 33-0753
SIGN OFF DATE	CHECKED BY	C. TSAI	FIELD INVESTIGATION BY: DATE: 04-25-11 TO 05-04-11		PROJECT ENGINEER	POST MILES 28.95

23RD AVENUE OC (REPLACE)

LOG OF TEST BORINGS 5 OF 8

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0724
PROJECT NUMBER & PHASE: 04000001601 CONTRACT NO.: 04-0A7101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
5-1-11	1-10-12	3-30-12	6-25-12	48	51

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Alc	880	28.4/29.2		

REGISTERED ENGINEER — DATE 4/25/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

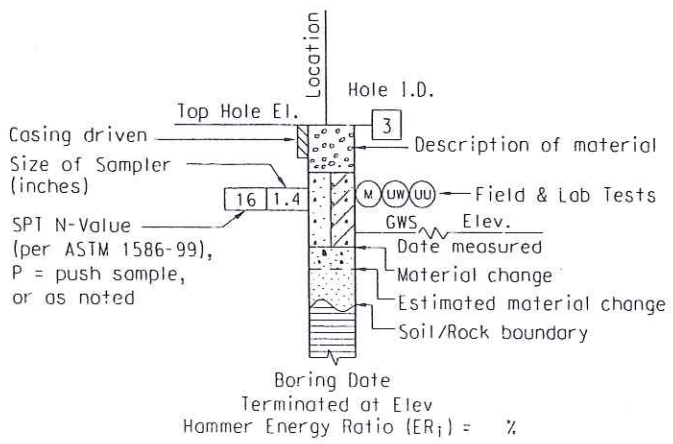
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R	Rotary drilled boring (conventional)
	RW	Rotary drilled with self-casing wire-line
	RC	Rotary core with continuously-sampled, self-casing wire-line
	P	Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD	Hand driven (1-inch soil tube)
	HA	Hand Auger
	D	Dynamic Cone Penetration Boring
	CPT	Cone Penetration Test (ASTM D 5778)
	O	Other (note on LOTB)

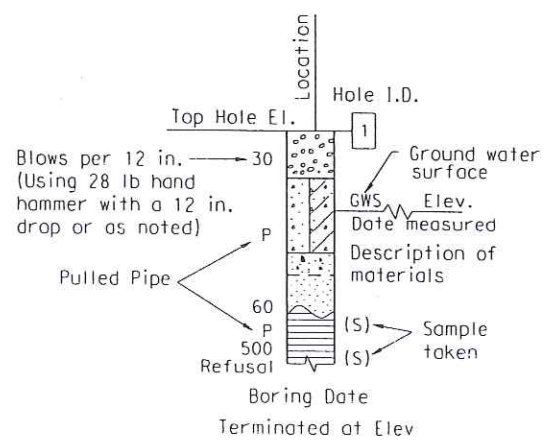
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

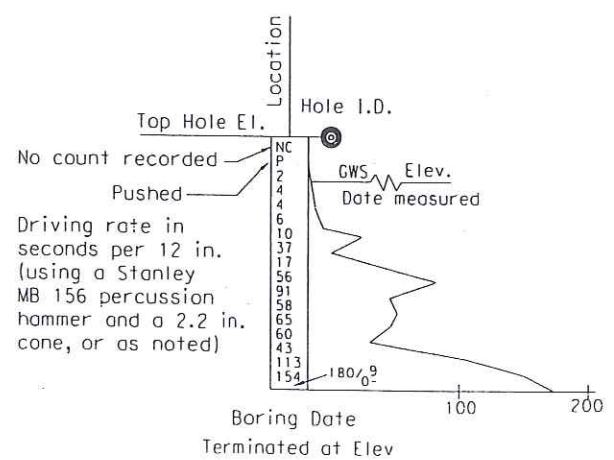
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



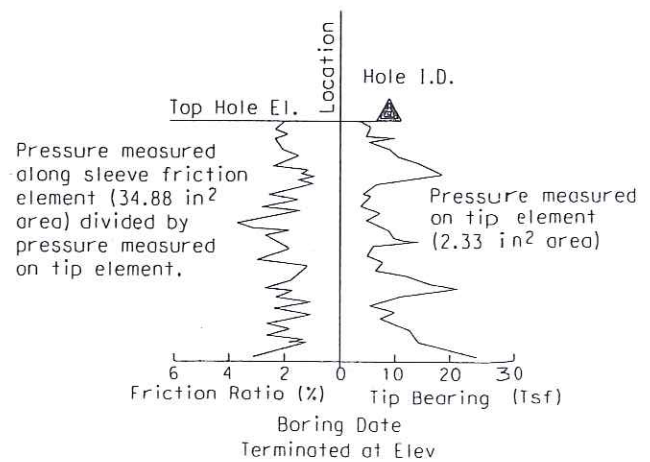
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	J. Fong	K. Thant	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	L. Cheang	BRIDGE NO. -	SOIL LEGEND
SIGN OFF DATE	CHECKED BY	G. J. Gunaranjan	FIELD INVESTIGATION BY: DATE: 3/2011, 4/2011		PROJECT ENGINEER	POST MILES Varies	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 0247 PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL		
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	28.4/29.2		

REGISTERED ENGINEER — DATE 6/15/11

REGISTERED PROFESSIONAL ENGINEER — L. CHEANG — NO. GE 2345 — EXP. 9-30-13 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ALAMEDA COUNTY TRANSPORTATION COMMISSION
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

DESIGN OVERSIGHT — SIGN OFF DATE

DRAWN BY: J. Fang — CHECKED BY: G. J. Gunaranjan

K. Thant — FIELD INVESTIGATION BY: — DATE: 3/2011, 4/2011

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

L. Cheang — PROJECT ENGINEER

BRIDGE NO. -

POST MILES Varies

UNIT: 0247
PROJECT NUMBER & PHASE: 04000001601

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES

SHEET OF

SOIL LEGEND
LOG OF TEST BORINGS 2 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

Grade Elevation	+27.3 ft				
Boring Depth	25.0 ft	Driller	SoCal Drilling	SHEET 1 OF 1	
Borehole Diameter	8 inches	Type of Rig	Mud Rotary	Comments	
Date Drilled	04-21-10	Drive Wt.	140-lb		
Logged By	P. F. Chan	Drop	30 inches		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	1			SILTY SAND (SM): dark olive-brown, moist, mostly medium to fine, little fines			R,CP
5	D	2	20		Poorly graded SAND (SP): loose, light olive-gray, moist, mostly coarse to fine SAND, slightly compact when handled	14	106	DS
	S	3	20		Poorly graded SAND with SILT and GRAVEL (SP-SM): light olive-gray, moist, little GRAVEL, mostly coarse to fine SAND, few fines, compact	35	-	PA
10								
15	D	4	40			24	108	

1. 'Sample Type' – Graphical representation of sample type as shown below.
   - S: Split Spoon – Standard Penetration Test Sample (SPT)
   - D: Drive Sample – California Drive Sampler
   - B: Bulk Sample – Obtained by collecting cuttings in a plastic bag
   - T: Tube Sample – Thin-walled Tube Sample
   - P: Thin-walled Pitcher Core Sample

2. 'Sample' – Sample Number

3. 'Blows/foot' – Number of blows required to advance sampler one foot (unless a distance is specified). Samplers in general were driven into the soil at the bottom of the hole with a 140-lb automatic trip hammer falling a standard 30 inches (as specified in header).

   'REC/RQD' – Sample Core Recovery (REC) in percent (%) and Rock Quality Designation (RQD) in percent (%). RQD is defined as the percentage of core in each run in which the spacing between natural fractures is greater than 4 inches. Mechanical breaks of the core are not considered.

4. 'Graphic Log' – Standard symbols for soil and rock types, as shown in Note B opposite

5. ▼ Groundwater elevation while drilling.

6. 'Geotechnical Description' (See also Note A, opposite).
   Soil – Soil classifications are in general accordance with the American Society for Testing and Materials (ASTM) D2488.84. Designations include consistency, moisture, and color. Field description have been modified to reflect results of laboratory analyses where deemed appropriate.

   Rock – Rock classifications generally include a rock type, color, moisture, mineral constituents, degree of weathering, alteration and the mechanical properties of the rock.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

EMI Project No.: 10-133 | Date: 8-15-11

LEGEND FOR LETTER-SIZE GEOTECHNICAL BORING LOGS (SHEET 1 OF 2)

7. 'Moisture Content' and 'Total Unit Weight' determined by laboratory testing.

8. 'Tests/Results' – Identify types of laboratory tests performed on samples collected from the field investigation. Abbreviations of tests are provided below:

C	Consolidation (ASTM D 2435)	P	Permeability (CTM 220)	SG	Specific Gravity (AASHTO T 100)
CL	Collapse Potential (ASTM D 5333)	PA	Particle Size Analysis (ASTM D 422)	SL	Shrinkage Limit (ASTM D 427)
CP	Compaction Curve (CTM 216)	PI	Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)	SW	Swell Potential (ASTM D 4546)
CR	Corrosivity Testing (CTM 643, CTM 422, CTM 417)	PL	Point Load Index (ASTM D 5731)	TV	Pocket Torvane
CU	Consolidated Undrained Triaxial (ASTM D 4767)	PM	Pressure Meter	UC	Unconfined Compression–Soil (ASTM D 2166) Unconfined Compression–Rock (ASTM D 2938)
DS	Direct Shear (ASTM D 3080)	PP	Pocket Penetrometer	UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
EI	Expansion Index (ASTM D 4829)	R	R–Value (CTM 301)	UW	Unit Weight (ASTM D 4767)
M	Moisture Content (ASTM D 2216)	SE	Sand Equivalent (CTM 217)	VS	Vane Shear (AASHTO T 223)
OC	Organic Content–% (ASTM D 2974)				

Criteria for Describing Moisture Condition

Description	Criteria (After ASTM D 2488)
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

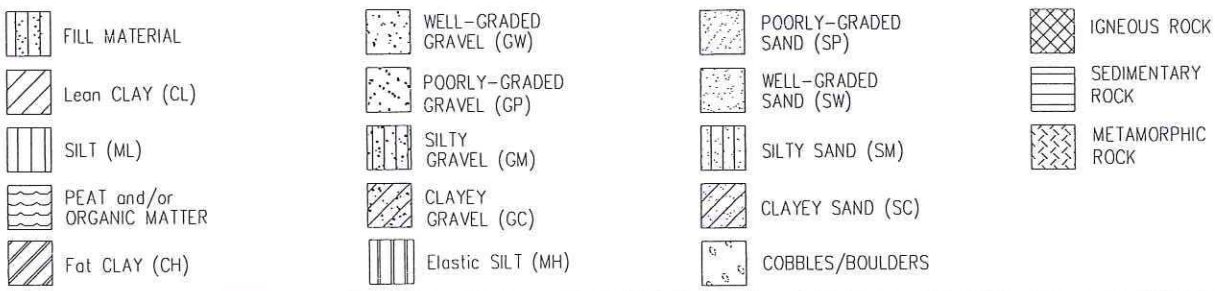
Relative Density of Coarse–Grained Soil

Blows/foot	Relative Density	Field Test (After Sowers, 1979)
0 – 4	Very Loose	Easily penetrated 12" with 0.5–inch steel rod pushed by hand
5 – 10	Loose	Easily penetrated with 0.5–inch steel rod pushed by hand
11 – 30	Medium Dense	Easily penetrated with 0.5–inch steel rod driven by 5–lb hammer
31 – 50	Dense	Penetrated a foot with 0.5–inch steel rod driven by 5–lb hammer
> 50	Very Dense	Penetrated a few inches with 0.5–inch steel rod driven by 5–lb hammer

Consistency of Cohesive Soils

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

Legend of Earth Materials



Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I–880 Operational and Safety Improvement

EMI Project No.: 10–133 | Date: 8–15–11

LEGEND FOR LETTER–SIZE GEOTECHNICAL BORING LOGS (SHEET 2 OF 2)

LOG OF BORING NO. HA-11-004

Grade Elevation:	+22.5 ft			
Boring Depth:	5.0 feet	Driller:	EMI	SHEET 1 OF 1
Borehole Diameter:	3.5"	Type of Rig:	Hand Auger	
Date Drilled:	4-20-11	Drive Wt. (lbs):	-	
Logged By:	KT	Drop (inches):	-	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			Lean CLAY with SAND (CL): dark brown, moist, fine SAND			PI,R,CP
5					Terminated Boring at 5.0 ft depth. Groundwater not encountered.			
10								
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-005

Grade Elevation:	+24.8 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-7-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY with GRAVEL (CL): very dark grayish brown, moist, little subangular fine GRAVEL, coarse to fine SAND, medium plasticity fines			
	B	1			SANDY lean CLAY (CL): very dark grayish brown, moist, trace subangular fine GRAVEL, coarse to fine SAND, medium plasticity fines			R, CP
5	S	2	8		stiff, olive-brown	-	-	
	B	3						
10	D	4	39		CLAYEY SAND with GRAVEL (SC): medium dense, brown, moist, little subangular fine GRAVEL, coarse to fine SAND, medium to high plasticity fines	-	-	
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-11-007

Grade Elevation:	+30.0 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SILTY SAND (SM): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	1			Lean CLAY with SAND (CL): dark gray to black, moist, fine SAND, medium to high plasticity			R
5	S	1	16		very stiff, olive-brown			
	B	2						
10	D	3	23		SANDY lean CLAY (CL): very stiff, olive-brown to yellowish brown mottled dark brown spots, moist, fine SAND, medium to high plasticity, PP=3.5 tsf			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-016

Grade Elevation:	+16.2 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-13-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					6" Asphalt, 4" Concrete, 14" Aggregate Base			
					SANDY lean CLAY (CL): brown mottled gray, moist, fine SAND, few fine GRAVEL, medium to high plasticity			
	B	0			Lean CLAY with SAND (CL): dark gray to black, moist, fine SAND, medium to high plasticity			R
5	S	1	15		very stiff, olive-brown			
	B	2						
10	D	3	26					
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-11-018

Grade Elevation:	+19.2 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					SILTY SAND (SM): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	0			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			
	B	1						
5	D	2	28		very stiff, olive-brown mottled yellowish brown, PP=3.0 tsf			
	B	3						
10	S	4	17		trace fine GRAVEL			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-11-020

Grade Elevation:	+20.2 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-13-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					0~3" Asphalt, 3"~12" Concrete			
					SANDY lean CLAY (CL): brown, moist, fine SAND, few fine GRAVEL, medium to high plasticity			
	B	0			Lean CLAY with SAND (CL): brown, moist, fine SAND, medium to high plasticity			CP,R,PI
5	D	1	28		very stiff, brown to strong brown			
	B	2						
10	S	3	7		stiff			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-022

Grade Elevation:	+17.8 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-13-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					2" Asphalt, 10" Concrete			
					CLAYEY SAND (SC): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	0			Lean CLAY with SAND (CL): brown to dark brown, moist, fine SAND, medium to high plasticity			R,PI
5	S	1	12		stiff			
	B	2						
10	D	3	7		medium stiff, mottled with reddish brown			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
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Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 Date: 8-15-11

LOG OF BORING NO. A-11-023

Grade Elevation:	+19.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SILTY SAND (SM): dark brown, moist, medium to fine SAND, few fine GRAVEL, nonplastic, weak cementation			
	B	1			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			R
5	S	2	12		stiff, olive-brown mottled yellowish brown			
10	D	3	9		medium stiff, PP=1.0 tsf			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
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Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. | Date: 8-15-11

LOG OF BORING NO. A-11-024

Grade Elevation:	+22.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			
5	S	1	12		stiff, olive-brown mottled yellowish brown			
	B	2						
10	D	3	27		very stiff, PP=2.75 tsf			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
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25								
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LOG OF BORING NO. A-11-025

Grade Elevation:	+21.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-12-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SILTY SAND with GRAVEL (SM): dark brown, moist, coarse to fine SAND, little fine GRAVEL, nonplastic, weak cementation			
	B	1			SANDY lean CLAY to Lean CLAY with SAND (CL): dark brown, moist, fine SAND, medium to high plasticity			
5	D	2	13		no recovery			
	D	2A	18		stiff			
	D	3	15		very stiff, PP=3.5 tsf			
10	S	4	23		very stiff			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
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20								
25								
30								
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Earth Mechanics, Inc.
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I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-026

Grade Elevation:	+22.4 ft				
Boring Depth:	11.5 feet	Driller:	West Coast Exploration		SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler	
Date Drilled:	4-7-11	Drive Wt. (lbs):	140		
Logged By:	GC	Drop (inches):	30		

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY (CL): very dark grayish brown, moist, medium to fine SAND, few fine GRAVEL, medium plasticity			
	B	1			coarse to fine SAND, trace concrete and brick fragments			
5	D	2	43		very stiff, very dark grayish brown to very dark brown, coarse to fine SAND			
	B	3			CLAYEY SAND (SC): medium dense, brown, moist, coarse to fine SAND, medium to low plasticity			
10	S	4	20					
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-027

Grade Elevation:	+19.5 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-18-11	Drive Wt. (lbs):	140	
Logged By:	RH	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					5" Asphalt Concrete, 7" Concrete, 8"~10" Aggregate Base			
	B	1			Lean CLAY (CL): dark olive-brown, moist, fine SAND, low to medium plasticity			R,PI
5	D	2	26		stiff			
10	S	3	12		SANDY lean CLAY (CL): stiff, dark reddish brown, moist, medium to fine SAND, few fine GRAVEL, low to medium plasticity			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
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Earth Mechanics, Inc.
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I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-11-028

Grade Elevation:	+22.6 ft			
Boring Depth:	13.0 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-7-11	Drive Wt. (lbs):	140	
Logged By:	GC	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			CLAYEY SAND (SC) to SANDY lean CLAY (CL): very dark grayish brown, moist, medium to fine SAND, few fine GRAVEL, medium plasticity			
	B	1			coarse to fine SAND			R
5	D	2	12		CLAYEY SAND (SC) to SANDY lean CLAY (CL): medium stiff, very dark grayish brown, moist, fine SAND, few fine GRAVEL, medium plasticity			
	B	3						
10	S	4	11		stiff, brown			
	S	5	11					
					Terminated Boring at 13.0 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
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LOG OF BORING NO. A-11-029

Grade Elevation:	+20.0 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-19-11	Drive Wt. (lbs):	140	
Logged By:	RH	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					6" Asphalt Concrete, 6" Concrete, 6"~8" Aggregate Base			
	B	1			Lean CLAY (CL): dark olive-brown, moist, fine SAND, low to medium plasticity			R,PI
5	S	2	9		stiff			
10	S	3	15		very stiff			
					Terminated Boring at 11.5 ft depth. Groundwater not encountered.			
15								
20								
25								
30								
35								

LOG OF BORING NO. A-11-032

Grade Elevation:	+15.4 ft			
Boring Depth:	11.5 feet	Driller:	West Coast Exploration	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-7-11	Drive Wt. (lbs):	140	
Logged By:	GC	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0	B	0			SANDY lean CLAY to SANDY fat CLAY (CL to CH): very dark grayish brown, moist, fine SAND, medium to high plasticity			R
	B	1			medium to fine SAND			
5	S	2	11		stiff, yellowish brown, coarse to fine SAND, trace fine GRAVEL, medium to low plasticity			
	B	3			CLAYEY SAND (SC): yellowish brown, moist, coarse to fine SAND, few fine GRAVEL, low plasticity			
10	D	4	31		SILTY GRAVEL with SAND (GM): medium dense, brown to dark greenish gray, moist, coarse to fine GRAVEL, coarse to medium SAND, nonplastic, weak cementation			
					Terminated Boring at 11.5 ft depth. Groundwater encountered at 10.5'.			
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Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

LOG OF BORING NO. A-10-036

Grade Elevation:	+18.7 ft			
Boring Depth:	31.5 feet	Driller:	Pitcher Drilling	SHEET 1 OF 1
Borehole Diameter:	8 inches	Type of Rig:	Hollow Stem	Comments: 1. 3.25" O.D. ring sampler
Date Drilled:	4-18-11	Drive Wt. (lbs):	140	
Logged By:	KT	Drop (inches):	30	

Depth (feet)	Sampler Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Total Unit Weight (pcf)	Tests/ Results
0					Asphalt Concrete; 6" Base			
	B	0			Lean CLAY with SAND (CL): dark brown, moist, fine SAND, low plasticity, few concrete debris			
5	D	1	24		SANDY lean CLAY (CL): hard, olive-brown, moist, 32% fine SAND, 68% fines, low plasticity, PP>4.5 tsf	14	121	PA,PI
10	S	2	4		Lean CLAY with SAND (CL): medium stiff, brown, moist, 2% fine GRAVEL, 13% fine SAND, 85% fines, low to medium plasticity	20	-	PA,PI
15	D	3	11		Lean CLAY (CL): medium stiff, brown, moist, fine SAND, medium plasticity, PP=0.5 tsf	20	134	
20	S	4	37		CLAYEY SAND with GRAVEL (SC): dense, brown to reddish brown, moist, 27% fine GRAVEL, 58% coarse to fine SAND, 15% fines, low plasticity	17	-	PA,PI
25	D	5	34		SANDY lean CLAY with GRAVEL (CL): very stiff, brown, moist, little fine GRAVEL, some coarse to fine SAND, low plasticity, PP=3.25 tsf	17	136	
30	S	6	19			14	-	
					Terminated Boring at 31.5 ft depth. Groundwater encountered at 11.0 ft.			
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Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-880 Operational and Safety Improvement

Project No. 10-133 | Date: 8-15-11

Appendix B

Laboratory Test Results

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil-pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-002	D-1	5	CL	17.8	127.9	4.0				41/17/24	1300	7.3	65	219
R-11-002	S-3	10	CL	17.9										
R-11-002	D-4	15	CL	25.9	124.0	0.75		0:12:88						
R-11-002	S-5	20	CL	17.1										
R-11-002	D-6	25	CL	19.6	128.9	1.5								
R-11-002	S-7	30	CL	20.7										
R-11-002	D-8	35	CL	19.3	130.3	3.75								
R-11-002	S-9	40	SC	13.3										
R-11-002	D-10	45	CL	23.4	128.3	2.0		30:15:55						
R-11-002	S-11	50	CL	19.6										
R-11-002	D-12	55	GC	11.9	141.4									
R-11-002	S-13	60	CL	33.8										
R-11-002	D-14	65	CL	20.9	130.0	2.0								
R-11-002	S-15	70	CL	29.1										
R-11-006	D-1	5	CL	17.6	128.5	3.75					1600	7.6	65	164
R-11-006	S-2	10	CL	13.1										
R-11-006	D-3	15	GC	10.7	136.0									
R-11-006	S-4	20	CL	32.0				0:1:99						
R-11-006	D-5	25	CL	21.4	129.8	2.0								
R-11-006	S-6	30	CL	20.4										
R-11-006	D-7	35	CH	22.3	128.0	4.0								
R-11-006	S-8	40	CL	24.3										
R-11-006	D-9	45	CH	27.0	125.0	4.25								
R-11-006	S-10	50	CL	21.9										
R-11-006	D-11	55	SM	21.7	128.2									
R-11-006	S-12	62	CL	16.8				8:40:52						
R-11-006	D-13	70	CL	21.3	127.8	2.0								
R-11-008	S-1	5	CL	19.4										
R-11-008	D-2	10	CL	12.2	130.3	4.25								
R-11-008	S-3	15	CL	24.1										
R-11-008	D-4	20	SC	12.5	136.7									
R-11-008	S-5	25	CL	26.1				0:19:81						
R-11-008	D-6	30	CL	37.8	132.4	2.75								
R-11-008	S-7	35	CL	18.1										
R-11-008	D-8	40	CH	29.7	120.1	2.5								
R-11-008	S-9	45	CL	24.4										
R-11-008	D-10	50	CL	24.8	125.5	1.75								
R-11-008	S-11	60	CL	18.2										
R-11-008	D-12	70	SC	18.7	130.8									

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-010	S-1	2.5	CL	14.3										
R-11-010	D-2	5	CL	14.9	131.3	>4.5								
R-11-010	S-3	10	SC	11.0							5900	6.7	55	185
R-11-010	D-4	15	CL	22.0	127.9	3.75								
R-11-010	S-5	20	CL	26.9										
R-11-010	D-6	25	SM	9.8	144.2									
R-11-010	S-7	30	CL	20.8										
R-11-010	D-8	35	CL	24.2	98.2	0.75								
R-11-010	S-9	40	CH	33.0										
R-11-010	D-10	45	CL	19.5	129.3	3.25								
R-11-010	S-11	50	CL	26.0										
R-11-014	S-1	5	CH	17.6							1300	6.6	70	158
R-11-014	D-2	10	SC	10.3	144.6									
R-11-014	S-3	15	CH	30.9										
R-11-014	D-4	20	CL	14.3	133.0	1.5								
R-11-014	S-5	25	CL	28.4										
R-11-014	D-6	30	CH	28.4	125.2	2.75								
R-11-014	S-7	35	CH	26.9										
R-11-014	D-8	40	CL	22.8	127.9	2.0								
R-11-014	S-9	45	CL	22.1										
R-11-014	D-10	50	CH	27.5	123.8	1.75								
R-11-014	S-11	55	CH	19.6										
R-11-014	D-12	60	CL	18.9	131.6	3.0								
R-11-014	S-13	65	CL	21.3										
R-11-014	D-14	70	SC	12.5	133.7									
R-11-021	D-1	5	CL	18.8	122.8	3.0					1500	6.5	65	197
R-11-021	S-2	10	CL	19.5										
R-11-021	D-3	15	CL	21.7	128.2			0:15:85						
R-11-021	S-4	20	CH	31.0				5:14:81						
R-11-021	D-5	25	GP-GM	7.4	147.3									
R-11-021	S-6	30	SC-SM	12.5										
R-11-021	D-7	35	CL	7.7	137.5									
R-11-021	S-8	40	CH	35.2										
R-11-021	D-9	45	SC	17.2	135.2	2.25								
R-11-021	S-10	50	CL	25.7										

TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

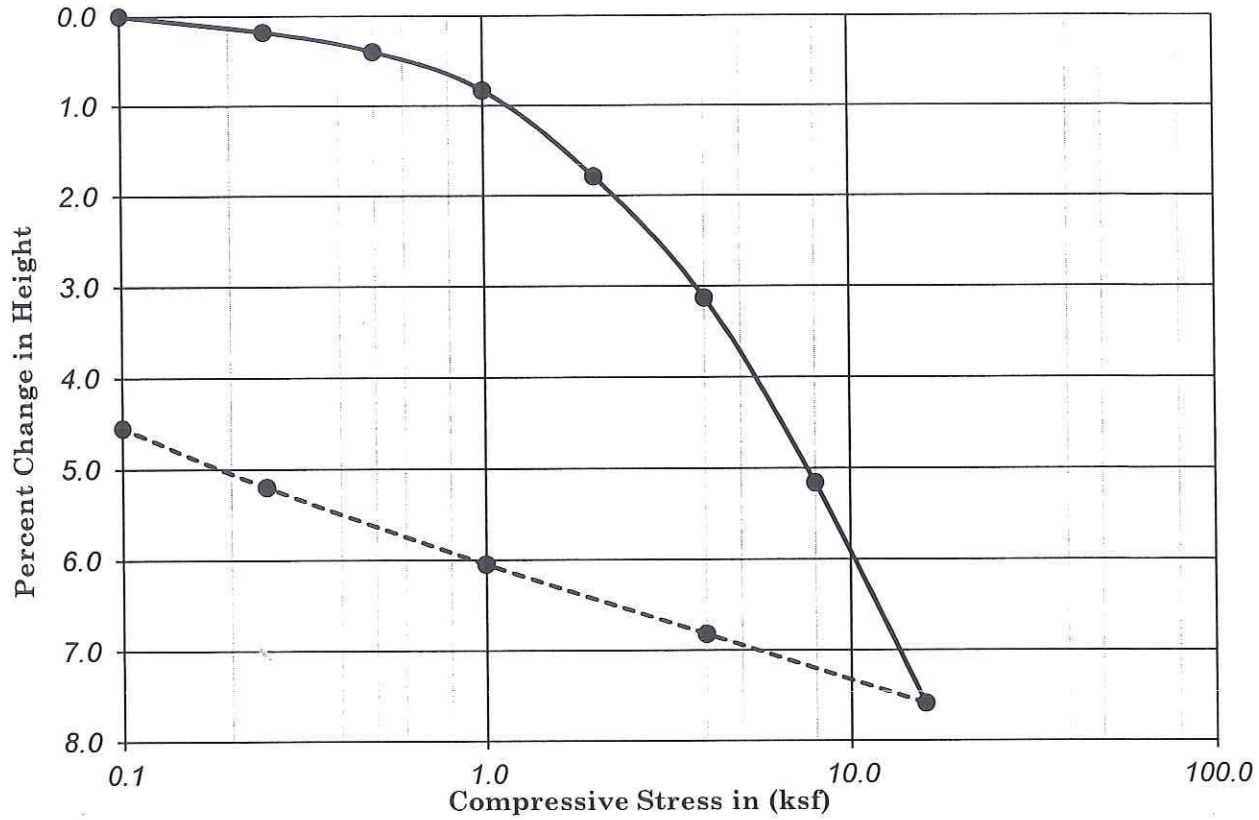
Project No. : 10-133 Project Name : I-880 Operational and Safety Improvement Project

Boring No.	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-030	S-1	5	CL	13.7				14:31:55						
R-11-030	D-2	10	CL	30.9	121.0	1.0				47/21/26	1200	6.6	80	231
R-11-030	S-3	15	CH	29.0										
R-11-030	D-4	20	SC	14.7	135.9			12:67:21						
R-11-030	S-5	25	CH	44.3				1:15:84						
R-11-030	D-6	30	CH	34.1	115.2	2.0								
R-11-030	S-7	35	CL	38.6										
R-11-030	D-8	40	CL	30.2	118.5	2.25								
R-11-030	S-9	45	CL	24.3				0:37:63						
R-11-030	D-10	50	CL	20.6	125.5	2.0								
R-11-030	S-11	55	CL	14.8										
R-11-030	D-12	60	CL	25.0	122.9	2.0								
R-11-030	S-13B	65	SC	15.1										
R-11-030	S-13A	65	CL	19.9										
R-11-030	D-14	70	SW-SM	11.7	141.6									
R-11-031	D-1	5	CH	20.8	120.4	3.25					1300	6.9	170	221
R-11-031	S-2	10	SC	12.2				27:27:46						
R-11-031	D-3	15	SP-SC	11.8	143.8			37:52:11						
R-11-031	S-4	20	CL	22.3										
R-11-031	D-5	25	CH	27.4	113.0	1.75				52/22/30				
R-11-031	S-6	30	CL	23.2										
R-11-031	D-7	35	CL	27.7	117.3	3.0								
R-11-031	S-8	40	CL	26.0										
R-11-031	D-9	45	CL	22.4	124.2	3.0								
R-11-031	S-10	50	CL	31.1										
R-11-031	D-11	55	SM	19.8	129.9									
R-11-031	S-12T	60	CH	21.5										
R-11-031	S-12B	60	SC	15.4										
R-11-031	D-13	65	CL	18.6	129.8	1.5								
R-11-031	S-14	70	CL	15.3										
R-11-034	S-1	5	CL	15.5										
R-11-034	D-2	10	CH	29.2	119.7	0.75								
R-11-034	S-3B	15	CL	19.0							2500	7.1	252	160
R-11-034	S-3T	15	SM	19.9										
R-11-034	D-4	20	CL	20.3	127.5									
R-11-034	S-5	25	CL	30.5				0:19:81						
R-11-034	D-6	30	CL	15.8	132.9	3.5								
R-11-034	S-7	35	CL	22.3										
R-11-034	D-8	40	CL	18.6	129.8	1.75								
R-11-034	S-9	45	CL	19.7				1:40:59						

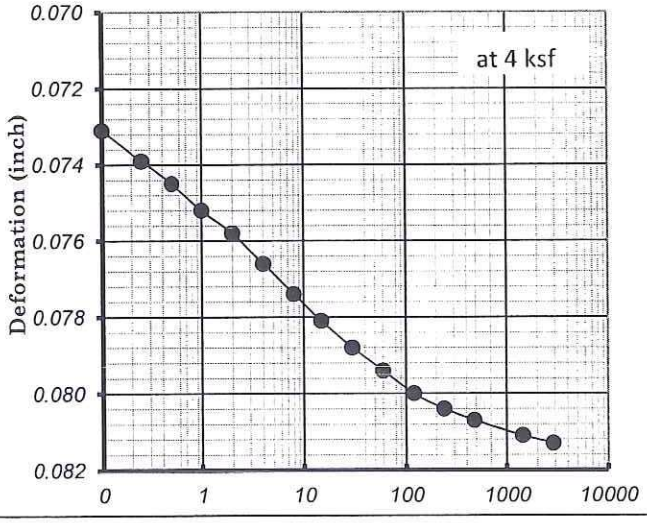
TABLE B1 SUMMARY OF LABORATORY TEST RESULTS

Project No. : 10-133 **Project Name :** I-880 Operational and Safety Improvement Project

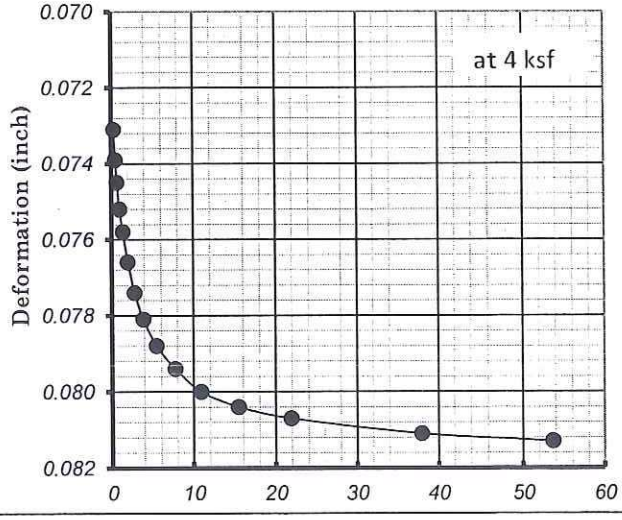
Boring No .	Sample No.	Sample Depth (ft)	Soil Identification (group symbol) ASTM D2488/D2487	Moisture Content ASTM D2216 (%)	Total Unit Weight ASTM D2937 (pcf)	Pocket Penetrometer (tsf)	Torvane Shear (tsf)	Grain Size Distribution GR:SA:FI (%)	Sand Equivalent (CT-217)	Atterberg Limits ASTM D4318 (LL/PL/PI)	Soil-Minimum Resisivity CT-532 (ohm-cm)	Soil- pH CT-532	Soil-Soluble Sulfate Content CT-417 (ppm)	Soil-Moisture Free Chloride Content CT-422 (ppm)
R-11-034	*D-10*	50	CL	20.1	128.4	1.75		0:11:89						
R-11-034	*S-11*	55	CL	23.1										
R-11-034	*D-12*	60	SC	15.7	133.2									
R-11-034	*S-13*	65	SM	22.6										
R-11-034	*D-14*	70	SM	12.8	137.0									
R-11-035	*D-1*	5	CH	17.6	125.0	3.5					1400	7.3	90	158
R-11-035	*S-2*	10	SC	12.2				36:47:17						
R-11-035	*D-3*	15	CL	27.5	120.1									
R-11-035	*S-4*	20	CL	29.8				12:15:73						
R-11-035	*D-5*	25	SC	11.5	139.7			30:55:15						
R-11-035	*S-6*	30	CL	21.9										
R-11-035	*D-7*	35	CL	18.9	129.0	3.0								
R-11-035	*S-8*	40	SC	20.8										
R-11-035	*D-9*	45	GP-GM	8.4	142.7									
R-11-035	*S-10*	50	SP-SM	10.0										
R-11-035	*D-11*	55	CL	21.7	122.7	2.75								
R-11-035	*S-12*	60	CL	18.2										
R-11-035	*D-13*	65	CL	23.3	125.8	3.25								
R-11-035	*S-14*	70	SC	13.0										
A-11-036	*D-1*	5	CL	14.1	120.7	>4.5		0:32:68		40/17/23				
A-11-036	*S-2*	10	CL	20.4				2:13:85		31/15/16				
A-11-036	*D-3*	15	CL	19.8	133.8	0.5								
A-11-036	*S-4*	20	SC	16.9				27:58:15		29/14/15				
A-11-036	*D-5*	25	CL	15.6	135.6	3.25								
A-11-036	*S-6*	30	CL	14.1										



Log of Time (minutes)



Square Root of Time (minutes)



Boring No. : R-11-002				Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-6				Plastic Limit :	-						
Depth	(ft) :	25.0	26.5	Plasticity Index :	-	Initial	23.86	102.16	16.08	99.12	0.65
	(m) :	7.63	8.08	Specific Gravity :	2.70	Final	21.56	107.04	16.85	101.27	0.57
Description : Olive-brown, Lean CLAY with SAND (CL)											

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CONSOLIDATION TEST
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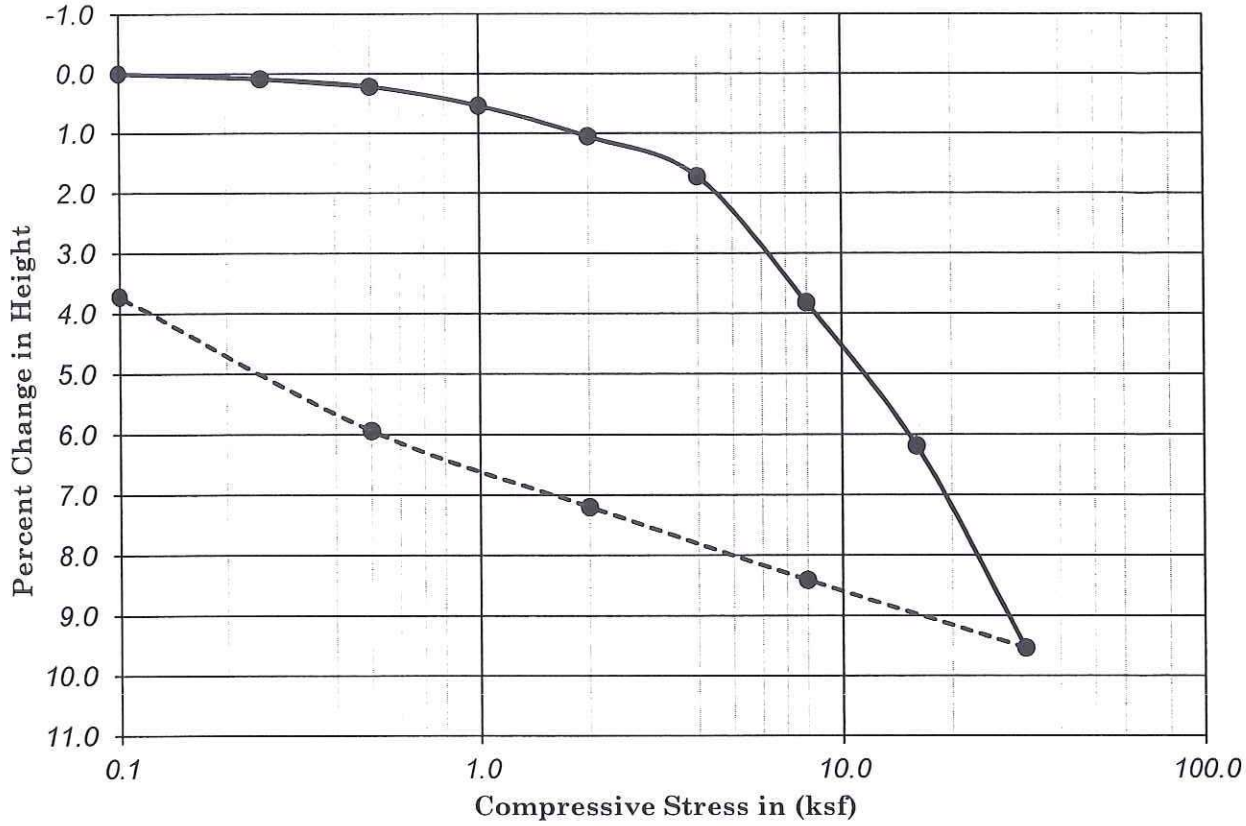

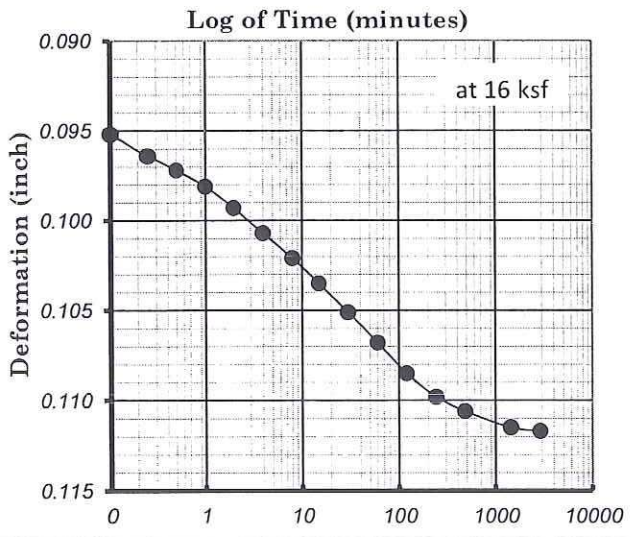

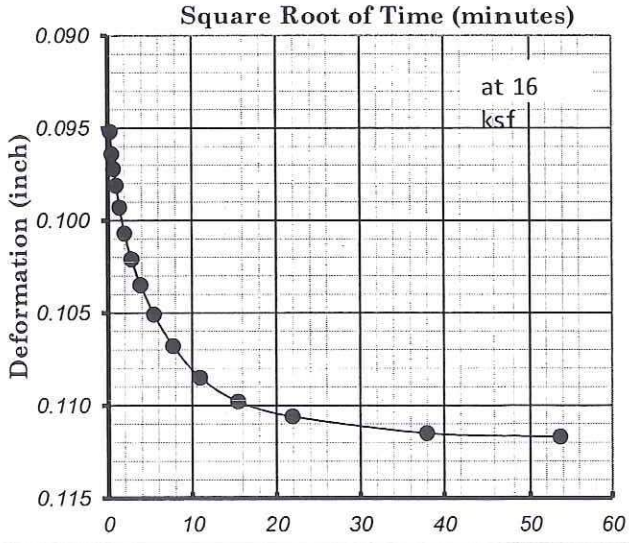

Boring No.	: R-11-006		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-7		Plastic Limit :	-						
Depth (ft)	: 35.0	36.5	Plasticity Index :	-	Initial	23.88	99.29	15.63	92.42	0.70
Depth (m)	: 10.68	11.13	Specific Gravity :	2.70	Final	24.03	103.15	16.24	102.32	0.63

Description : Olive-brown, Fat CLAY (CH)

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CONSOLIDATION TEST
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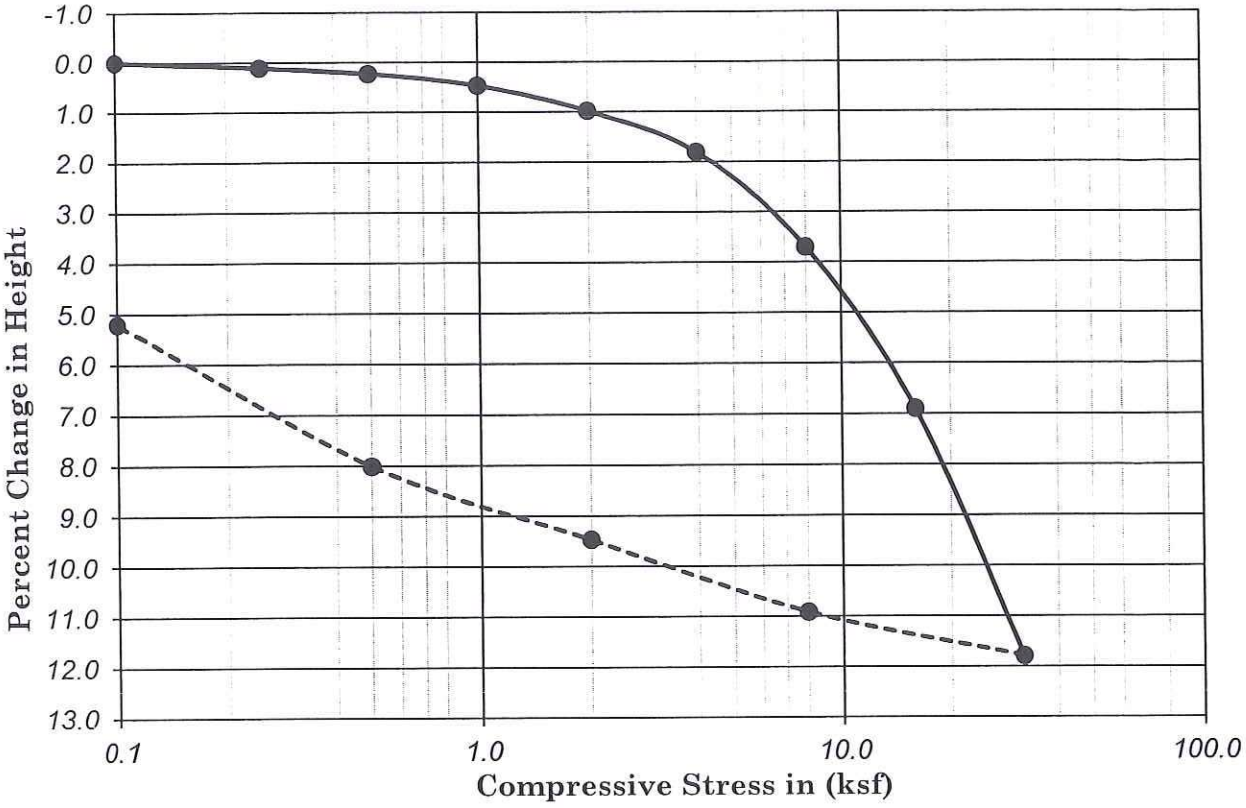

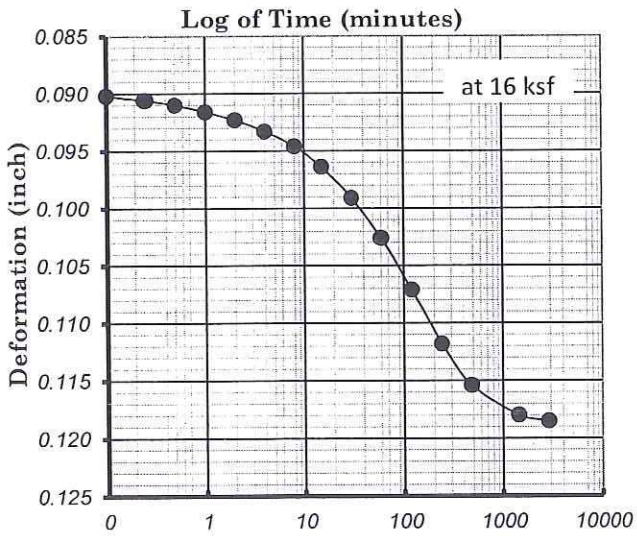

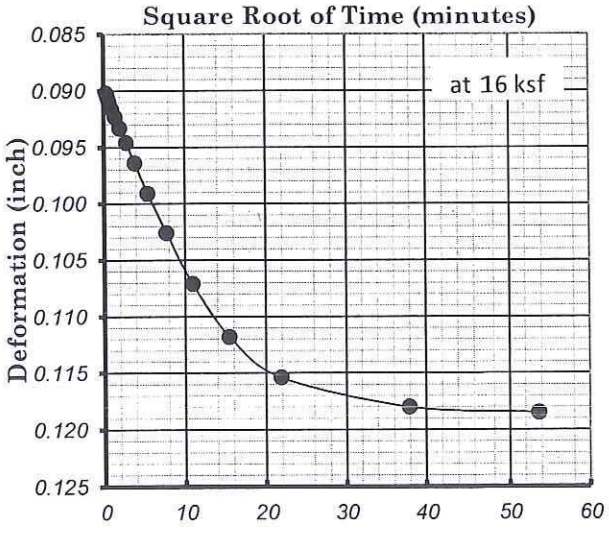

Boring No. : R-11-008				Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-8				Plastic Limit :	-						
Depth	(ft) :	40.0	41.5	Plasticity Index :	-	Initial	29.68	91.70	14.43	95.61	0.84
	(m) :	12.20	12.66	Specific Gravity :	2.70	Final	27.58	96.76	15.23	100.37	0.74
Description : Olive- brown, Fat CLAY (CH)											

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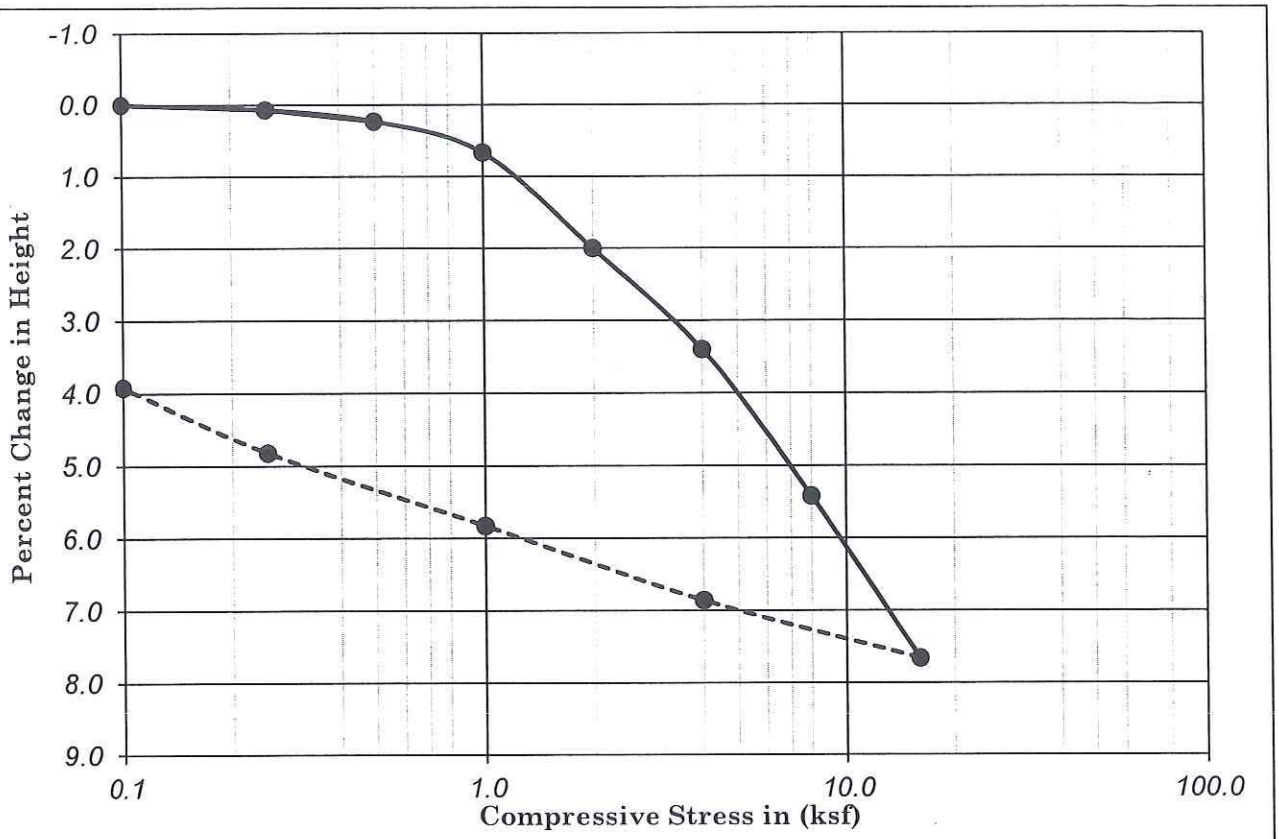

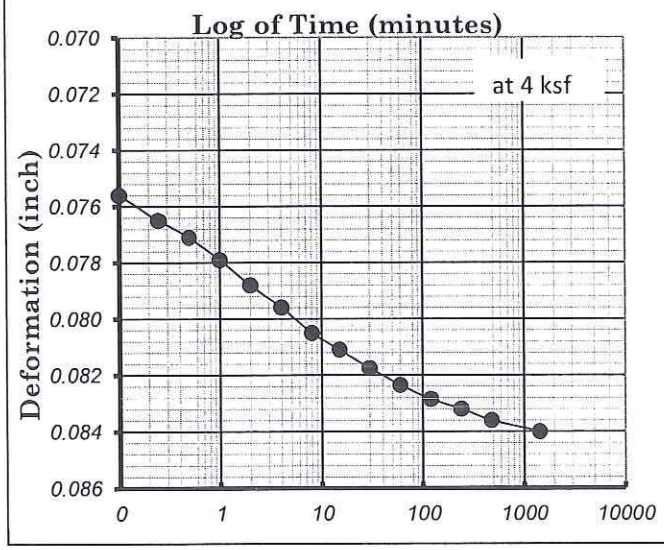

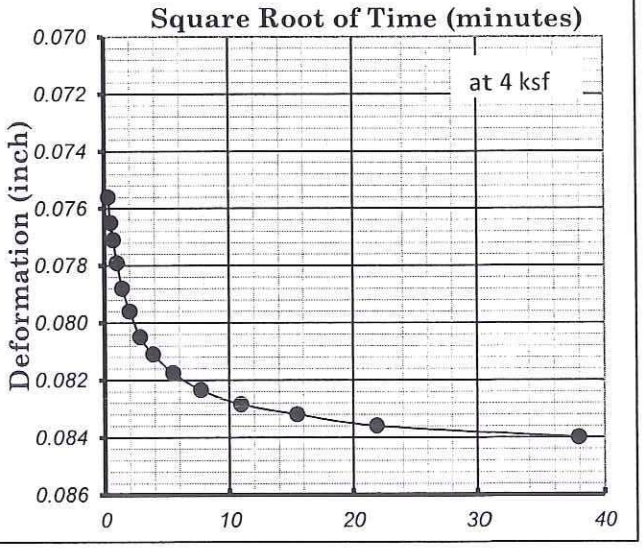

Boring No.	: R-11-010		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-2		Plastic Limit :	-						
Depth (ft)	: 5.0	6.5	Plasticity Index :	-	Initial	22.14	103.95	16.36	96.18	0.62
Depth (m)	: 1.53	1.98	Specific Gravity :	2.70	Final	21.18	108.21	17.03	102.53	0.56
Description : Mottled olive-brown, yellowish brown and white, SANDY lean CLAY (CL)										

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CONSOLIDATION TEST
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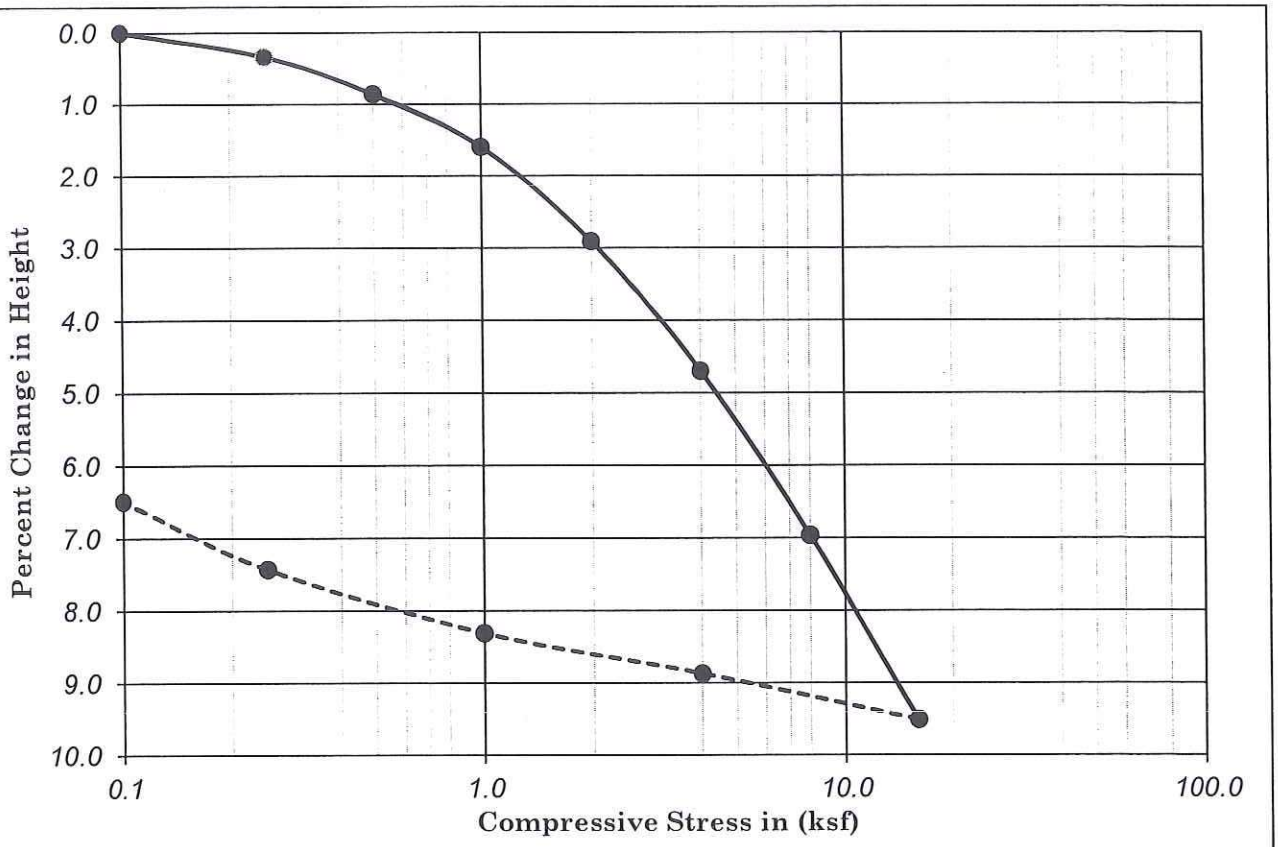

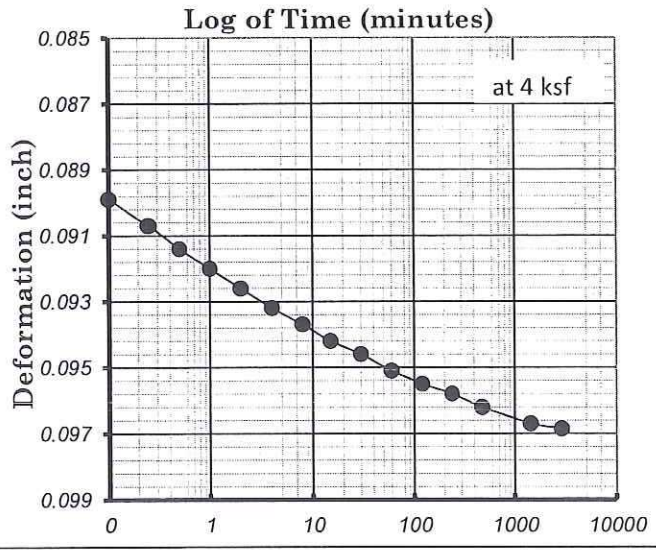

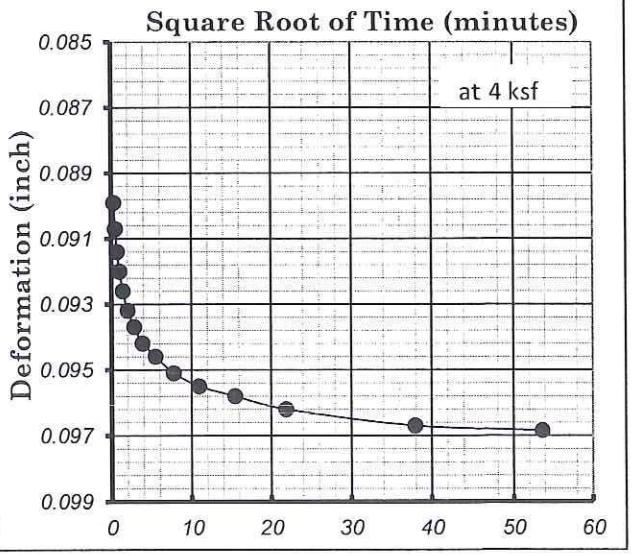

Boring No. : R-11-014				Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-8				Plastic Limit :	-						
Depth	(ft)	: 40.0	41.5	Plasticity Index :	-	Initial	23.92	100.90	15.88	96.31	0.67
	(m)	: 12.20	12.66	Specific Gravity :	2.70	Final	21.74	107.92	16.99	104.47	0.56
Description : Olive-brown, SANDY lean CLAY (CL)											

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CONSOLIDATION TEST
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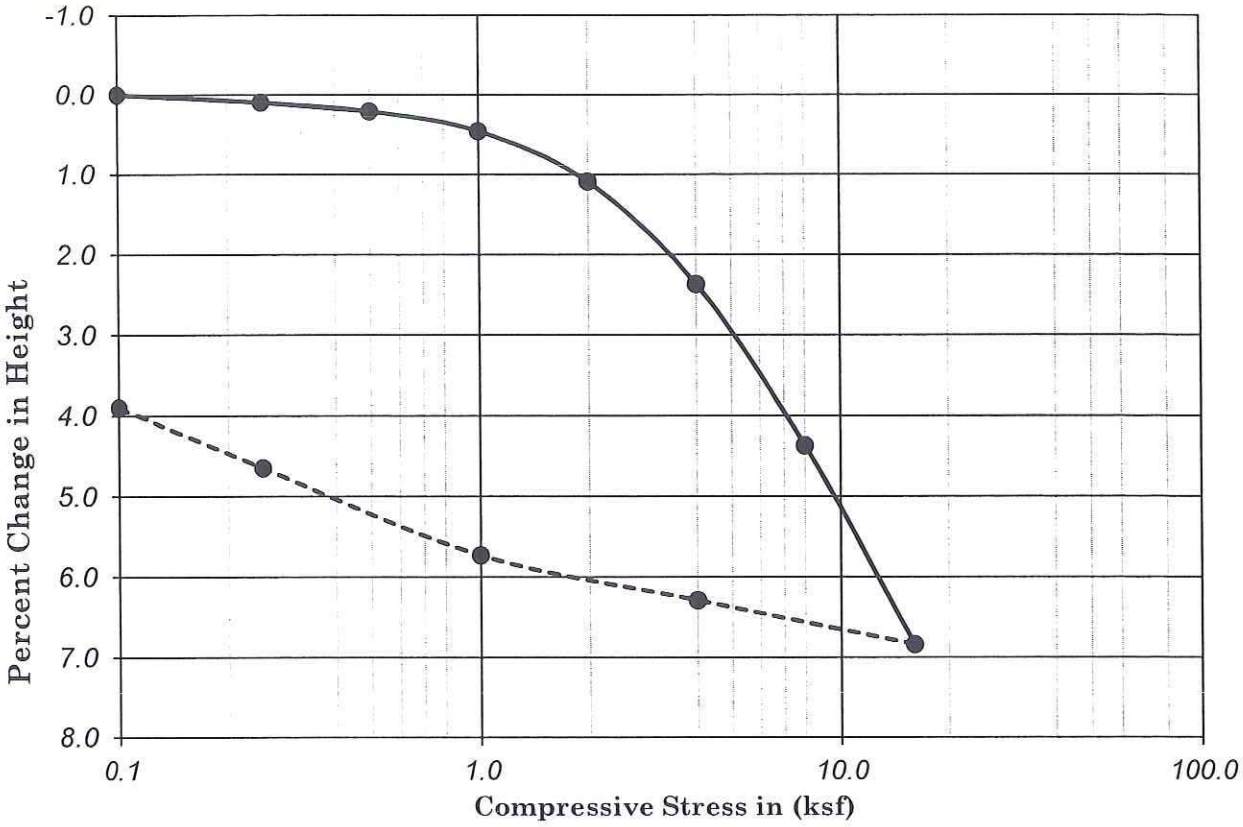

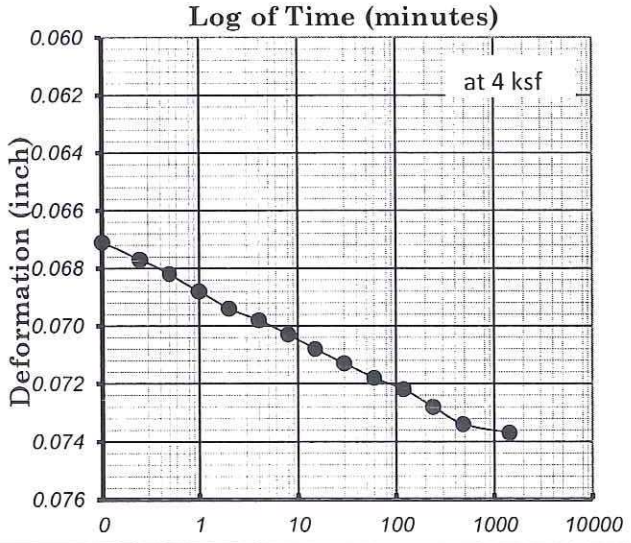

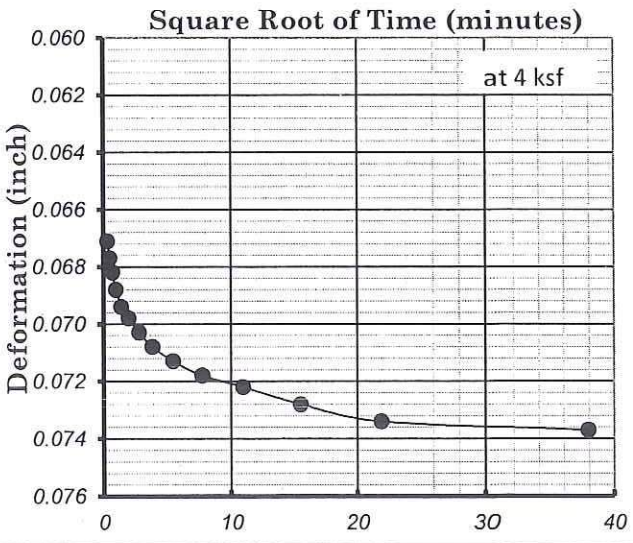

Boring No. : R-11-021			Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-1			Plastic Limit :	-						
Depth	(ft) : 5.0	6.5	Plasticity Index :	-	Initial	19.57	106.04	16.69	89.63	0.59
	(m) : 1.53	1.98	Specific Gravity :	2.70	Final	19.54	110.35	17.37	100.03	0.53
Description : Very dark brown to black, Lean CLAY with SAND (CL)										

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CONSOLIDATION TEST
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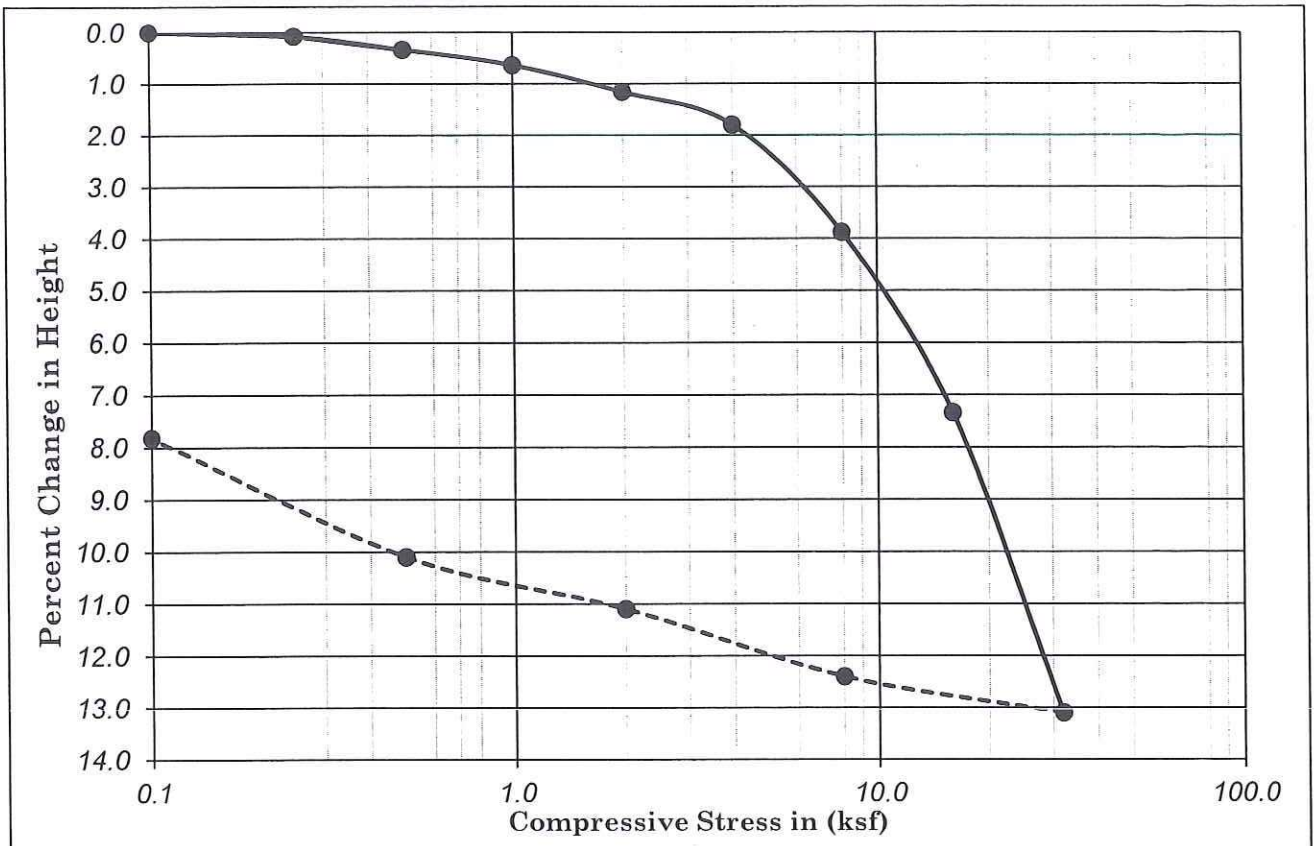

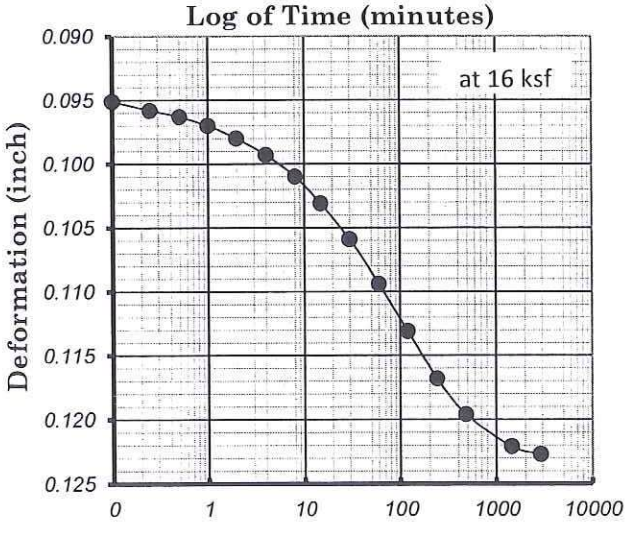

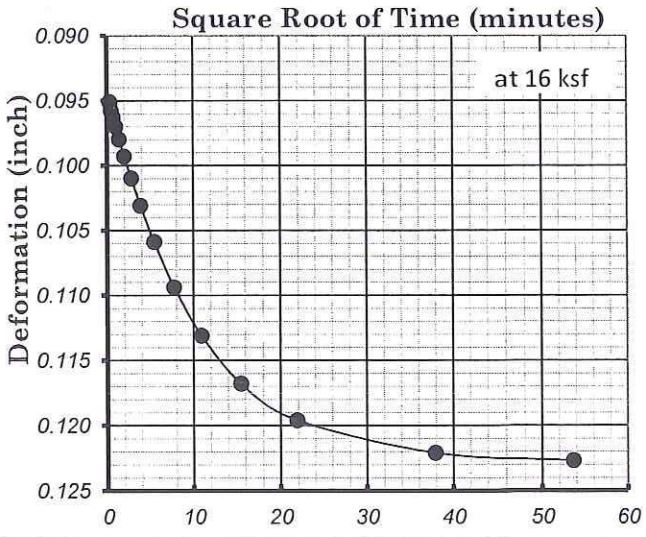

Boring No.	: R-11-030		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 30.0	31.5	Plasticity Index :	-	Initial	34.76	83.58	13.15	92.31	1.02
Depth (m)	: 9.15	9.61	Specific Gravity :	2.70	Final	32.68	90.71	14.28	102.81	0.86

Description : Olive-gray, Fat CLAY (CH)

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CONSOLIDATION TEST
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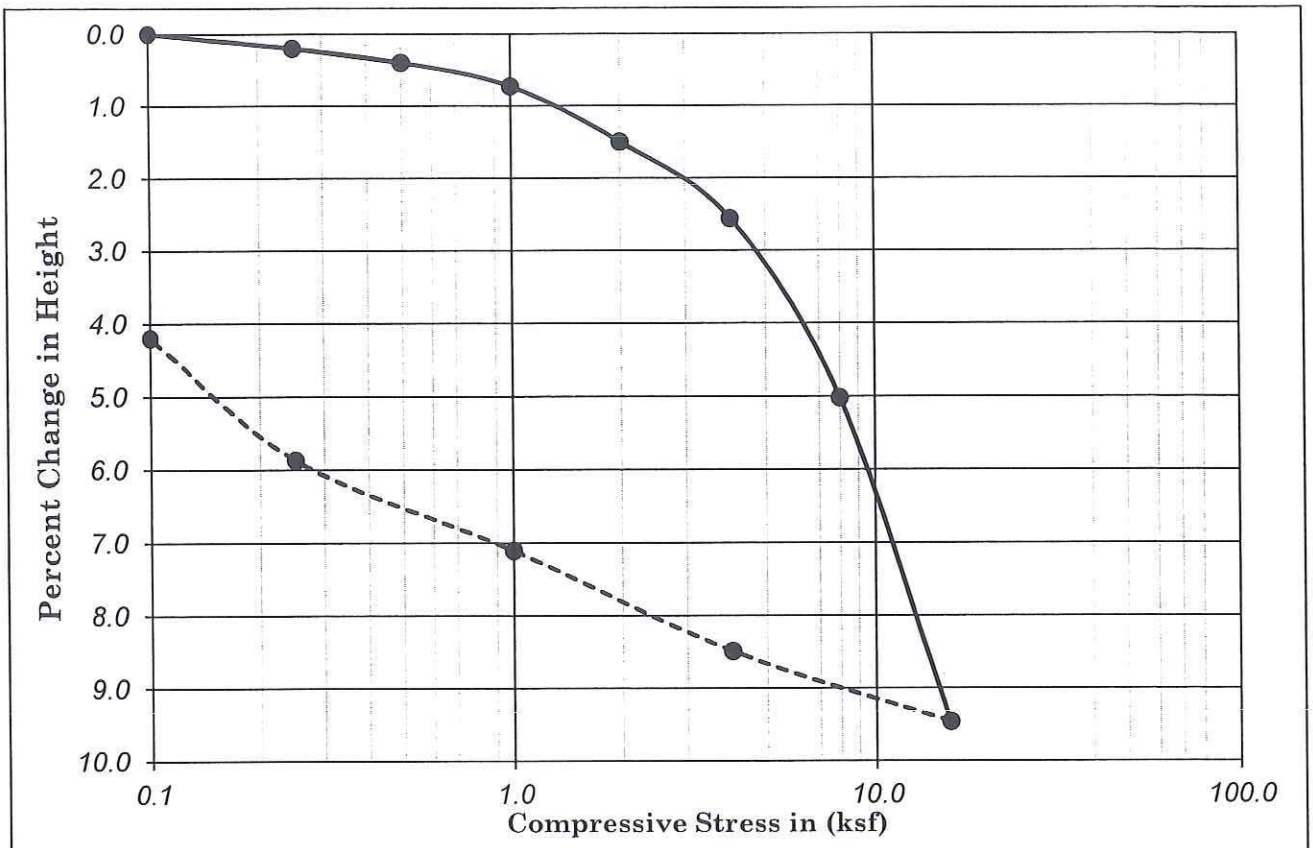

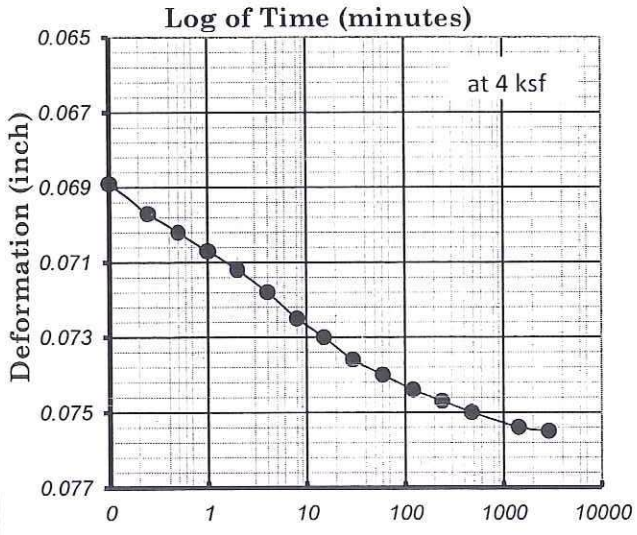

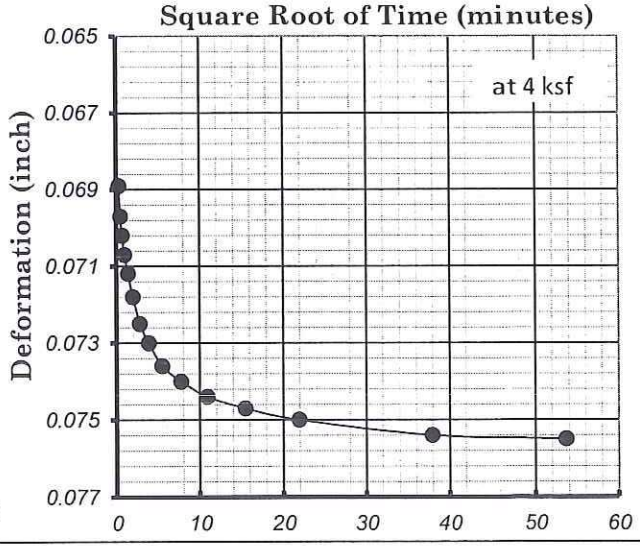

Boring No.	: R-11-031		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-7		Plastic Limit :	-						
Depth (ft)	: 35.0	36.5	Plasticity Index :	-	Initial	33.54	87.94	13.84	98.77	0.92
Depth (m)	: 10.68	11.13	Specific Gravity :	2.70	Final	31.85	91.81	14.45	102.86	0.84

Description : Olive-brown, Fat CLAY (CH)

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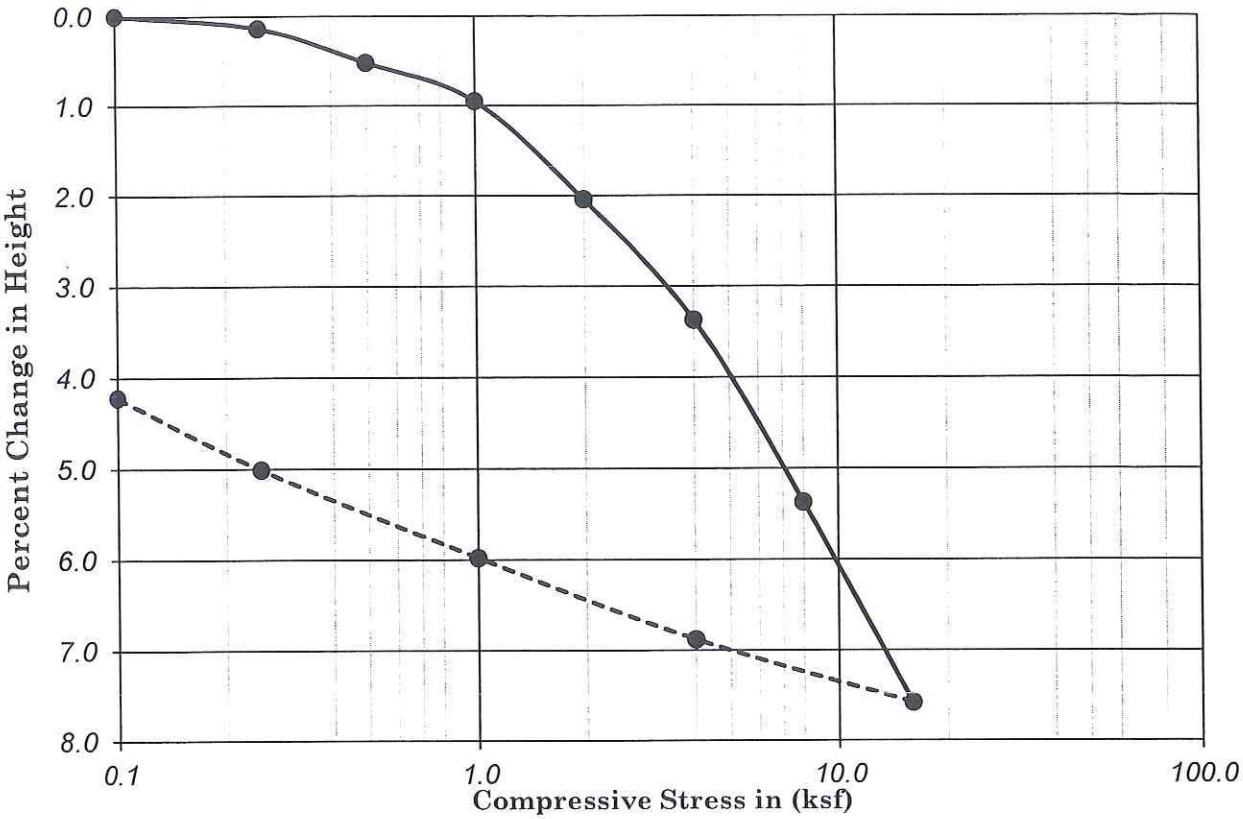

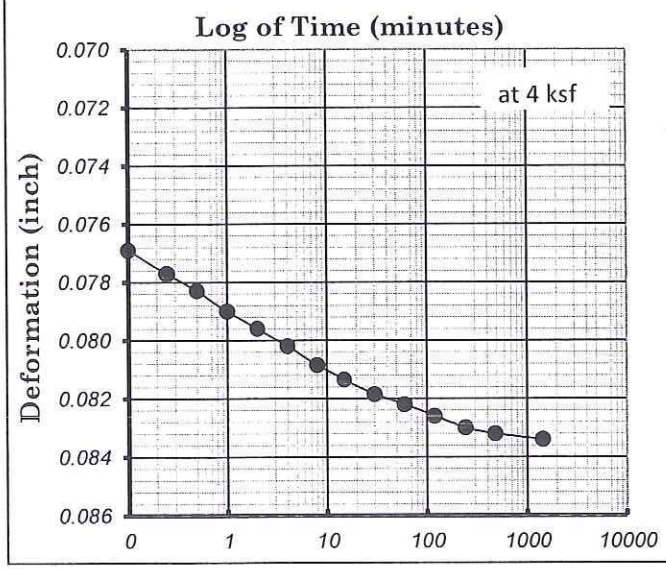

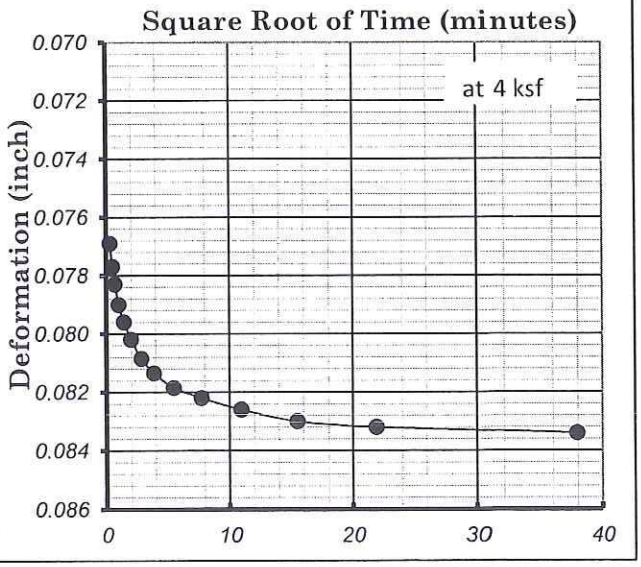

Boring No.	: R-11-034			Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6			Plastic Limit :	-						
Depth	(ft) :	30.0	31.5	Plasticity Index :	-	Initial	26.33	96.43	15.18	95.05	0.75
	(m) :	9.15	9.61	Specific Gravity :	2.70	Final	25.69	100.69	15.85	102.90	0.67
Description : Yellowish brown with white, SANDY lean CLAY (CL)											

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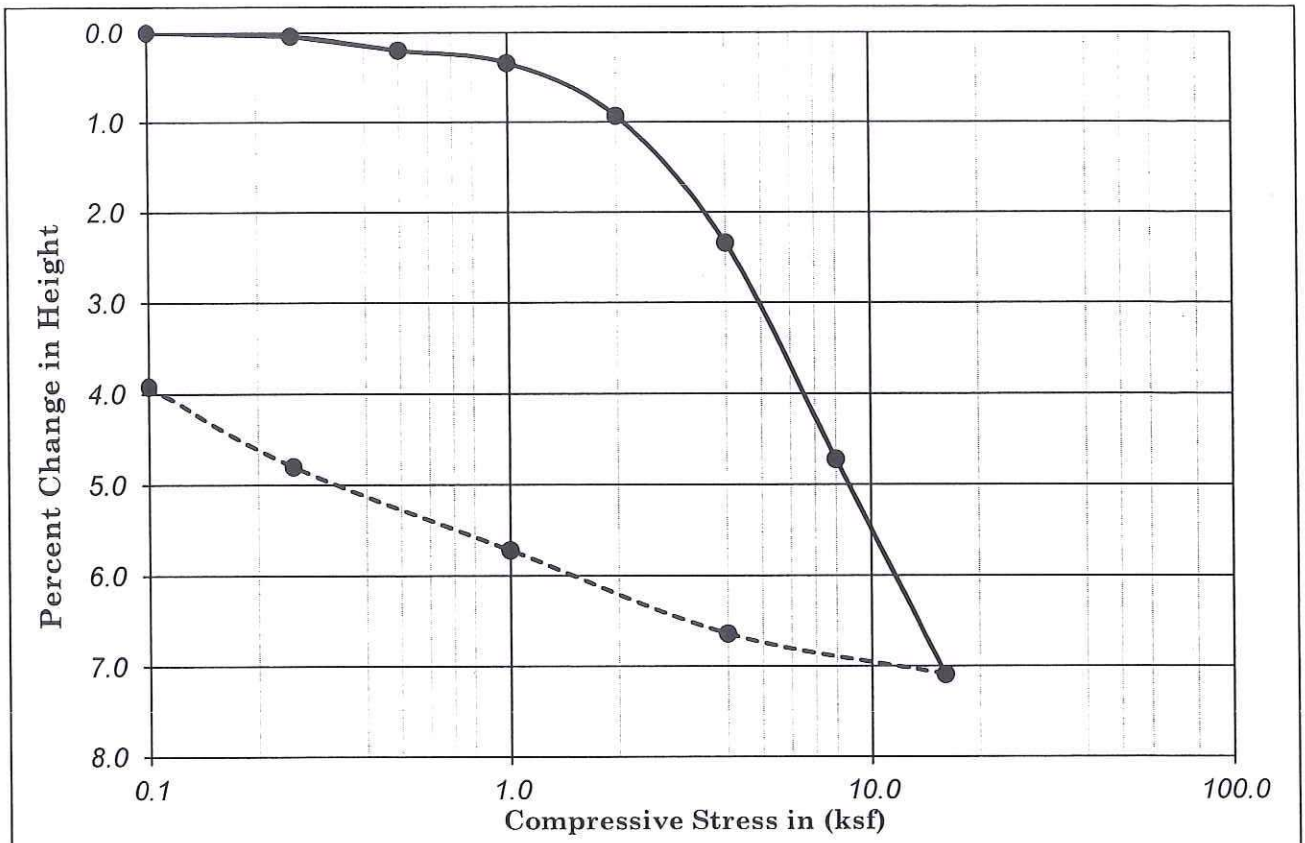

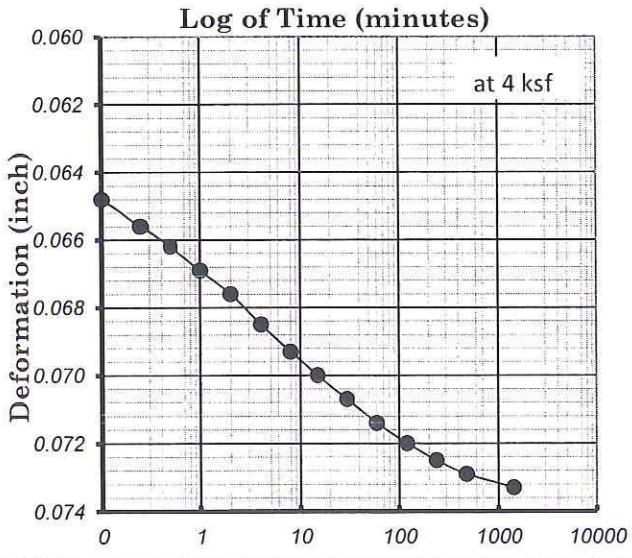

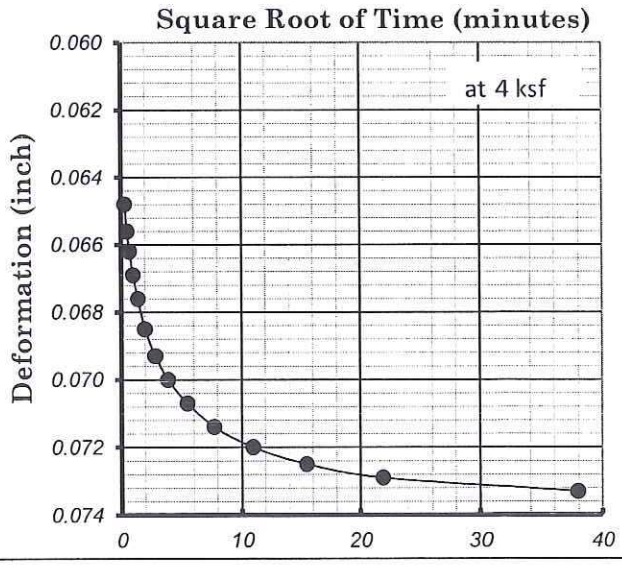

Boring No.	: R-11-035		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-7		Plastic Limit :	-						
Depth (ft)	: 35.0	36.5	Plasticity Index :	-	Initial	19.87	109.21	17.19	98.72	0.54
Depth (m)	: 10.68	11.13	Specific Gravity :	2.70	Final	17.94	113.68	17.89	100.30	0.48

Description : *Mottled olive-brown, yellowish brown and white, Lean CLAY with SAND (CL)*

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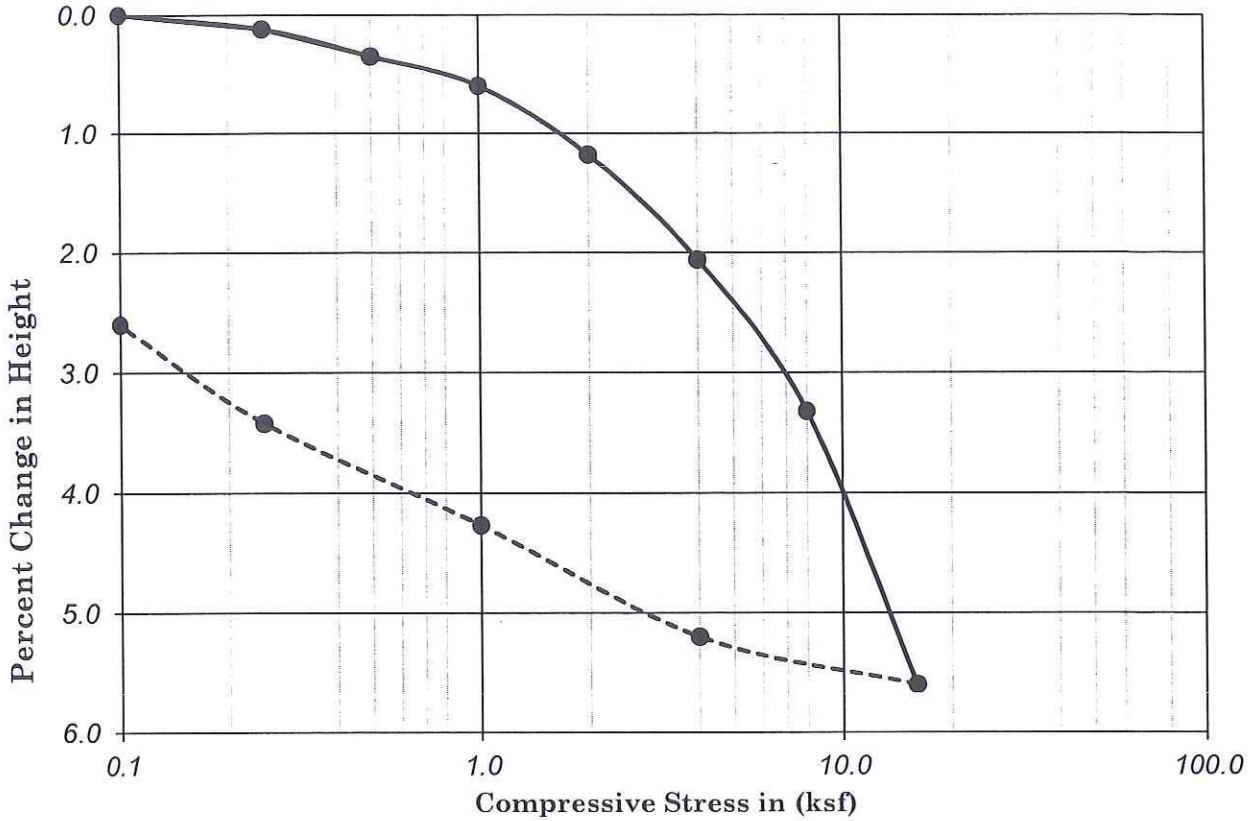

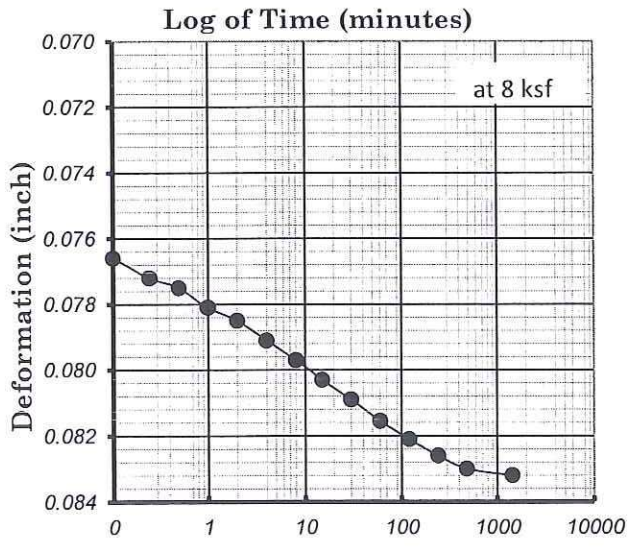

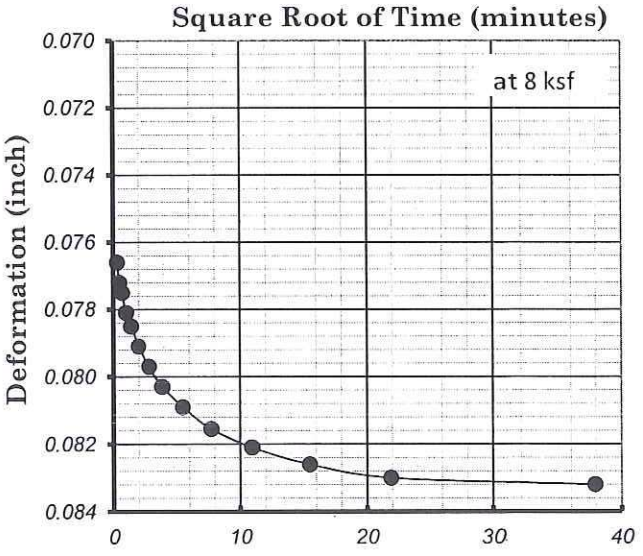

Boring No. : R-11-035			Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-11			Plastic Limit :	-						
Depth	(ft) : 55.0	56.5	Plasticity Index :	-	Initial	21.29	104.11	16.39	92.84	0.62
	(m) : 16.78	17.23	Specific Gravity :	2.70	Final	21.38	106.91	16.83	100.12	0.58
Description : Olive-brown, Lean CLAY (CL)										

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CONSOLIDATION TEST
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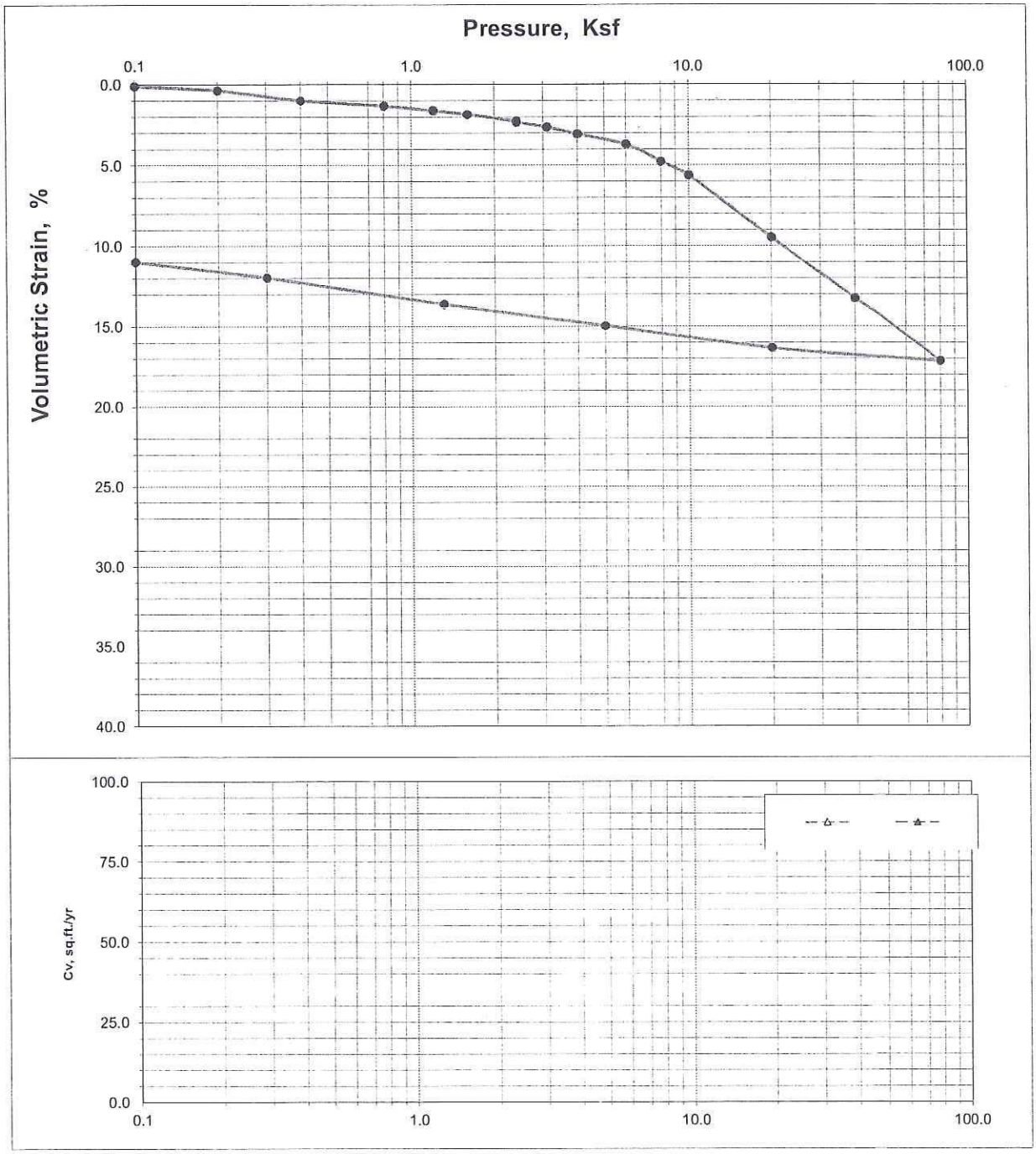
CONSOLIDATION TEST

Boring Number	B-2		Sample Number		6	Depth (ft)	31.5-34		
Soil Description	Brown sandy lean clay								
	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	20.8	124.1	0.641	87.6	1.00	2.420	(assumed) 2.70		
Final	16.9	135.7	0.452	100.7	0.885				



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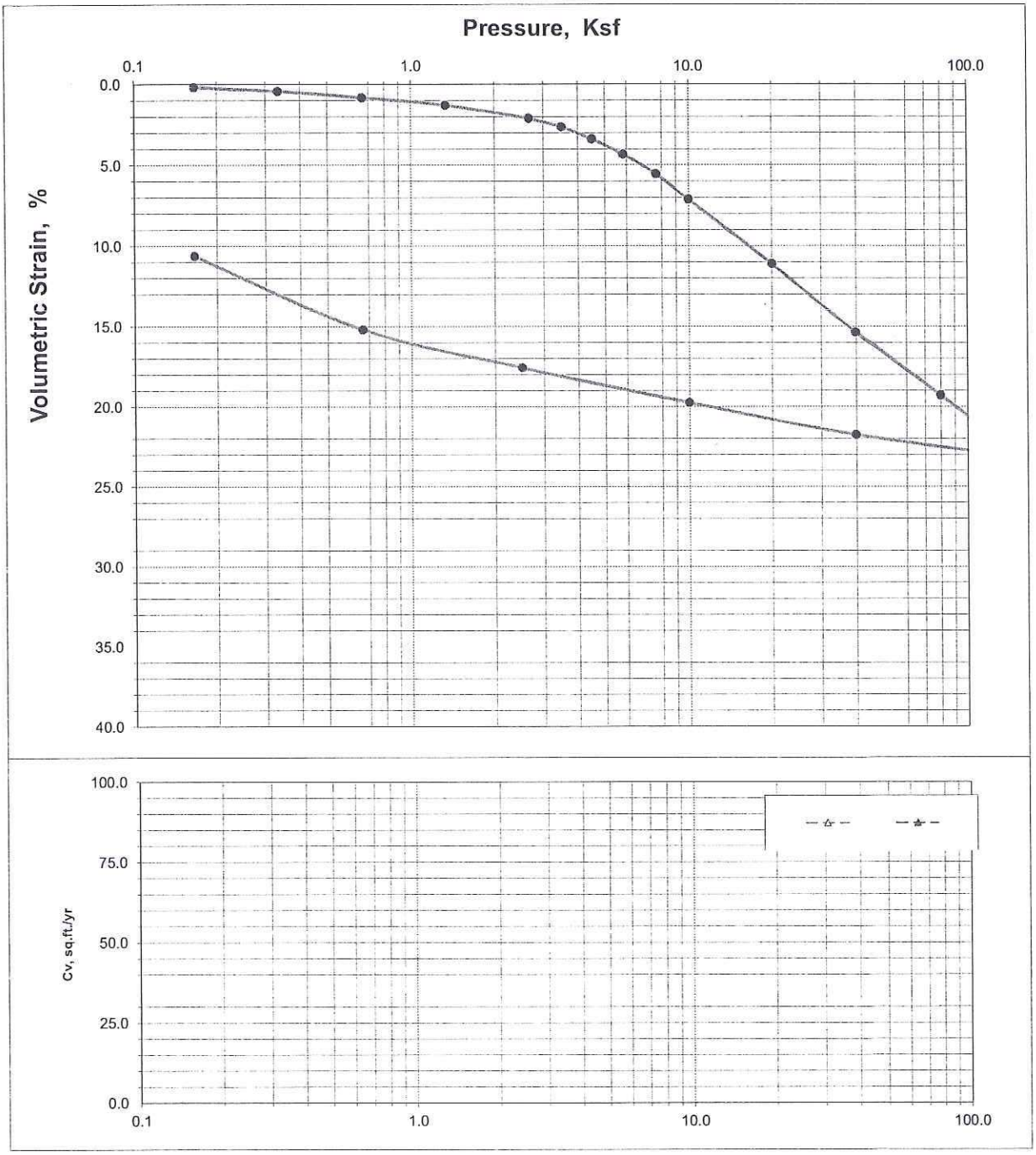
CONSOLIDATION TEST

Boring Number	B-4		Sample Number	5-3		Depth (ft)	21-21.5		
Soil Description	Olive brown sandy lean clay								
	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	24.6	126.9	0.656	101.1	0.69	1.880	(assumed) 2.70		
Final	18.2	135.5	0.470	104.4	0.613				



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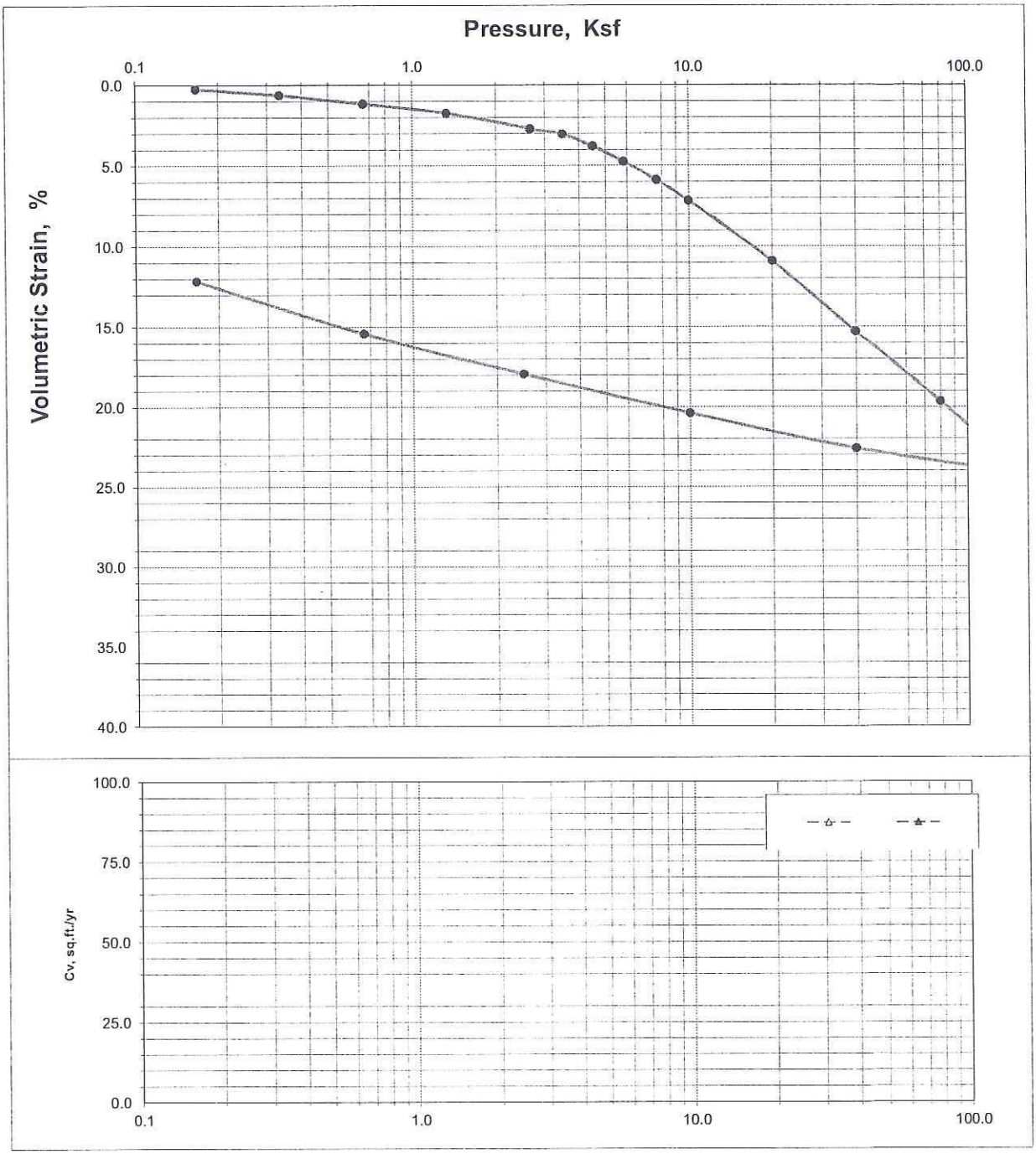
CONSOLIDATION TEST

Boring Number	B-5		Sample Number	11-2	Depth (ft)	50.5-51		
Soil Description	Dark grayish brown lean clay with sand							
	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	25.4	123.0	0.719	95.5	0.70	1.880	(assumed) 2.70		
Final	19.2	133.0	0.511	101.5	0.615				



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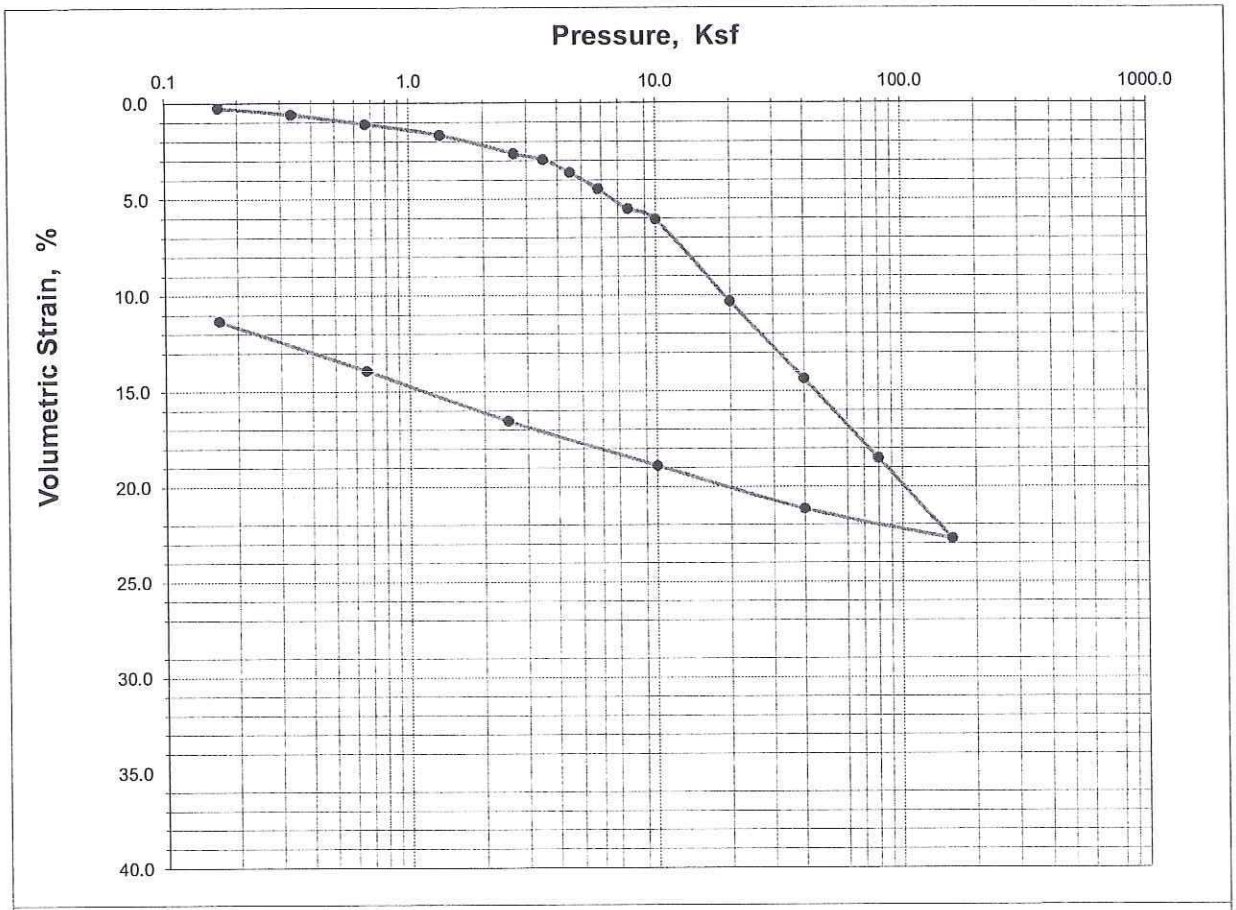
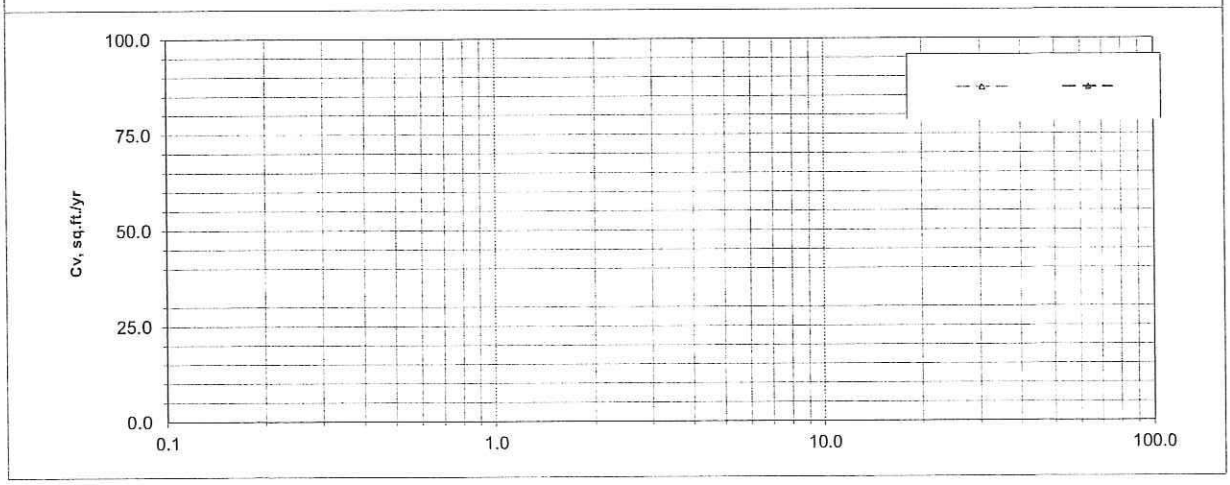
CONSOLIDATION TEST

Boring Number	B-8	Sample Number	3-2	Depth (ft)	10.5-11	
Soil Description	Dark brown lean clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	23.0	124.1	0.671	92.6	0.70	1.880	(assumed) 2.70		
Final	17.4	134.8	0.468	100.4	0.615				





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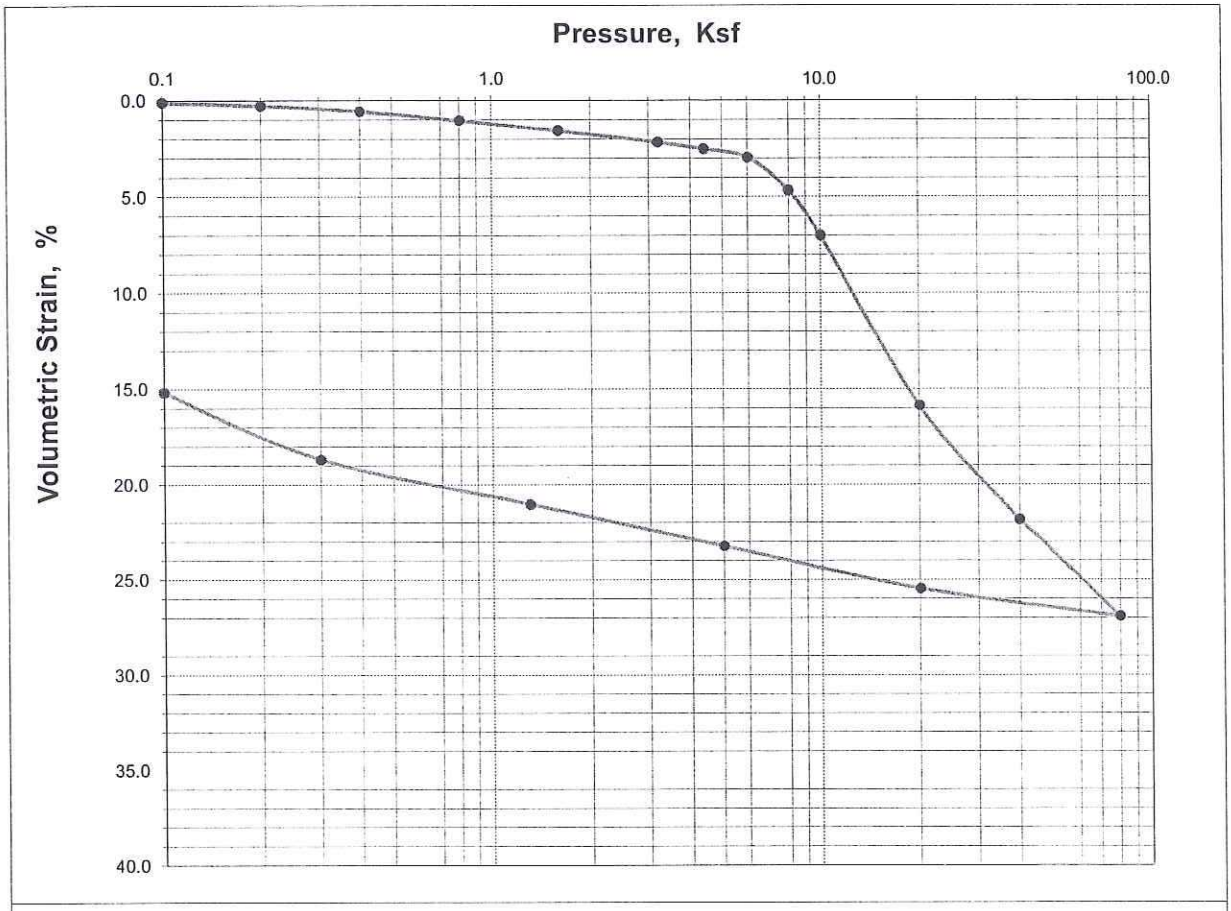
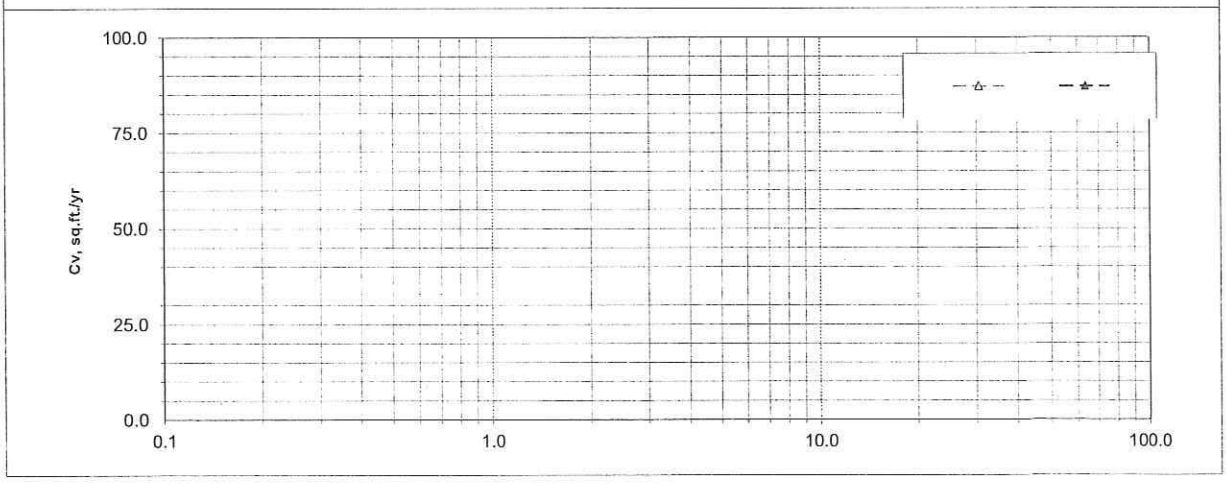
CONSOLIDATION TEST

Boring Number	B-11	Sample Number	7	Depth (ft)	26.5-29	
Soil Description	Light grayish brown fat clay					

	Water Content, %	Total Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Liquid Limit, %	Plasticity Index, %
Initial	35.6	114.5	0.996	96.4	1.00	2.420	(assumed) 2.70		
Final	25.9	125.3	0.694	100.8	0.848				





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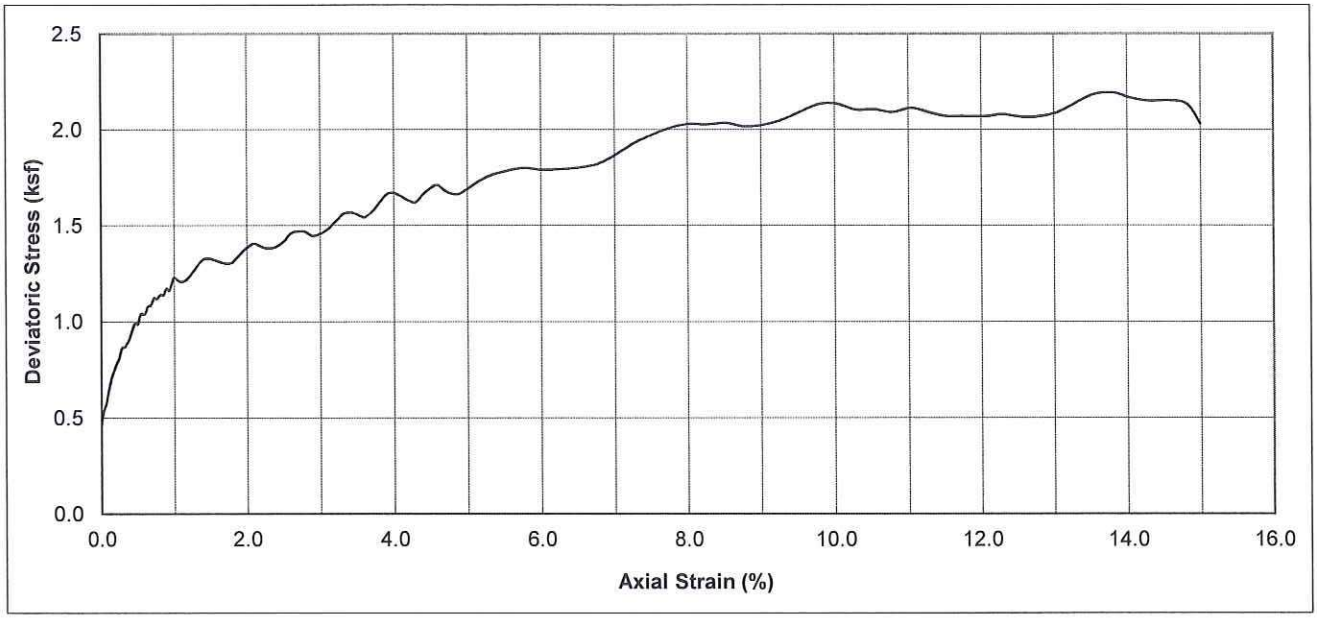
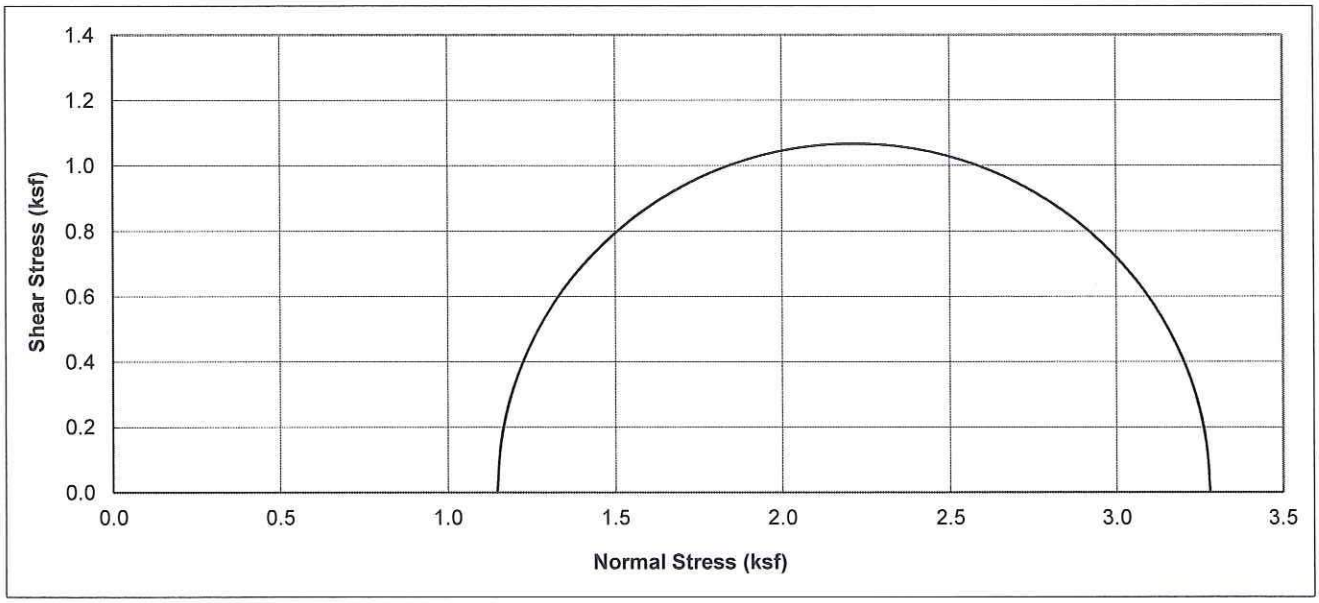
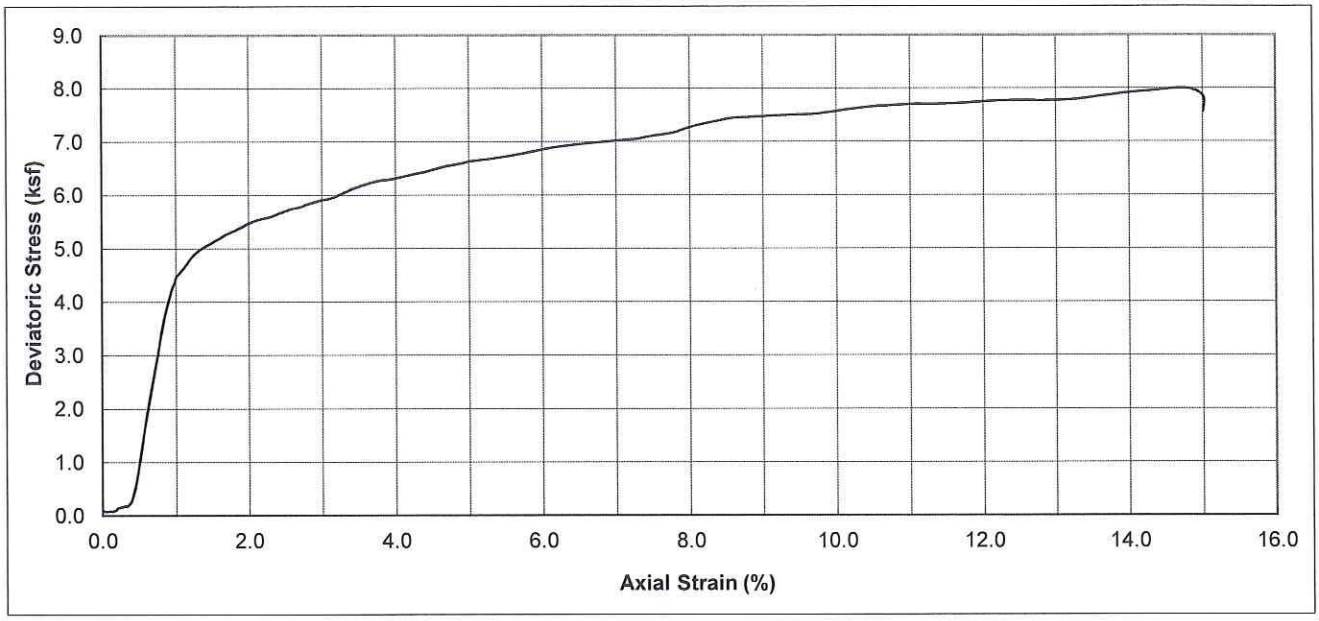
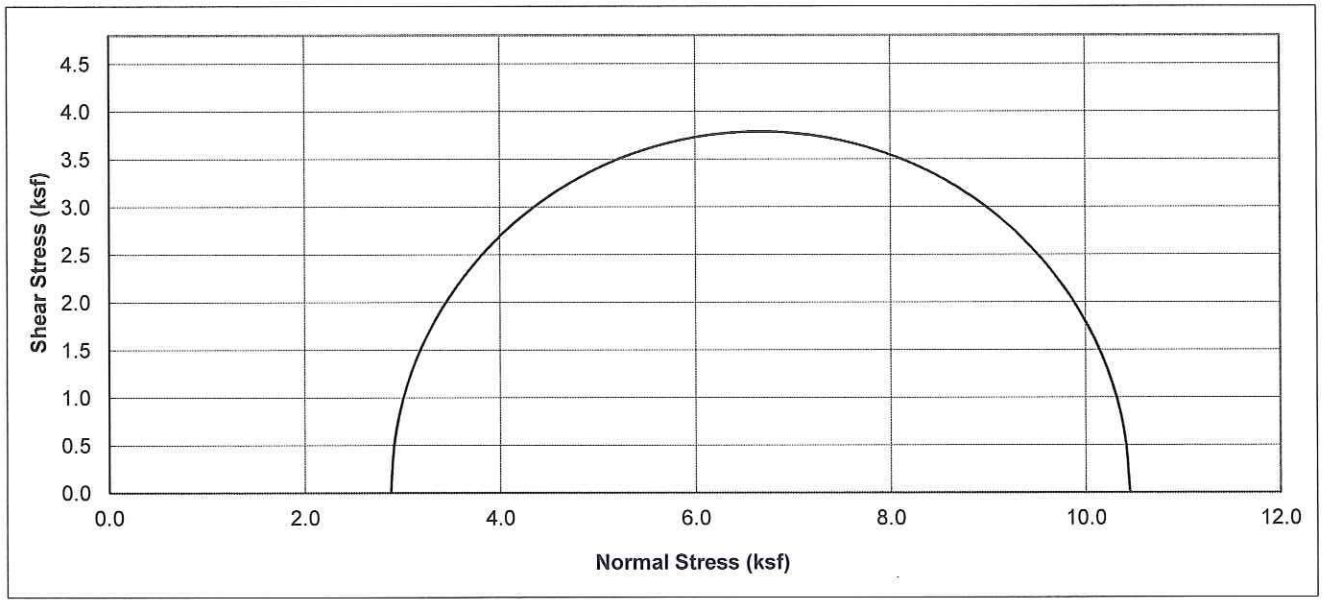




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-002	D-4	15	Olive Brown, LEAN CLAY (CL)	96.8	25.92	1.15	2.13	94.5

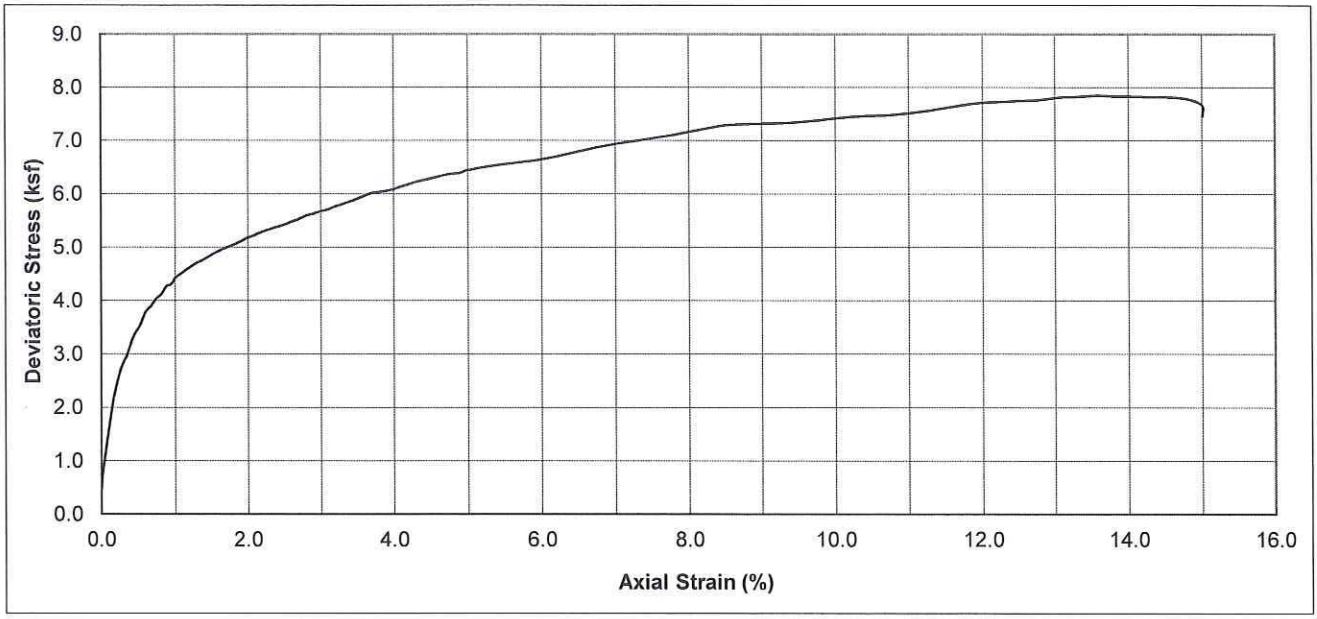
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 **Date :** 06/06/11	**(ASTM D2850)** Figure No. :

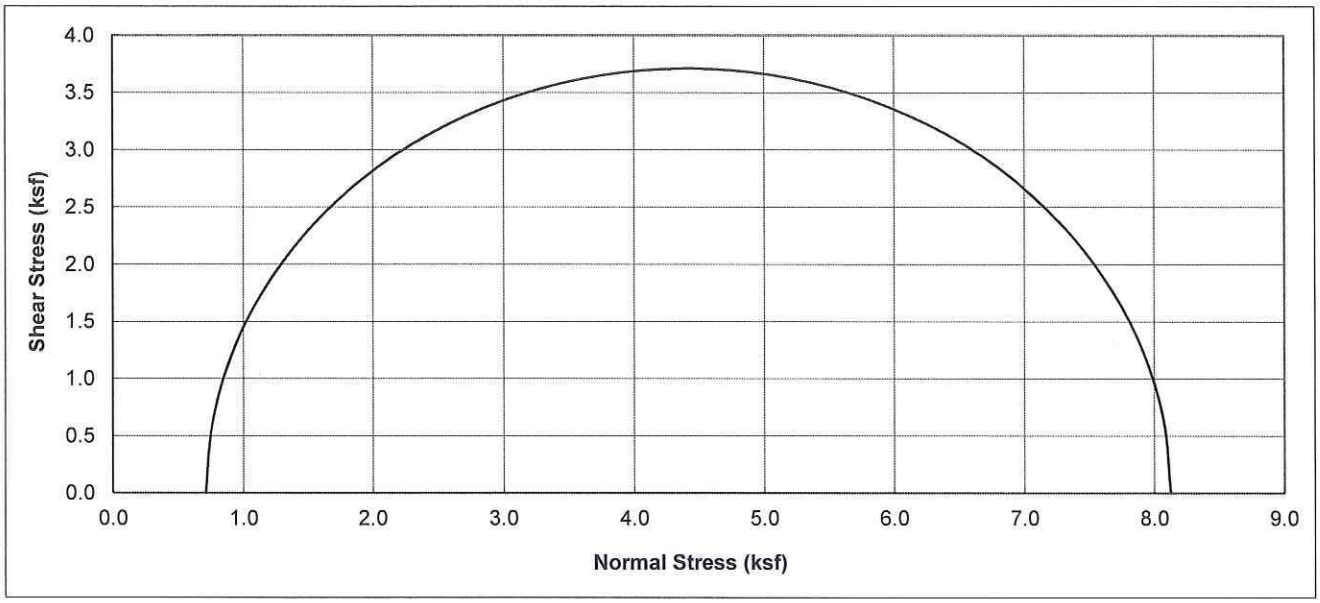




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-002	D-8	35	Olive Brown, LEAN CLAY (CL)	107.9	19.30	2.87	7.58	92.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
Project No. : 10-133 **Date :** 06/07/11	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-006	D-1	5	Olive Brown, LEAN CLAY(CL)	110.0	17.63	0.70	7.42	89.6

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
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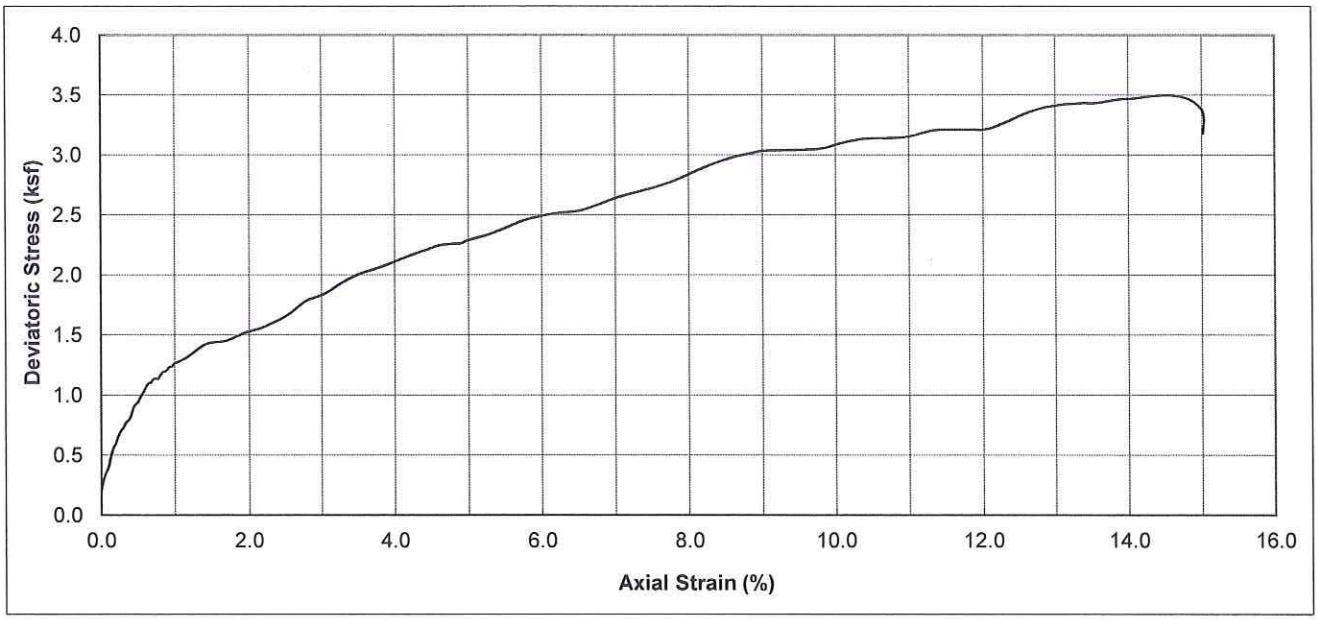

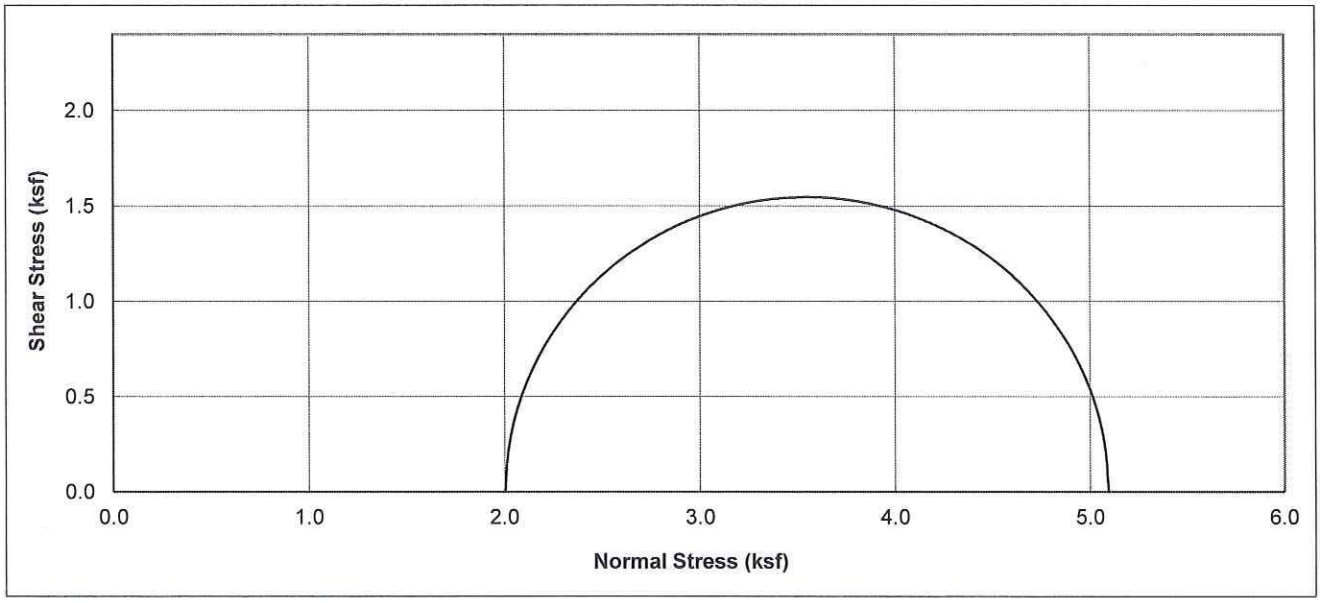

Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-006	D-5	25	Olive Brown , LEAN CLAY (CL)	106.8	21.41	2.00	3.09	100.1

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
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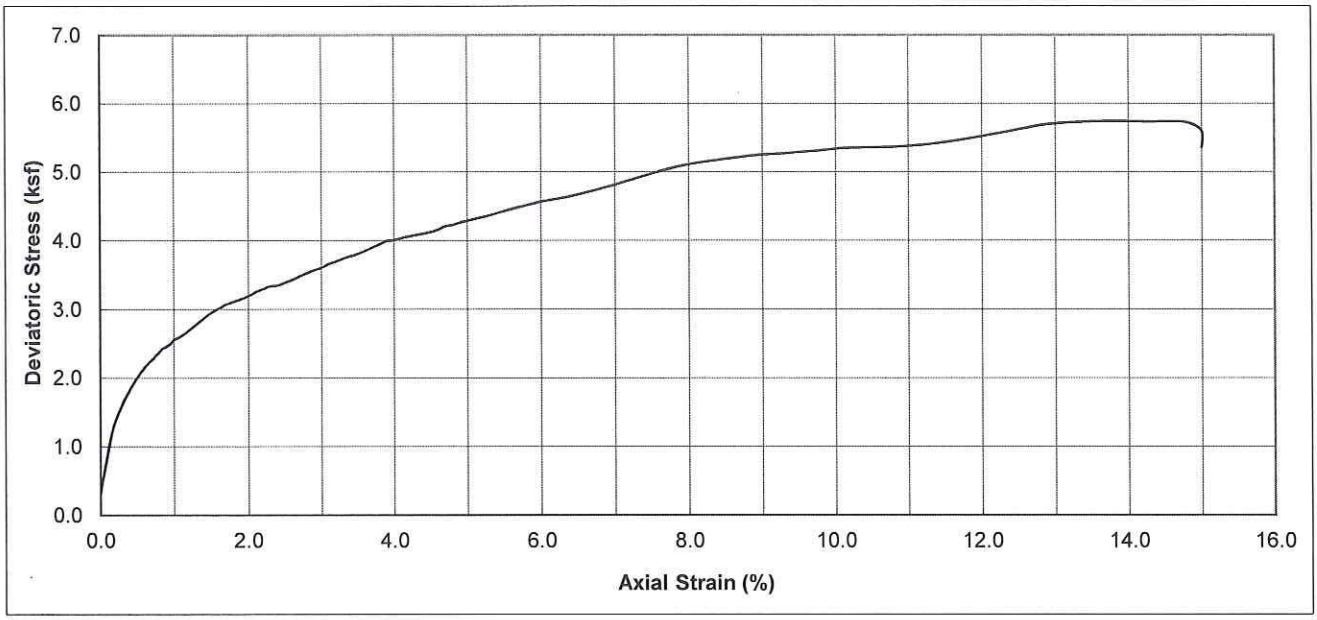

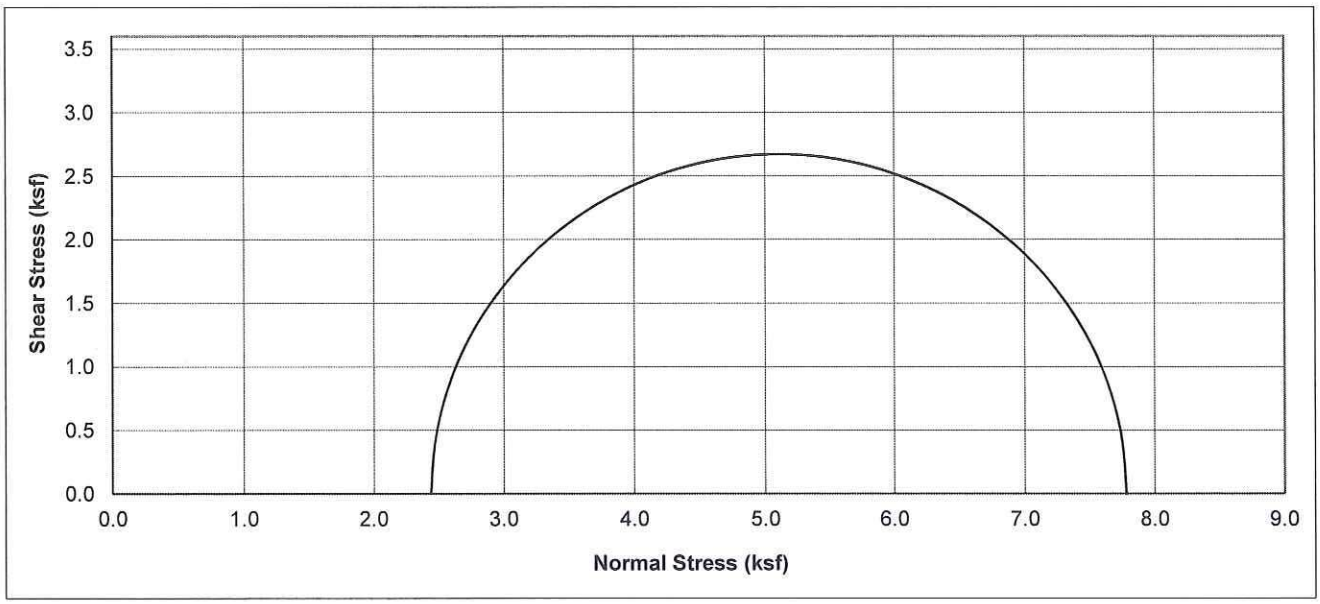

Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-008	D-6	30	Olive Brown , LEAN CLAY (CL)	111.3	17.79	2.44	5.34	93.6

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
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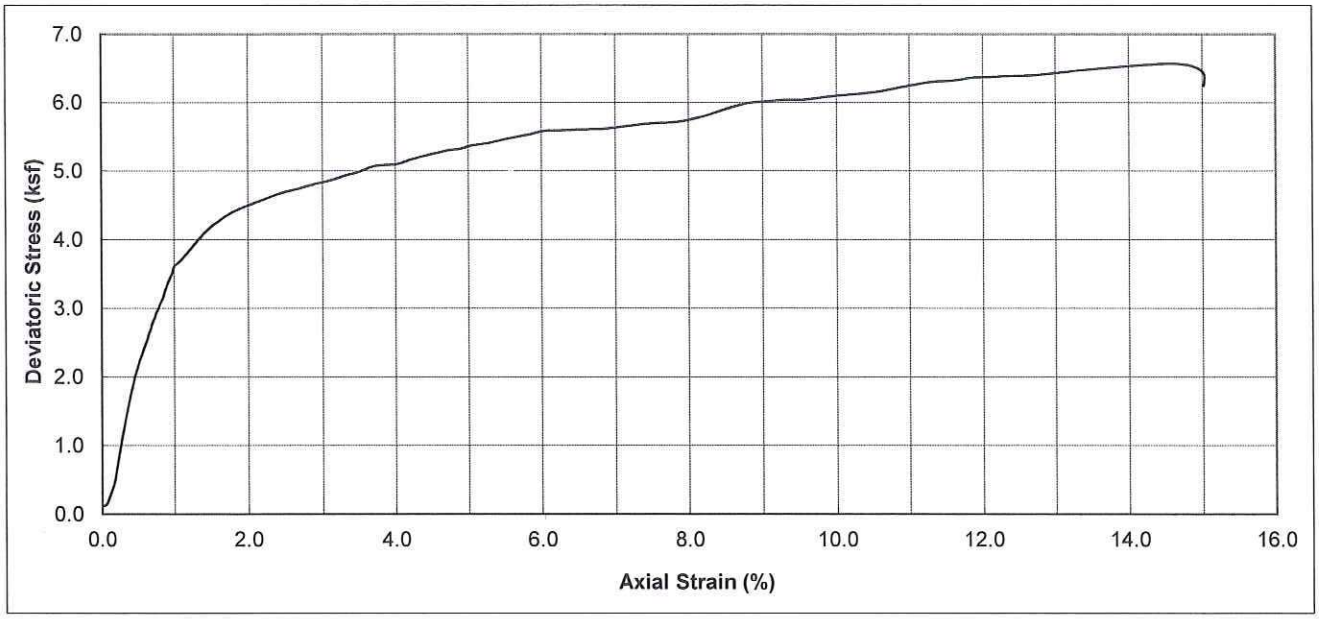
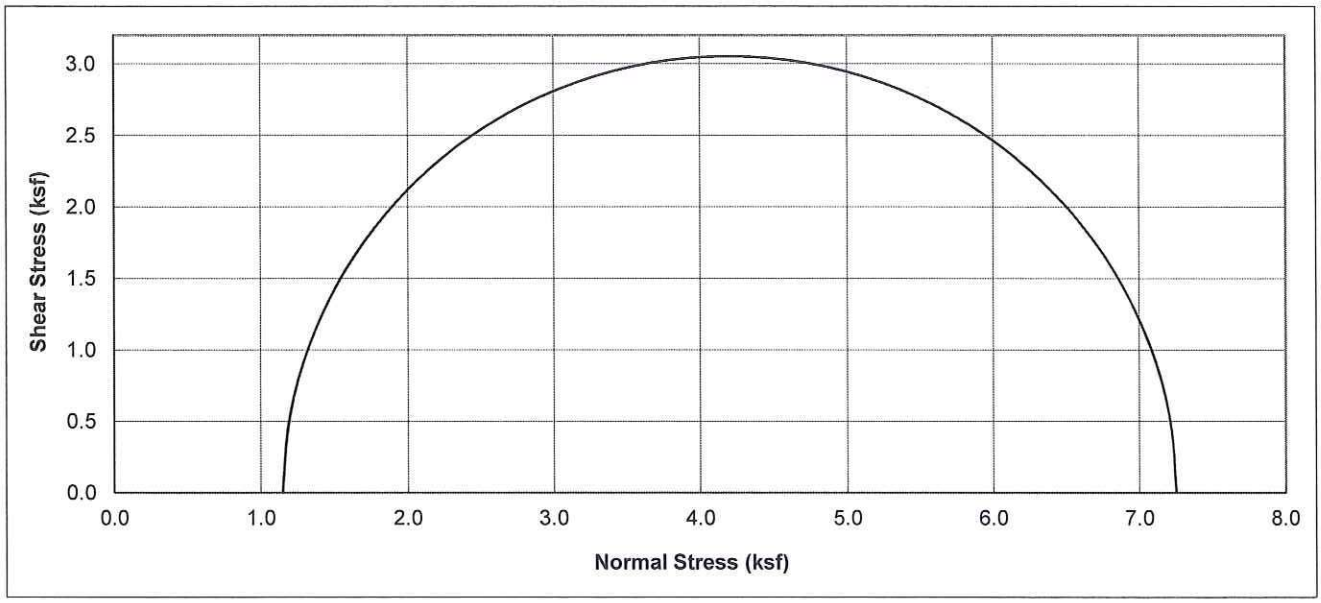
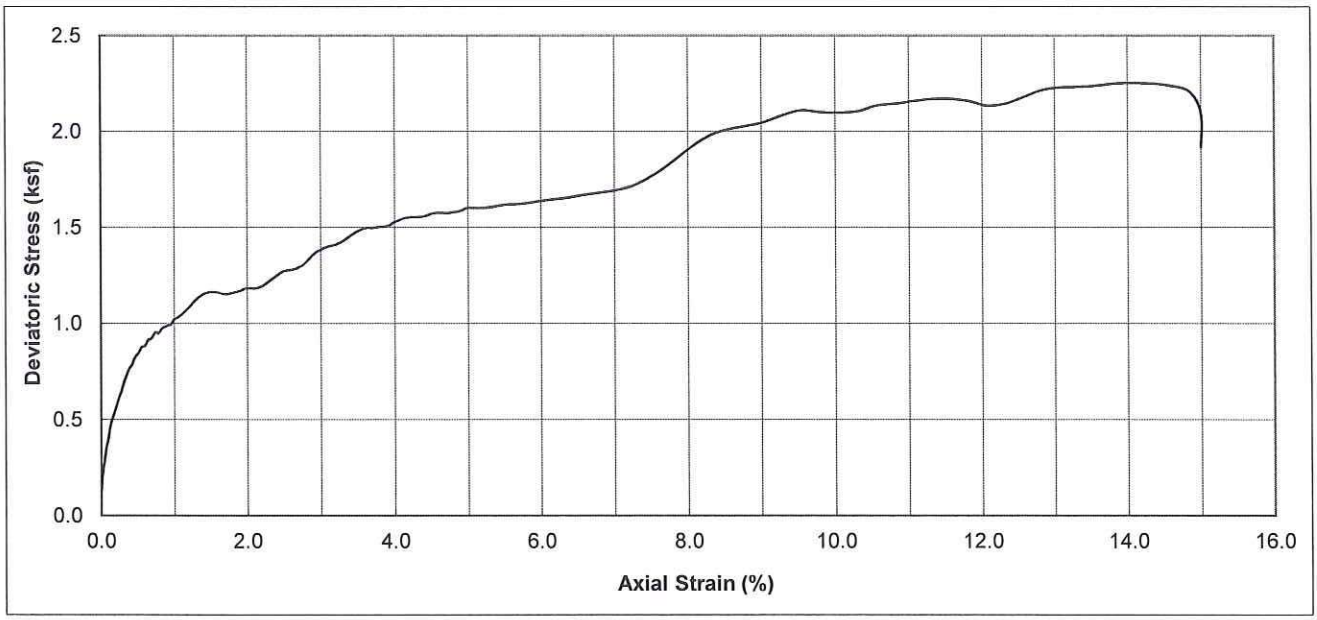
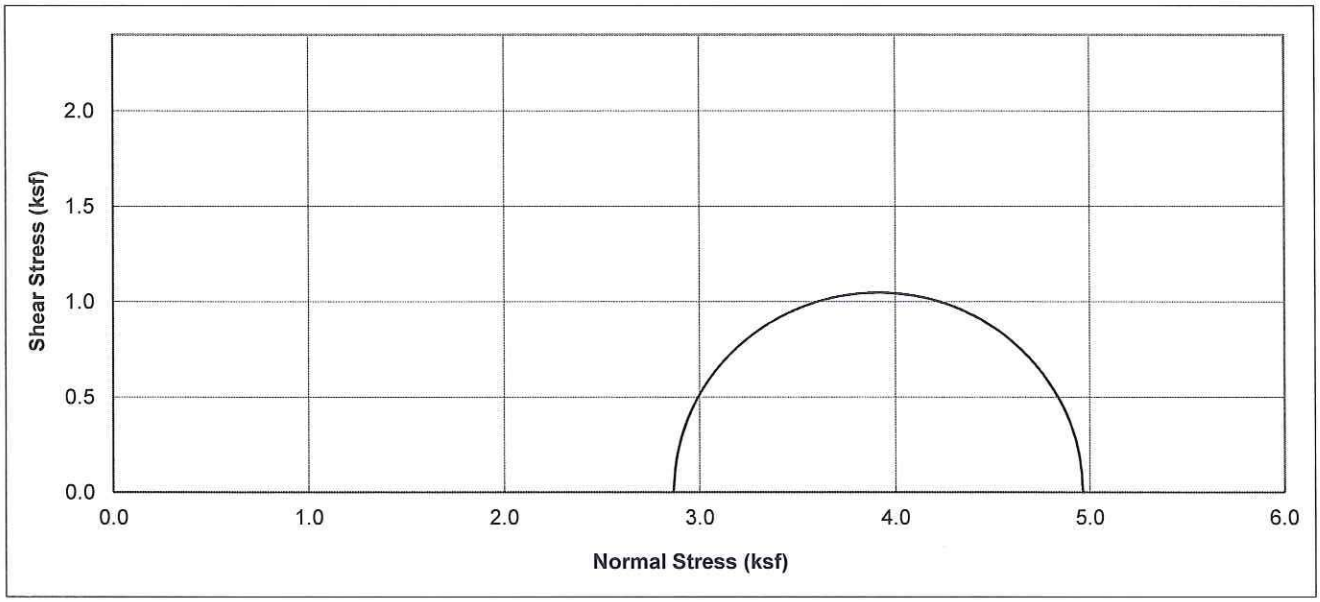




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-010	D-4	15	Olive Brown , LEAN CLAY (CL)	103.6	21.96	1.15	6.11	94.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
Project No. : 10-133 **Date :** 06/08/11	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-010	D-8	35	Olive Brown , LEAN CLAY (CL)	99.5	24.20	2.87	2.10	94.2

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
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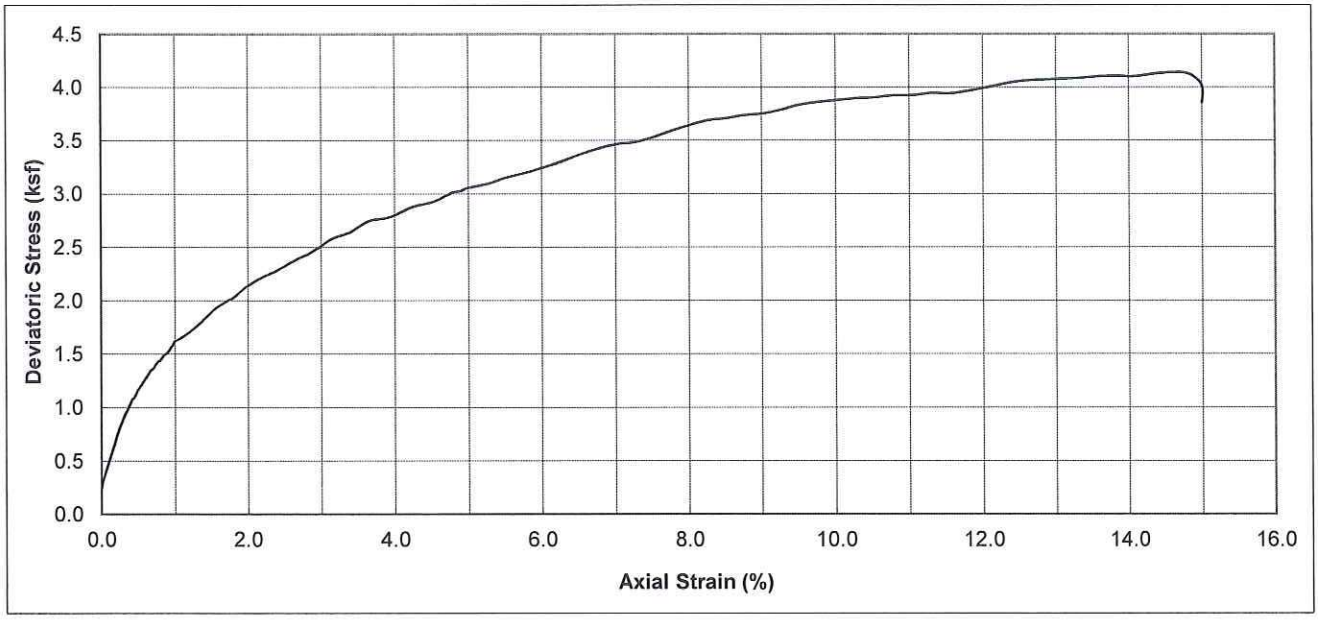
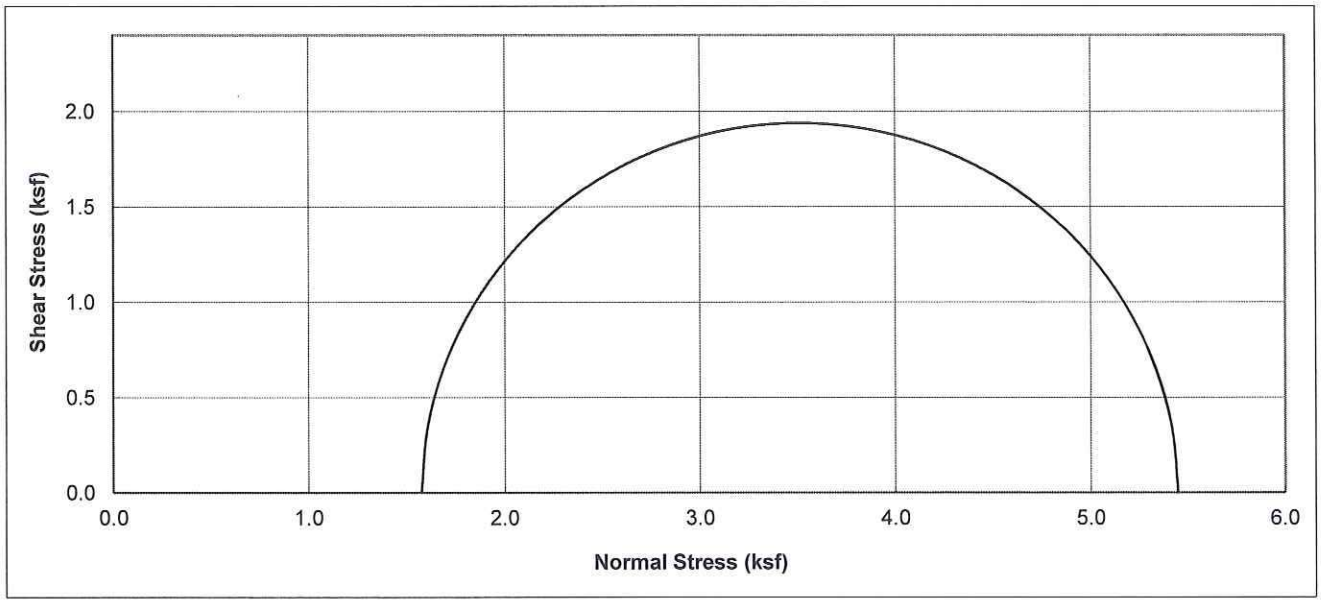
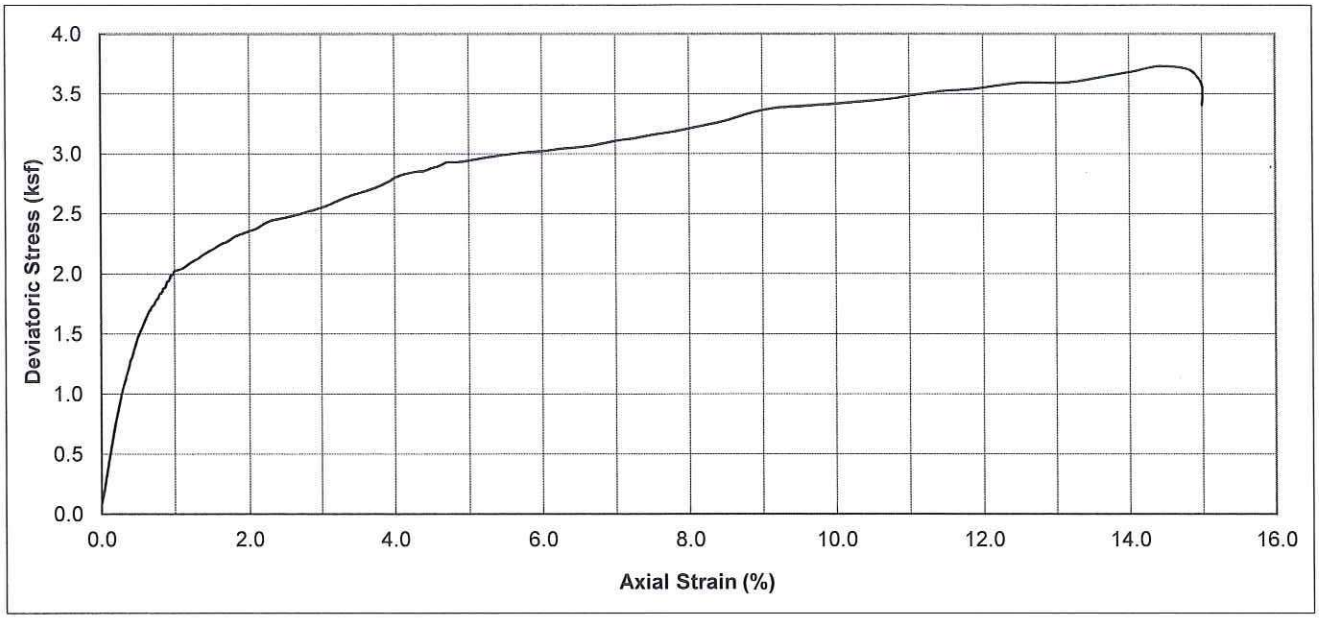
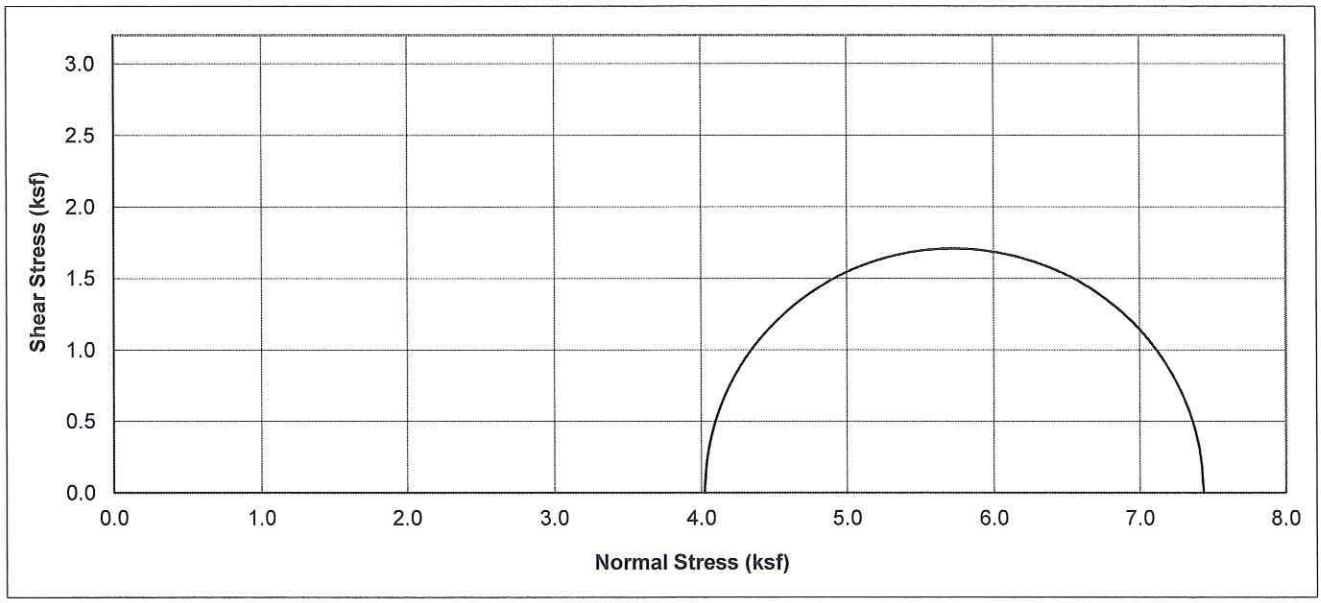




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-014	D-4	20	Olive Brown , LEAN CLAY (CL)	115.9	14.26	1.57	3.88	84.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)
Project No. : 10-133 Date : 06/08/11	Figure No. :





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-014	D-10	50	Olive Brown , FAT CLAY (CH)	95.2	27.47	4.02	3.42	96.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
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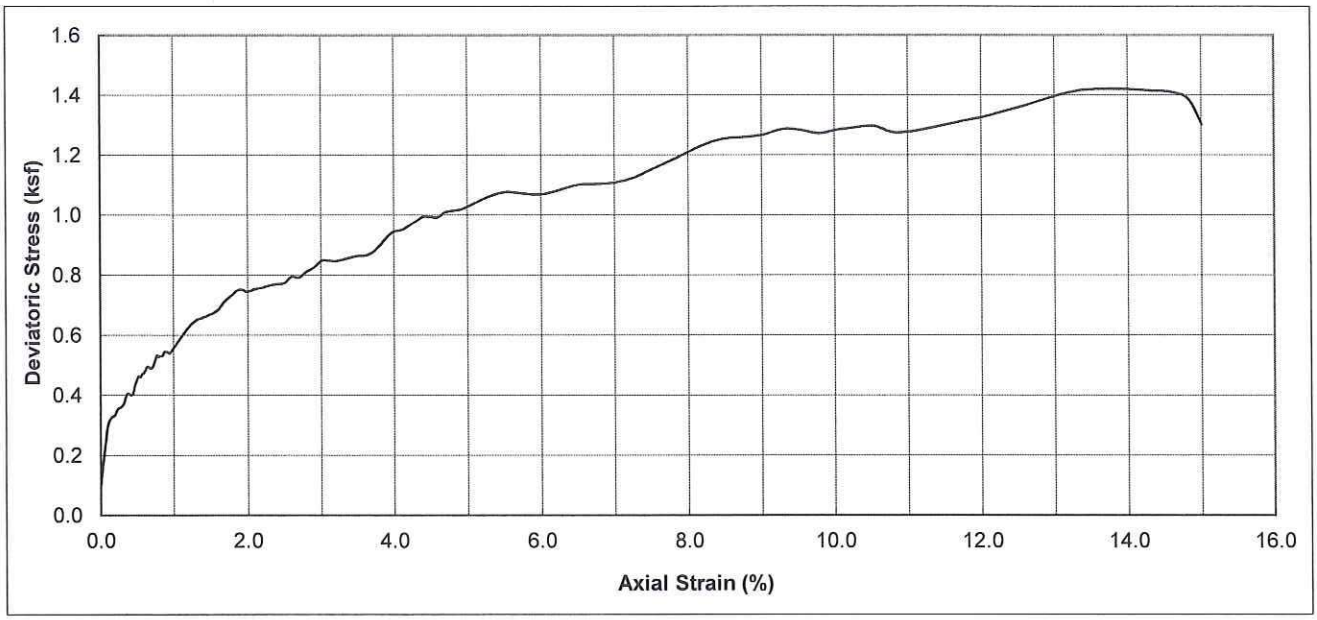

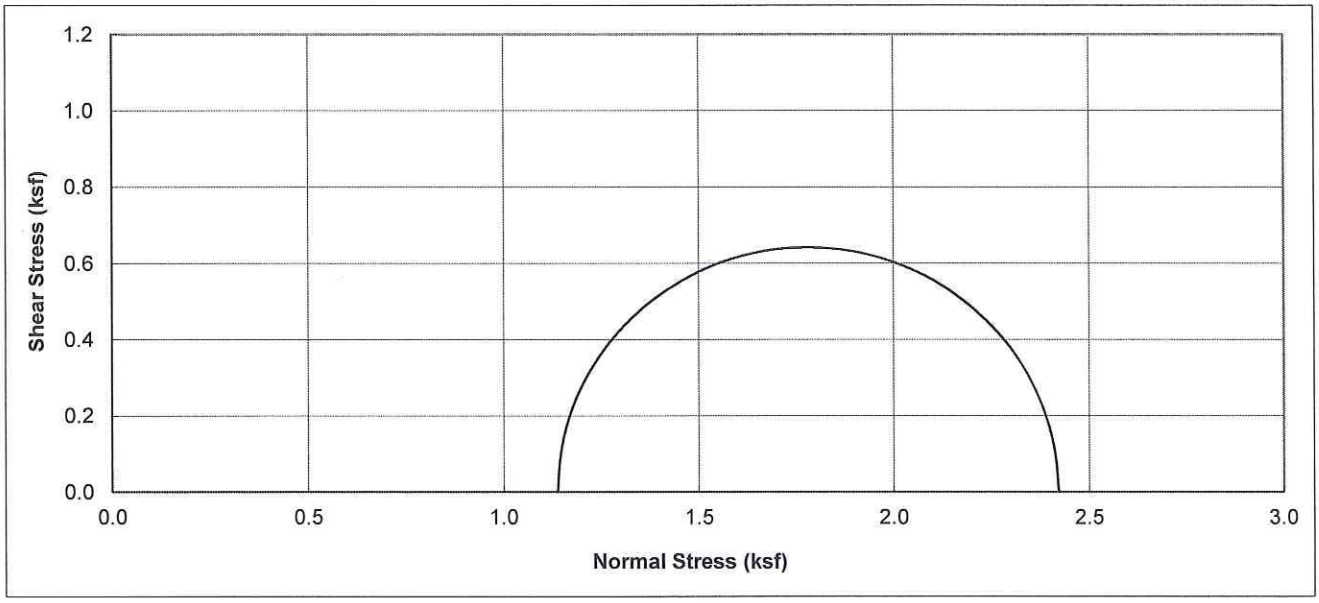

Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-021	D-3	15	Olive Brown , SANDY CLAY (CL)	105.9	21.67	1.14	1.28	99.0

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
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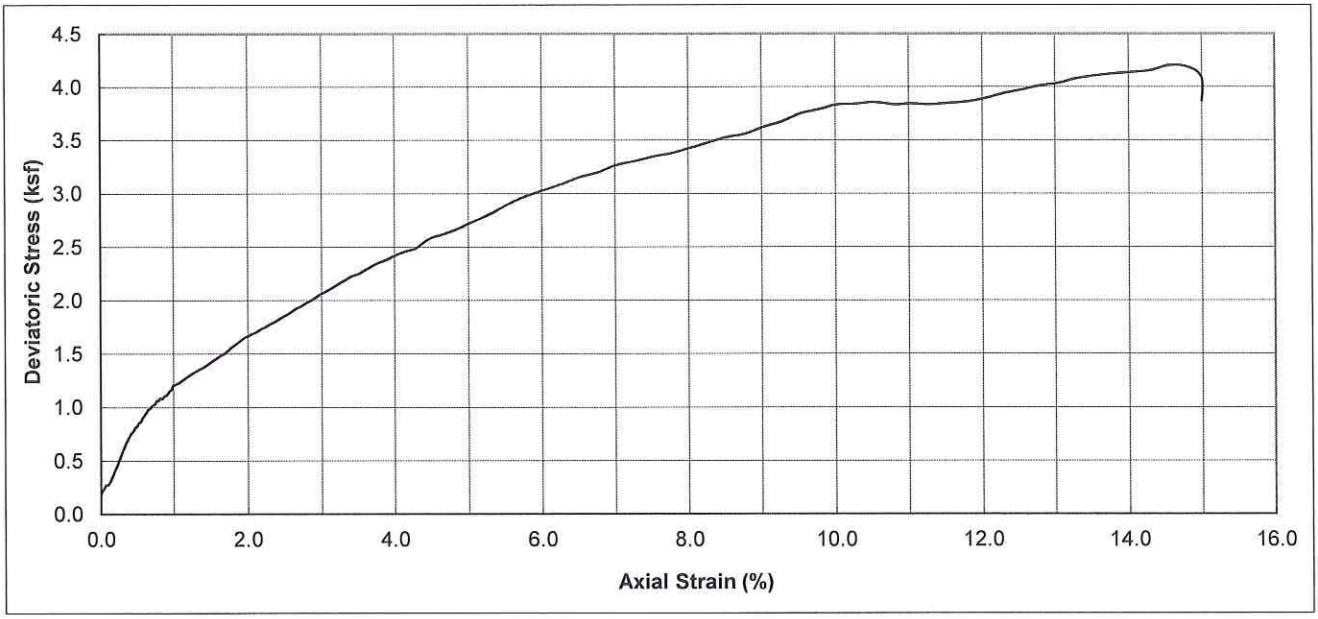
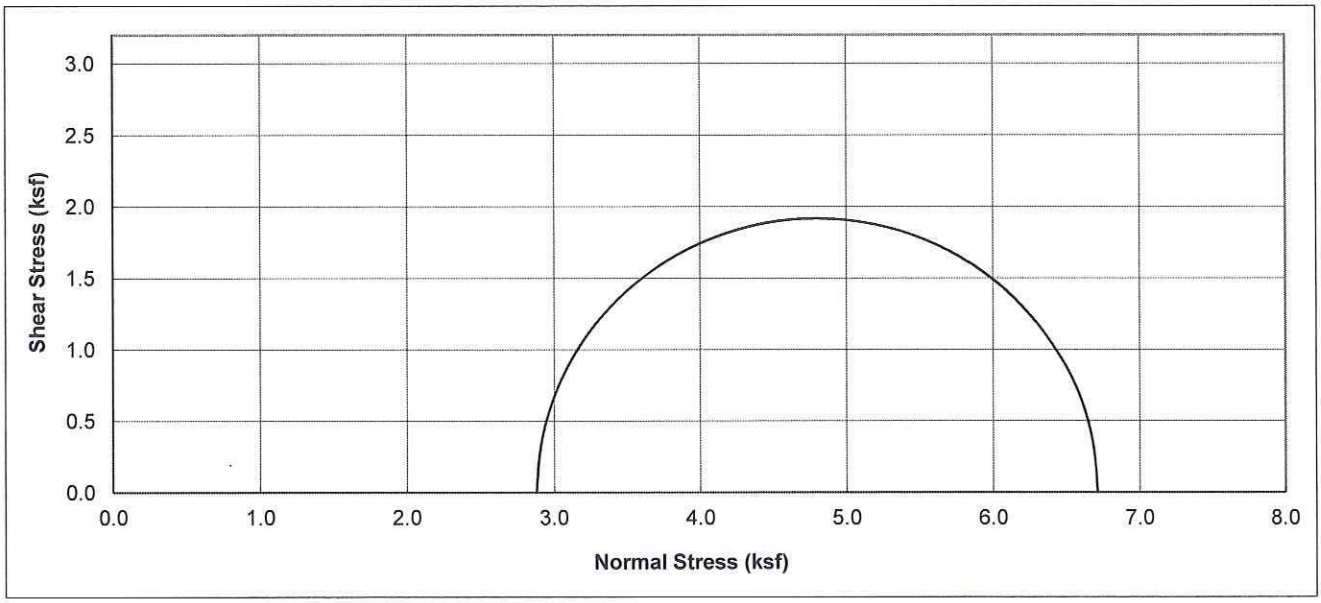
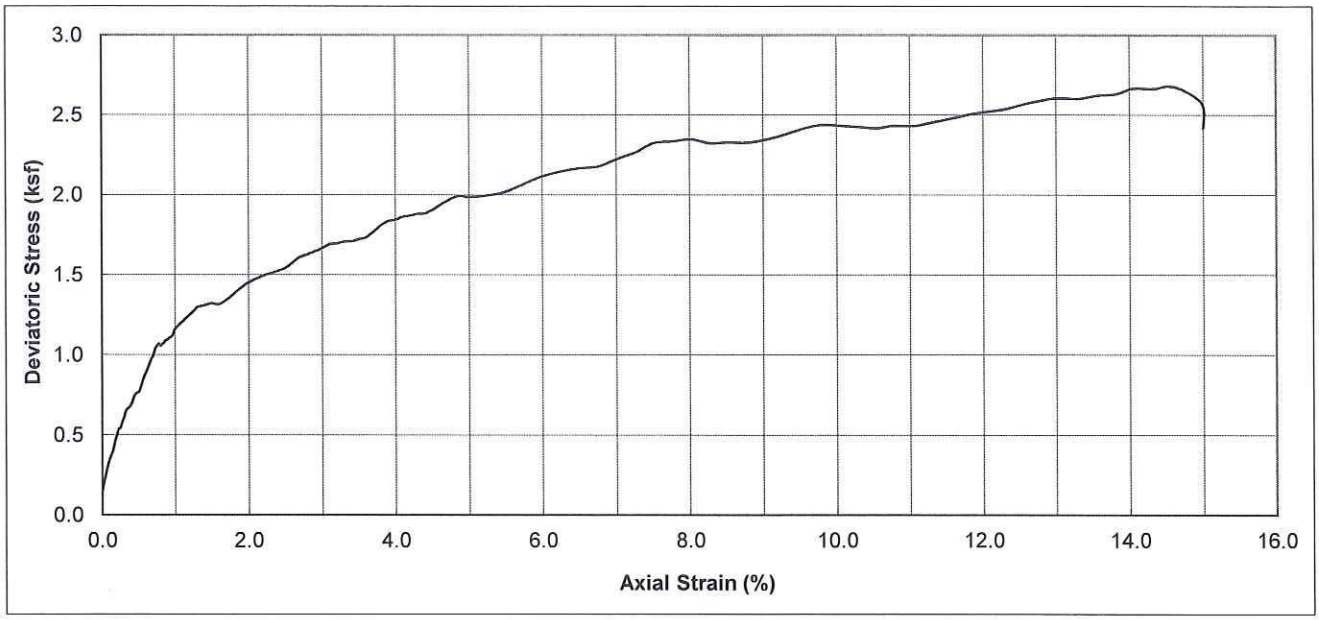
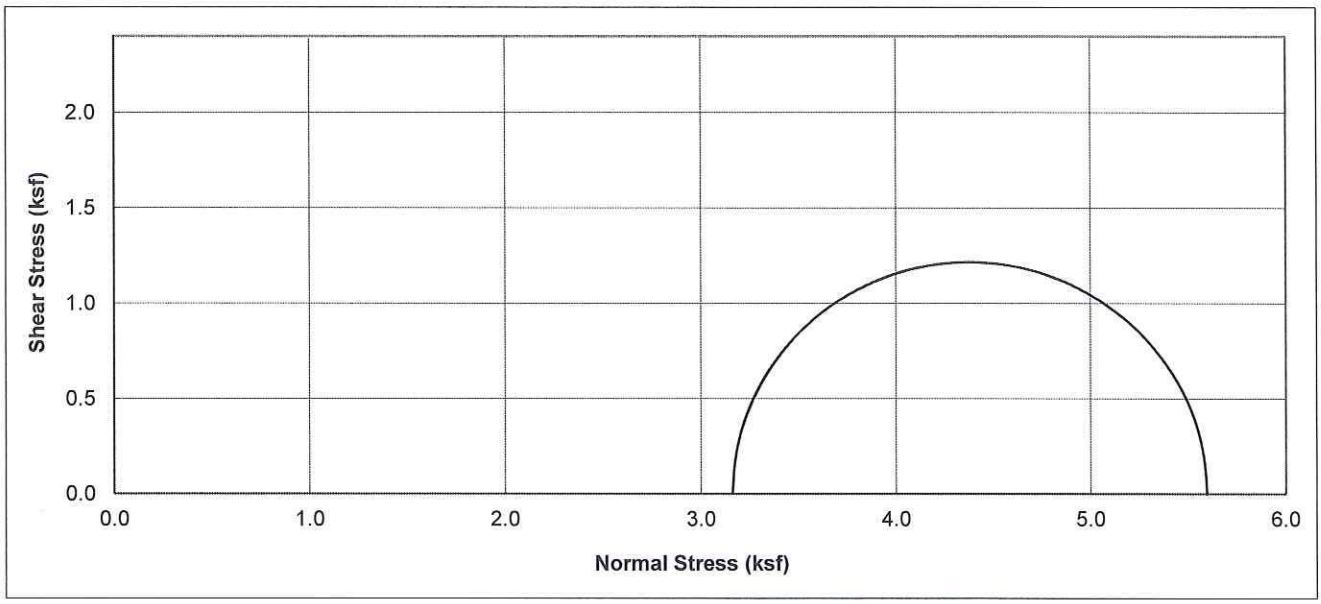




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-021	D-7	35	Olive Brown , SANDY CLAY (CL)	126.4	7.70	2.88	3.83	62.5

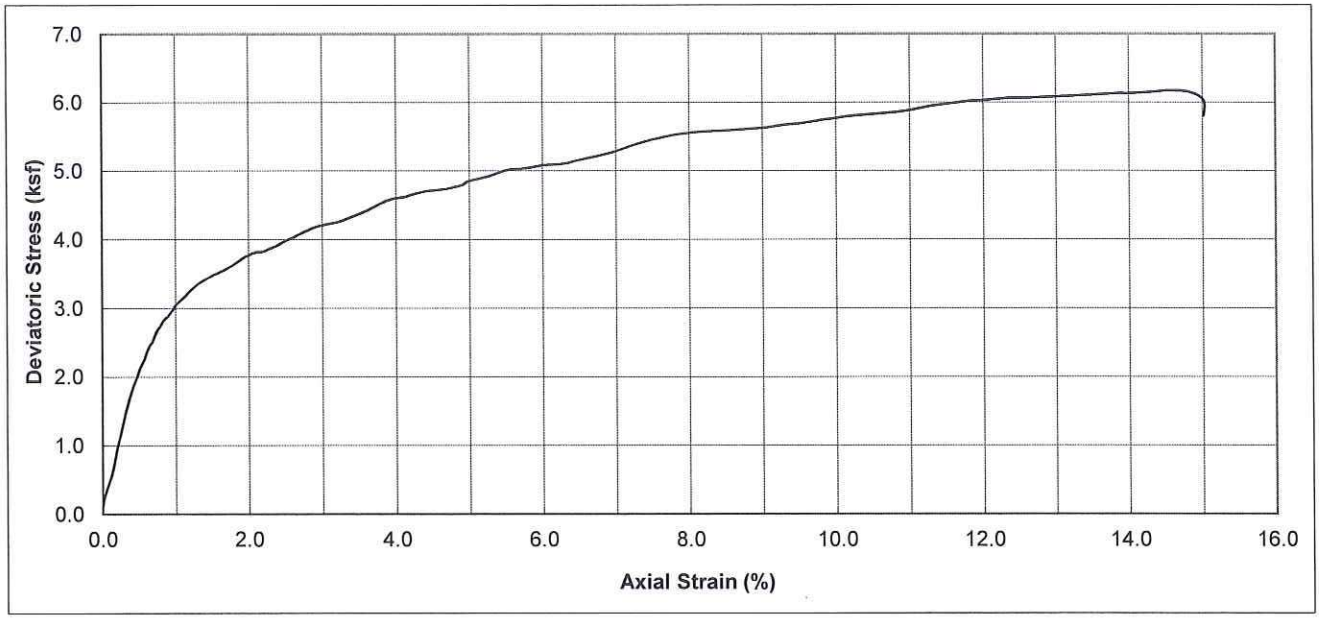
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
Project No. : 10-133 **Date :** 06/08/11	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :

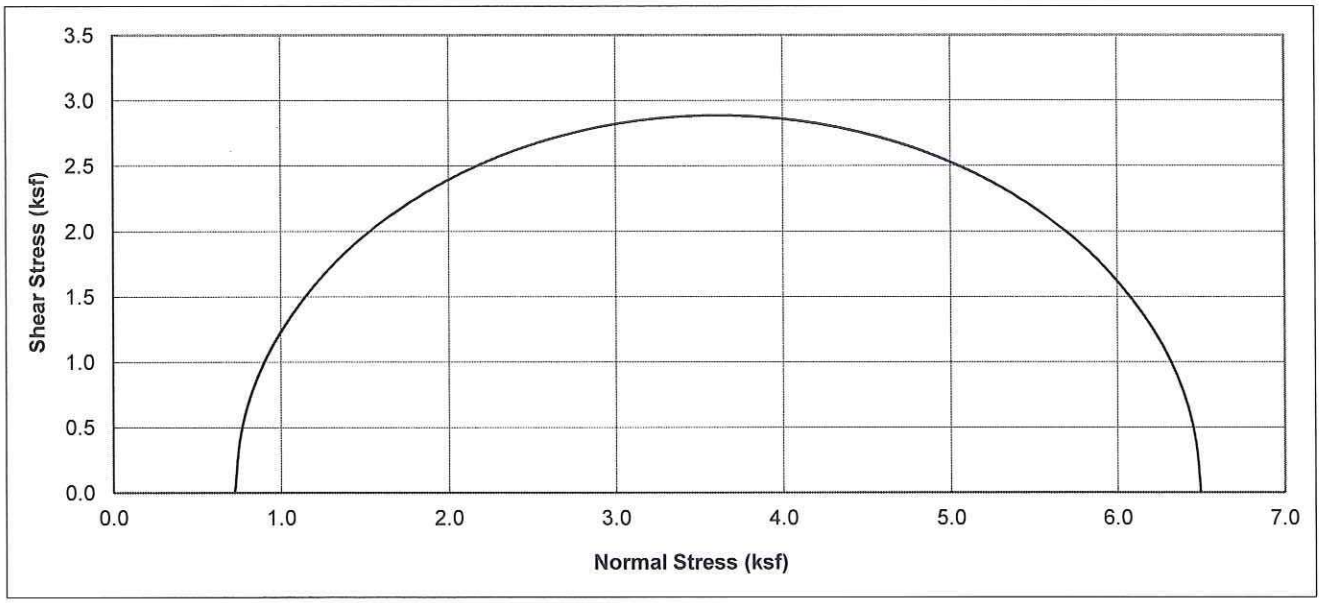




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-030	D-8	40	Olive Brown , LEAN CLAY (CL)	91.0	30.16	3.16	2.43	95.6

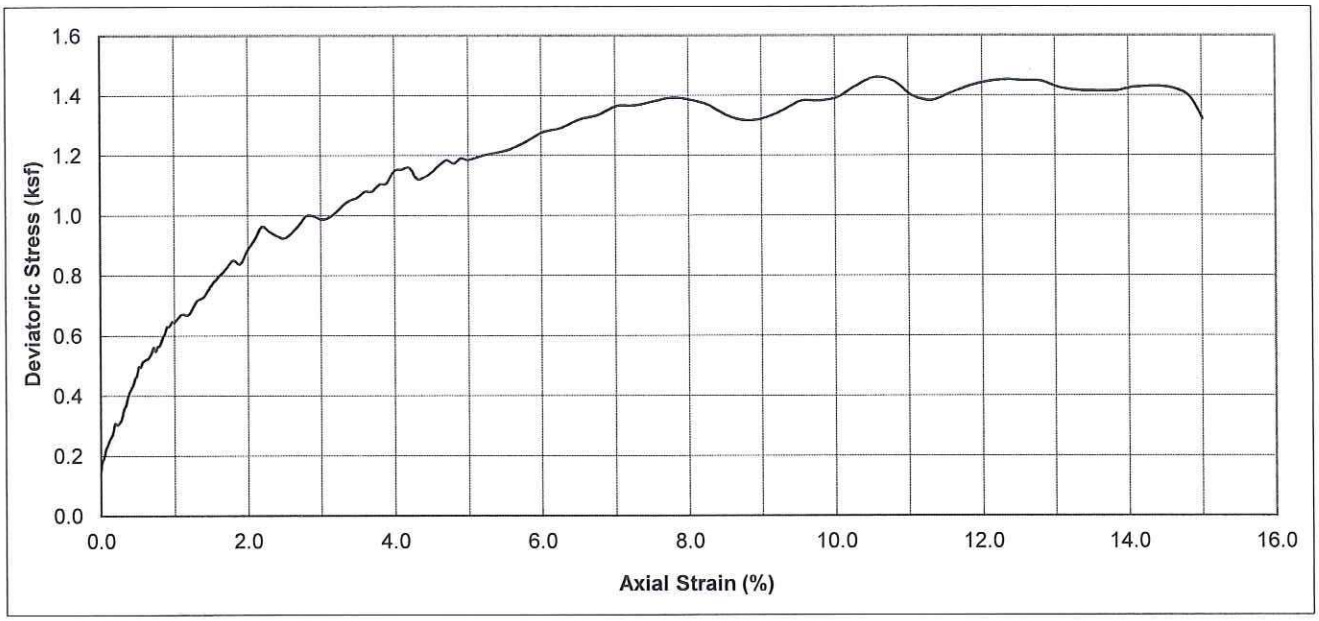
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)
Project No. : 10-133 / Date : 06/08/11	Figure No. :

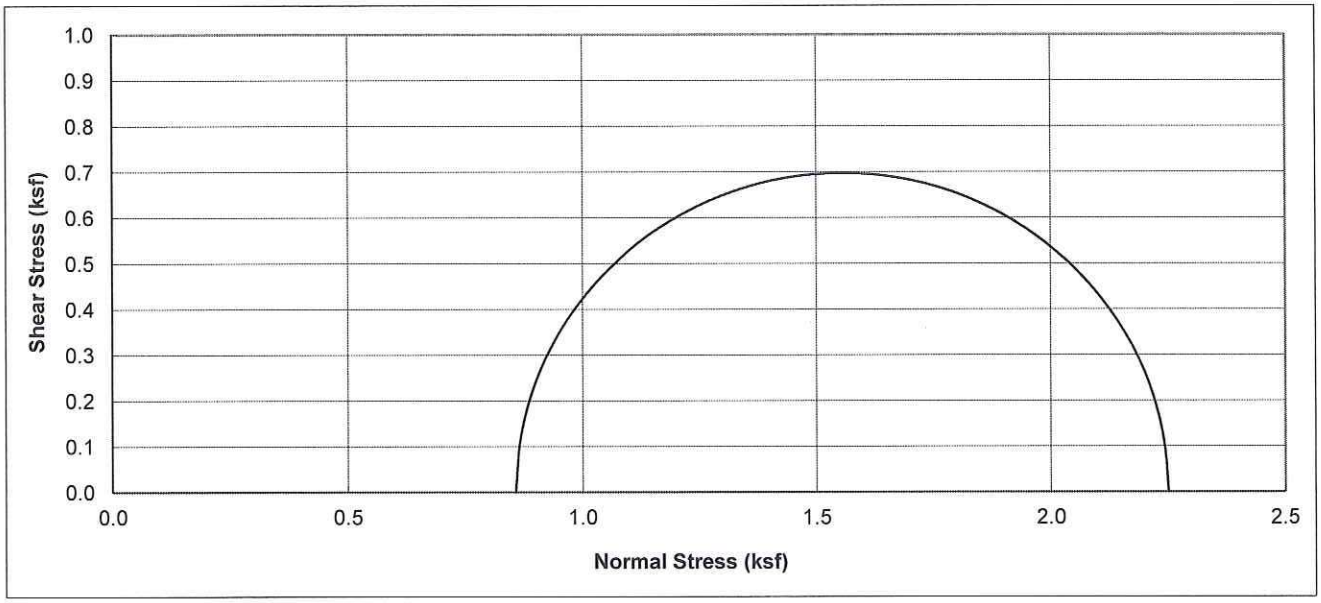




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-031	D-1	5	Olive Brown , FAT CLAY (CH)	101.9	20.71	0.72	5.77	85.5

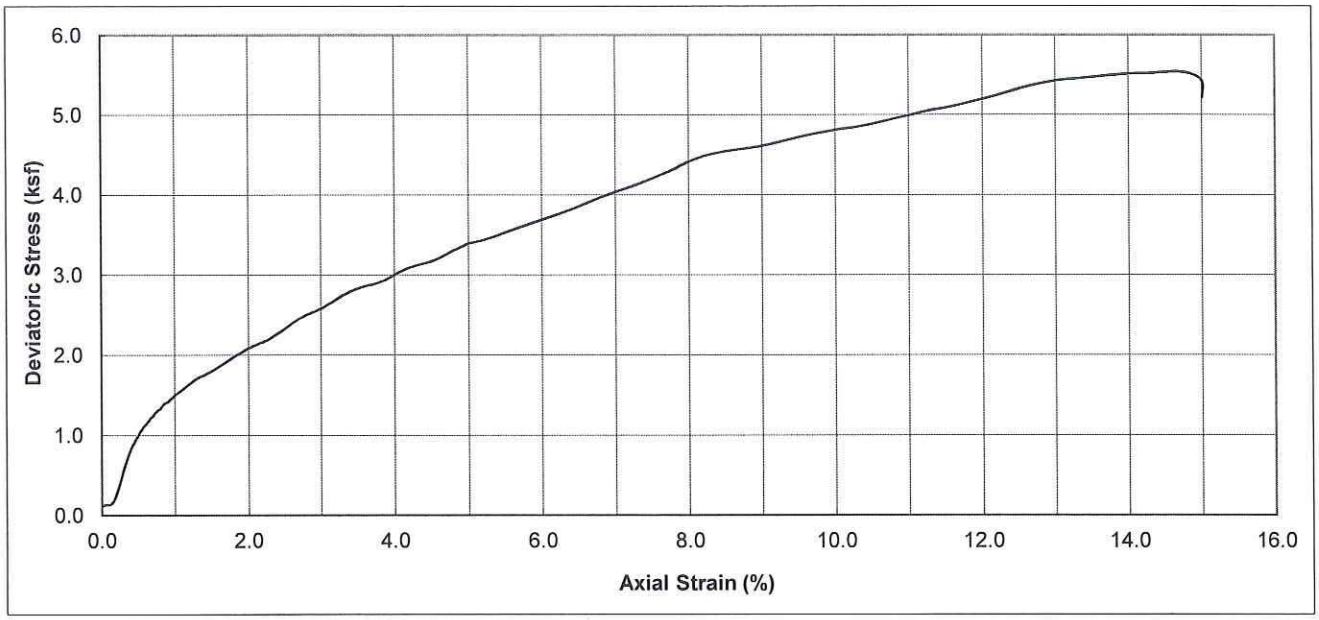
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		I-880 Operational and Safety Improvement
		UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133	Date : 06/09/11	(ASTM D2850) Figure No. :

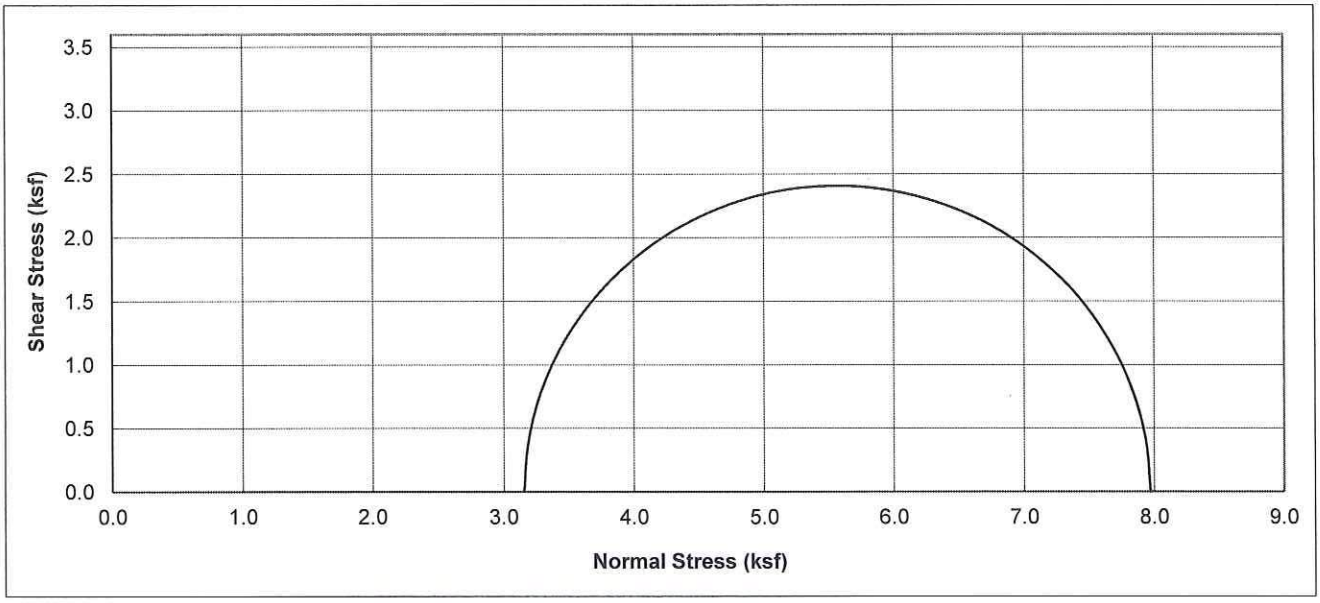




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-034	D-2	10	Olive Brown , FAT CLAY (CH)	91.3	29.17	0.86	1.39	93.3

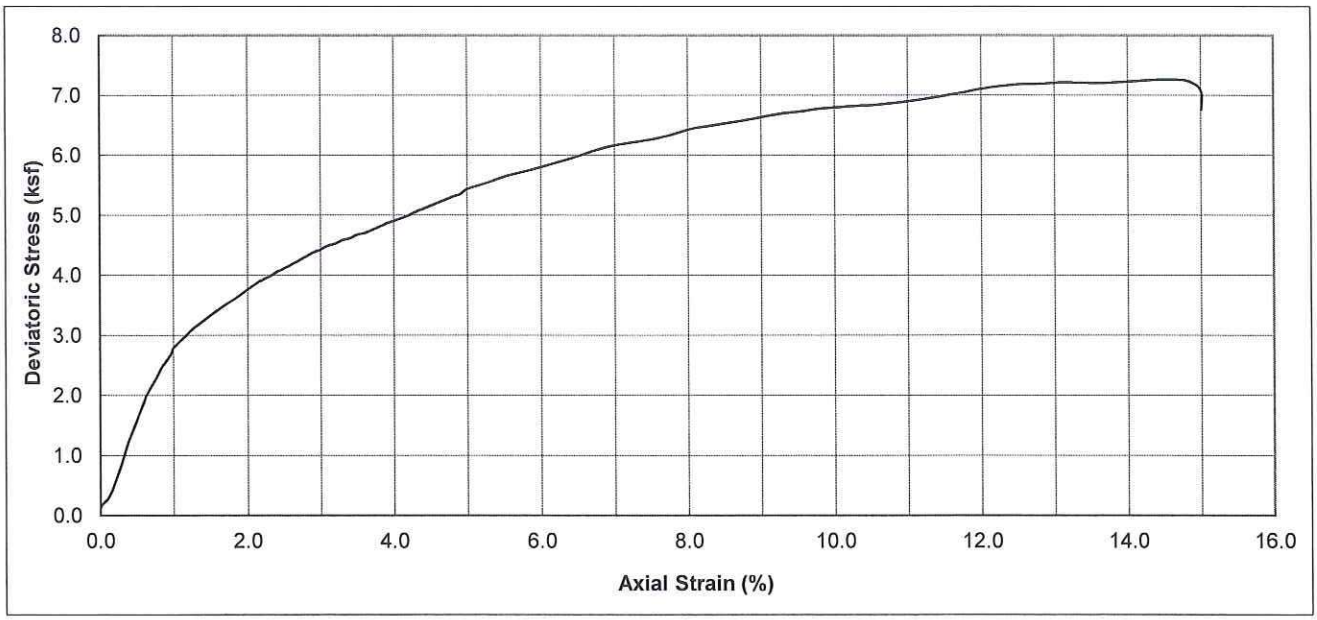
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)
Project No. : 10-133 / Date : 06/09/11	Figure No. :

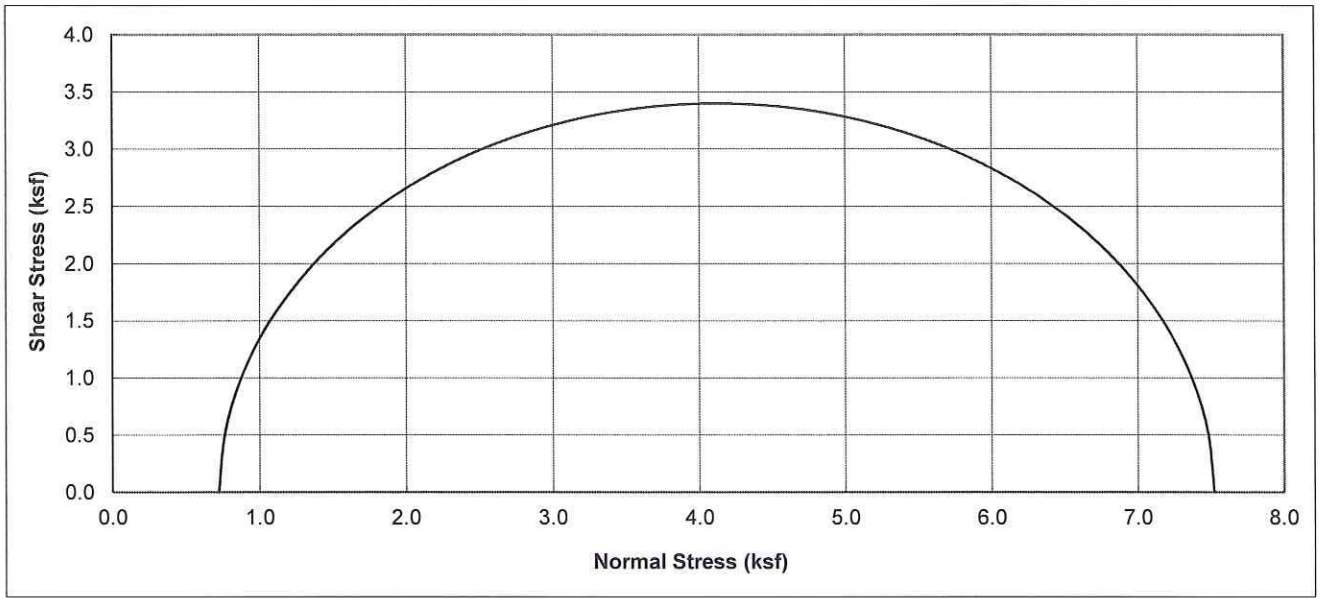




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-034	D-8	40	Olive , LEAN CLAY , (CL)	107.8	19.13	3.16	4.82	91.7

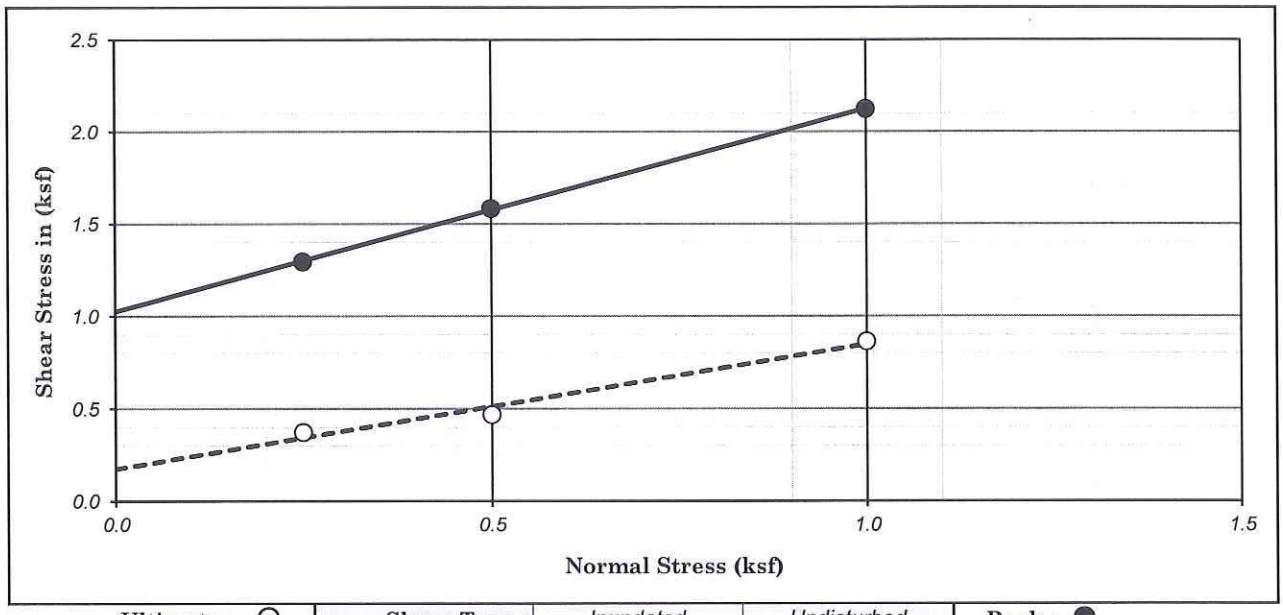
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**I-880 Operational and Safety Improvement**
	UNCONSOLIDATED UNDRAINED TEST
Project No. : 10-133 **Date :** 06/09/11	**(ASTM D2850)** Figure No. :



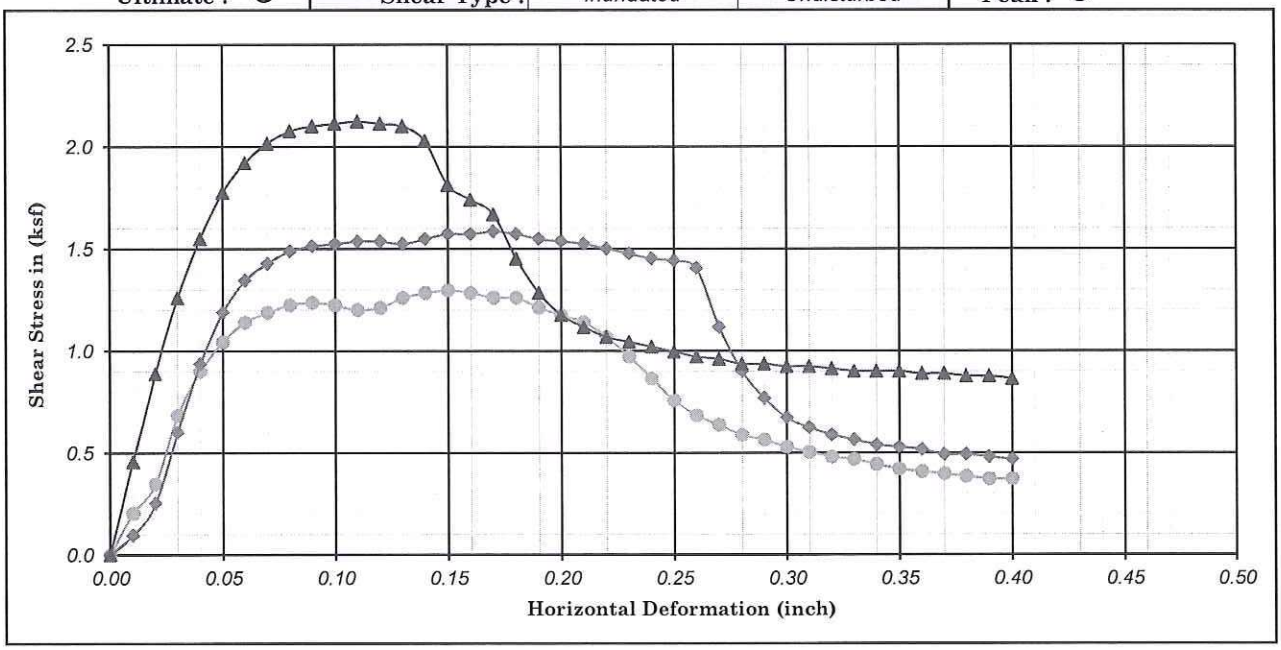


Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
R-11-035	D-1	5	Olive, LEAN CLAY(CL)	109.7	17.74	0.72	6.80	89.5

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-880 Operational and Safety Improvement
	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)
Project No. : 10-133 / Date : 06/09/11	Figure No. :



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-002		Strength Intercept (C) :	1.03	(ksf)	Peak	0.17	(ksf)	Ultimate		
Sample No. : D-1			49.12	(kPa)		8.33	(kPa)			
Depth (ft/m) : 5.0	0.00	Friction Angle (ϕ) :	47.74	Degree		34.04	Degree			
Description : olive-brown/black, yellow dots, Lean CLAY (CL)						Shear Rate (inch/minute) :		0.02		

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	24.35	103.22	16.25	0.63	0.25	11.97	1.30	62.05	0.37	17.81
◆	22.75	104.52	16.45	0.61	0.50	23.94	1.58	75.84	0.47	22.41
▲	24.46	101.82	16.03	0.66	1.00	47.88	2.12	101.70	0.86	41.37

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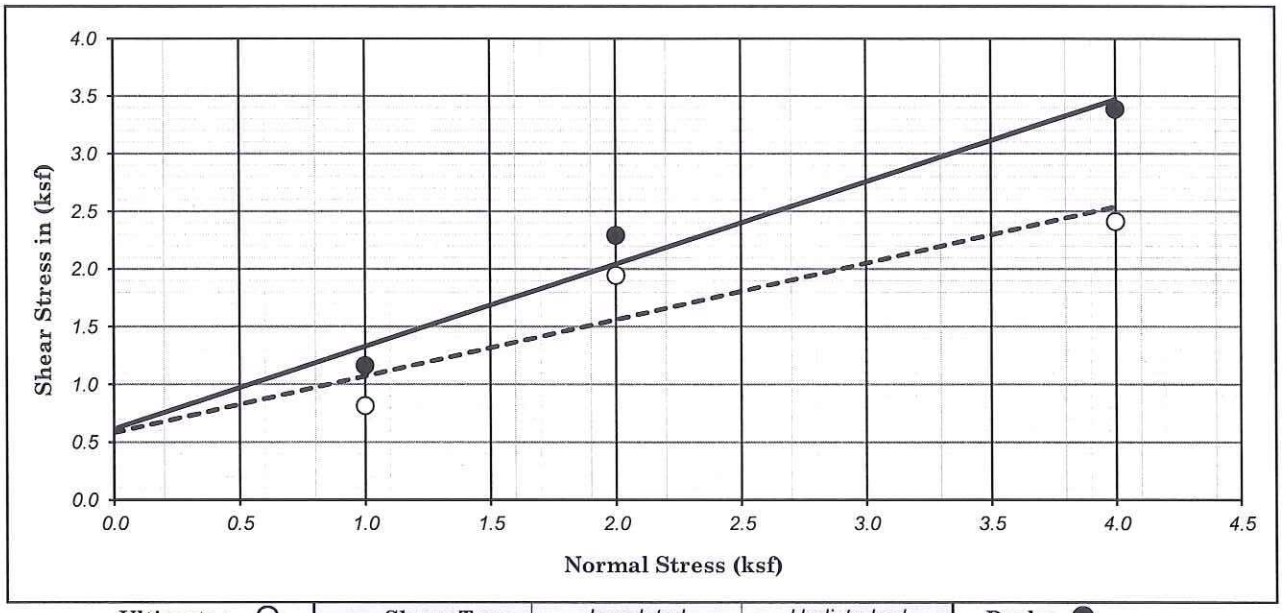
Geotechnical and Earthquake Engineering

I-880 Operational and Safety Improvement

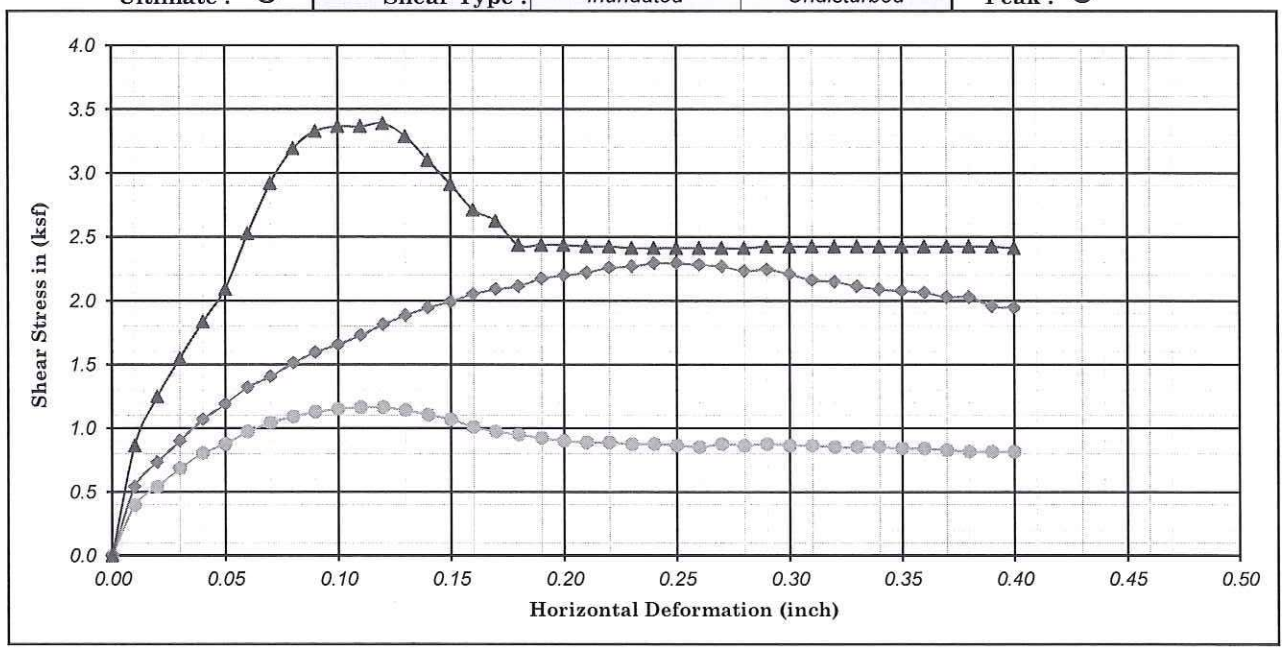
Project No. : 10-133 | **Date :** 06/09/11

DIRECT SHEAR TEST (ASTM D-3080)

Figure No. :



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-008		Strength Intercept (C) :	0.62	(ksf)	Peak	0.58	(ksf)	Ultimate
Sample No. : D-4			29.49	(kPa)		27.87	(kPa)	
Depth (ft/m) : 20.0	0.00	Friction Angle (ϕ) :	35.52	Degree		26.08	Degree	

Description : Dark yellowish brown, CLAYEY SAND with GRAVEL (SC) — Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.60	105.23	16.56	0.60	1.00	47.88	1.16	55.73	0.82	39.07
◆	21.21	111.76	17.59	0.51	2.00	95.76	2.29	109.74	1.94	93.08
▲	25.46	101.06	15.91	0.67	4.00	191.52	3.39	162.22	2.41	115.49

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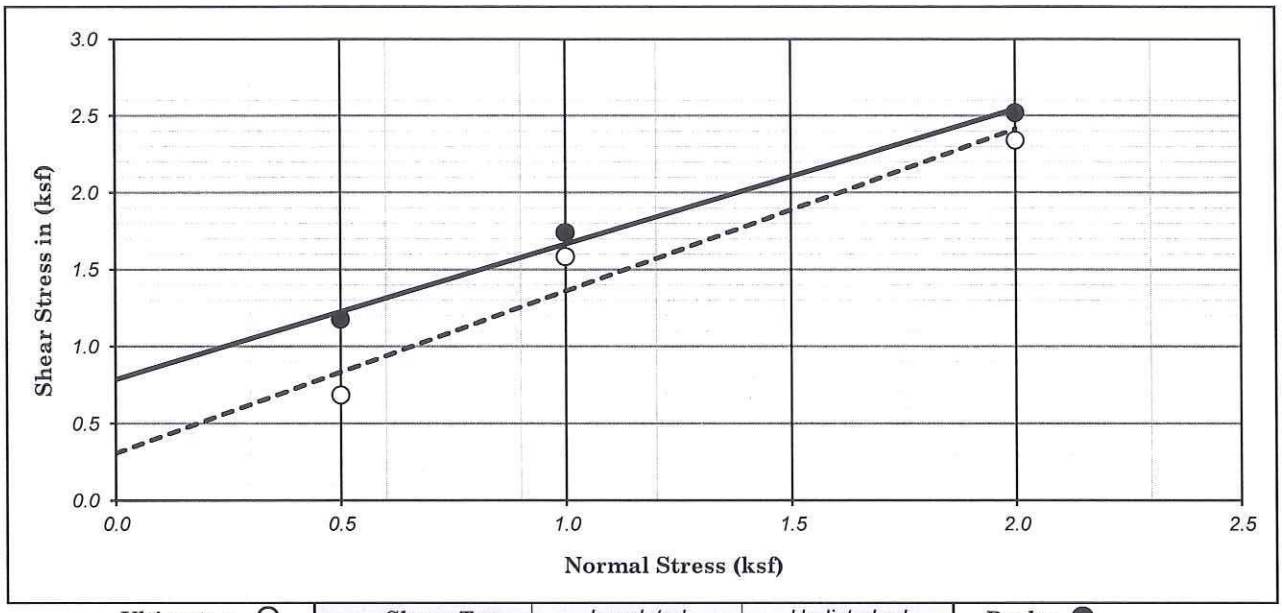
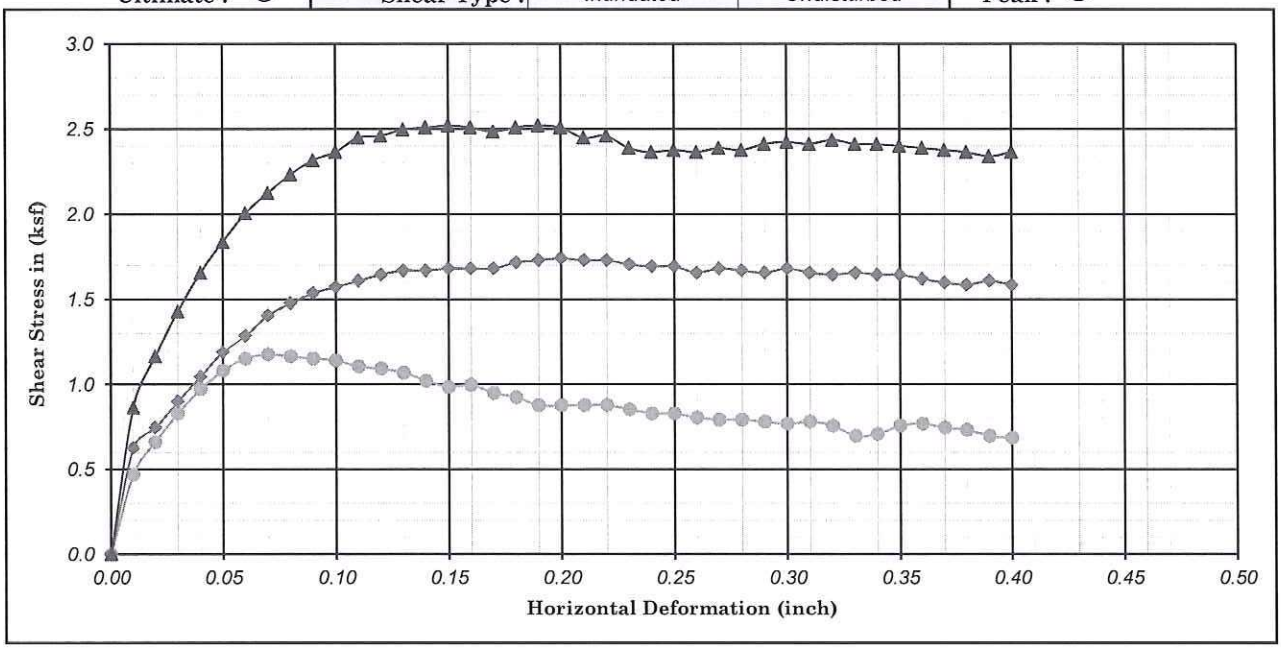
DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 10-133 | Date : 06/09/11 | Figure No. :



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-014		Strength Intercept (C) :	0.79	(ksf)	Peak	0.31	(ksf)	Ultimate	
Sample No. : D-2			37.63	(kPa)		14.65	(kPa)		
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	41.33	Degree		46.51	Degree		
Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC)						Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	15.98	120.37	18.95	0.40	0.50	23.94	1.18	56.31	0.68	32.75
◆	16.15	125.97	19.83	0.34	1.00	47.88	1.74	83.31	1.58	75.84
▲	16.43	121.54	19.13	0.39	2.00	95.76	2.52	120.66	2.34	112.04

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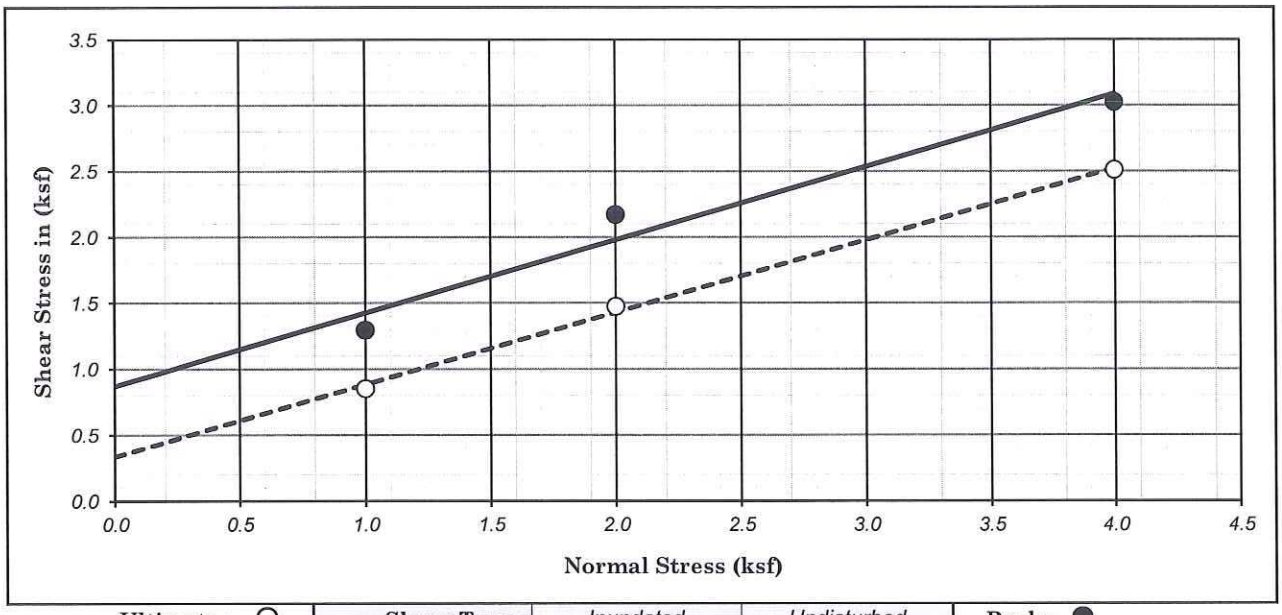
Geotechnical and Earthquake Engineering

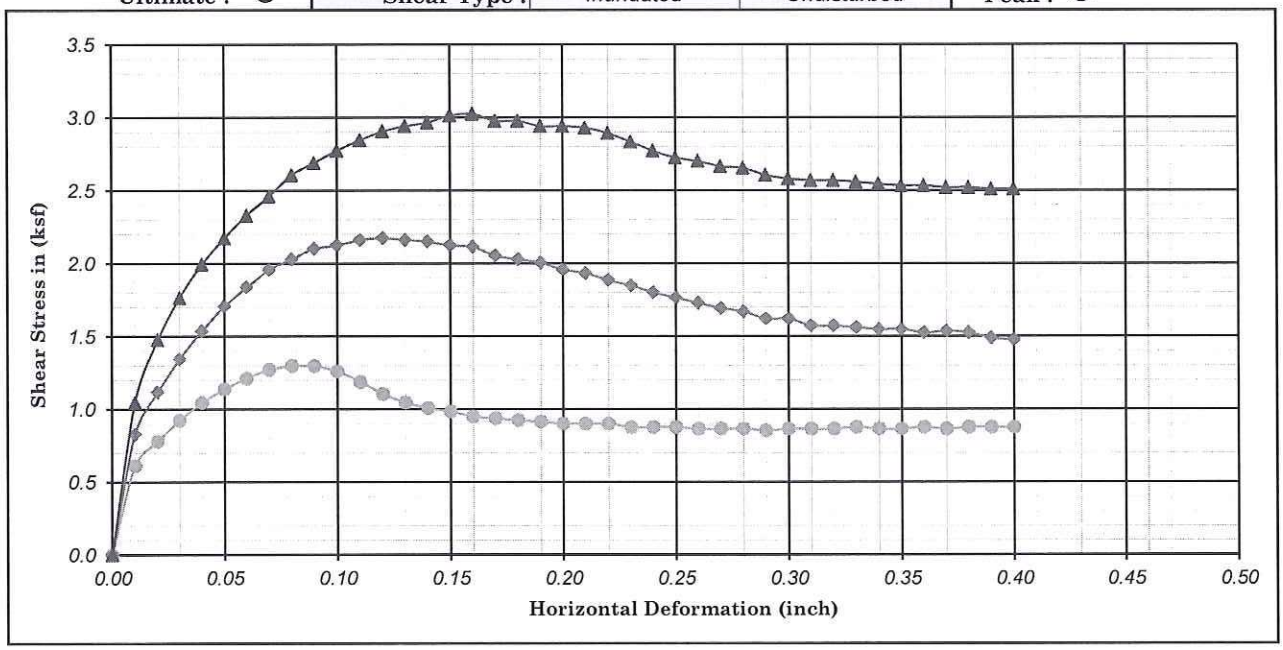
I-880 Operational and Safety Improvement

DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 10-133 | Date : 06/09/11 | Figure No. :



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-030		Strength Intercept (C) :	0.87	(ksf)	Peak	0.34	(ksf)	Ultimate	
Sample No. : D-4			41.66	(kPa)		16.09	(kPa)		
Depth (ft/m) : 20.0	0.00	Friction Angle (ϕ) :	29.01	Degree		28.67	Degree		
Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC)						Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.83	106.74	16.80	0.58	1.00	47.88	1.30	62.05	0.85	40.79
◆	20.46	114.18	17.97	0.48	2.00	95.76	2.17	104.00	1.48	70.67
▲	21.80	110.09	17.33	0.53	4.00	191.52	3.02	144.79	2.51	120.08

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Geotechnical and Earthquake Engineering

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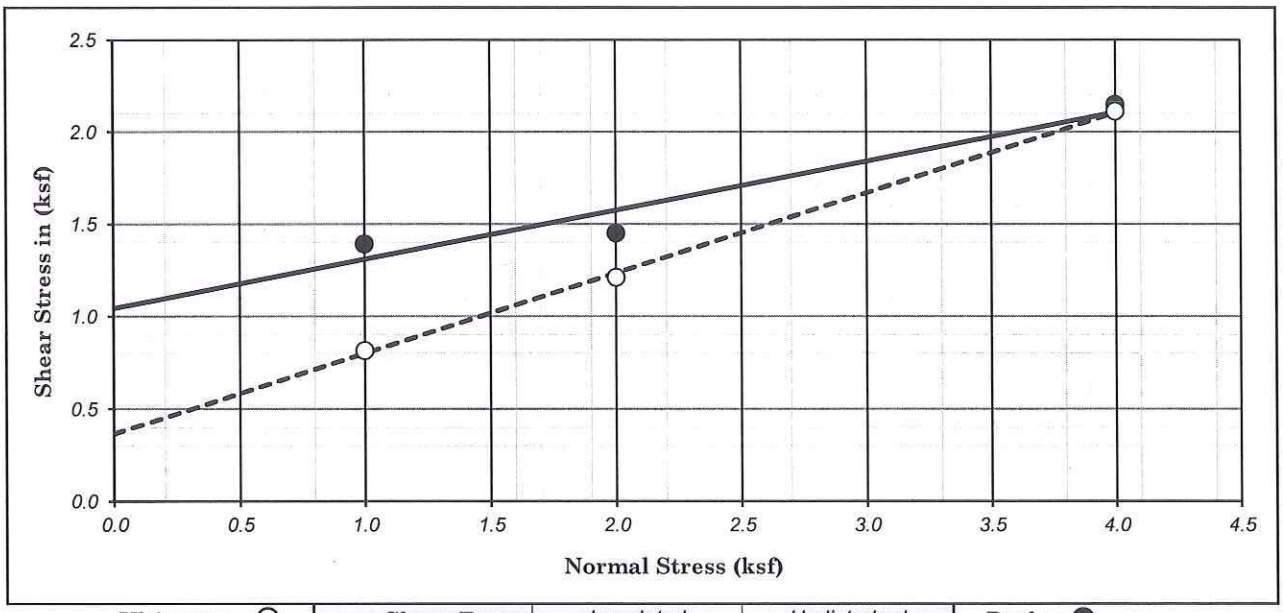
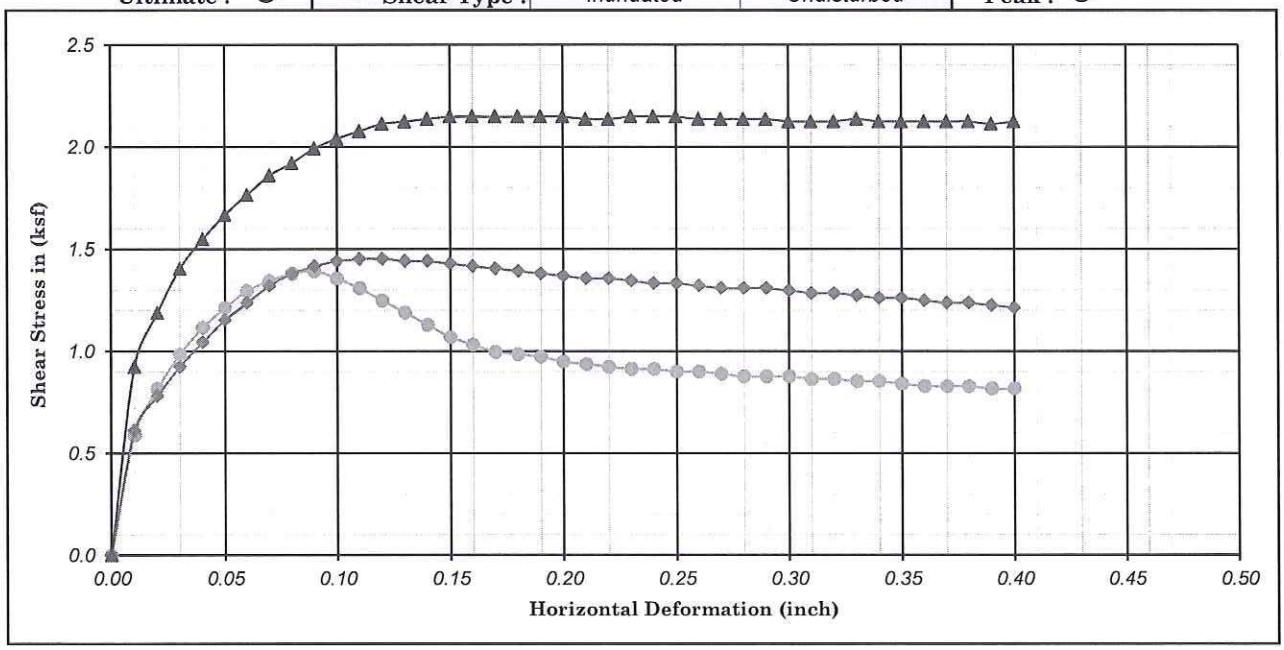
DIRECT SHEAR TEST (ASTM D-3080)

Figure No. :

Project No. : 10-133 | **Date :** 06/09/11



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-034		Strength Intercept (C) :	1.04	(ksf)	Peak	0.37	(ksf)	Ultimate	
Sample No. : D-4			49.99	(kPa)		17.52	(kPa)		
Depth (ft/m) : 20.0	0.00	Friction Angle (ϕ) :	14.88	Degree		23.49	Degree		
Description : Olive-brown, Lean CLAY with SAND (CL)						Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	25.28	102.13	16.07	0.65	1.00	47.88	1.39	66.65	0.82	39.07
◆	26.70	96.47	15.18	0.75	2.00	95.76	1.45	69.52	1.21	58.03
▲	24.28	100.75	15.86	0.67	4.00	191.52	2.15	102.85	2.11	101.12

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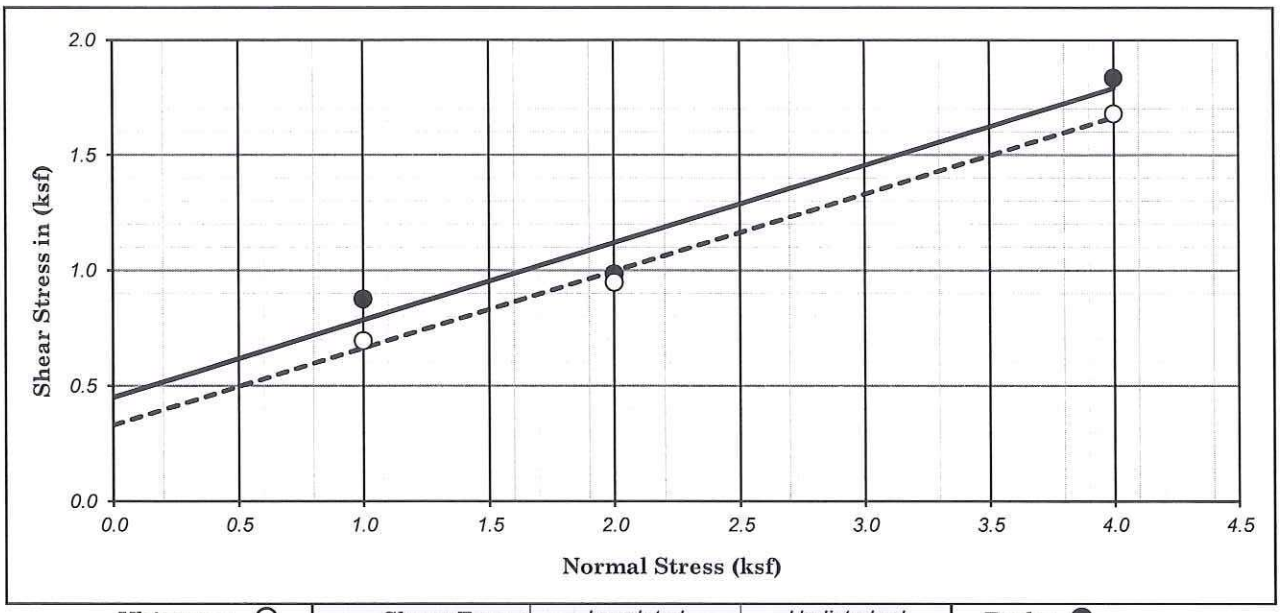
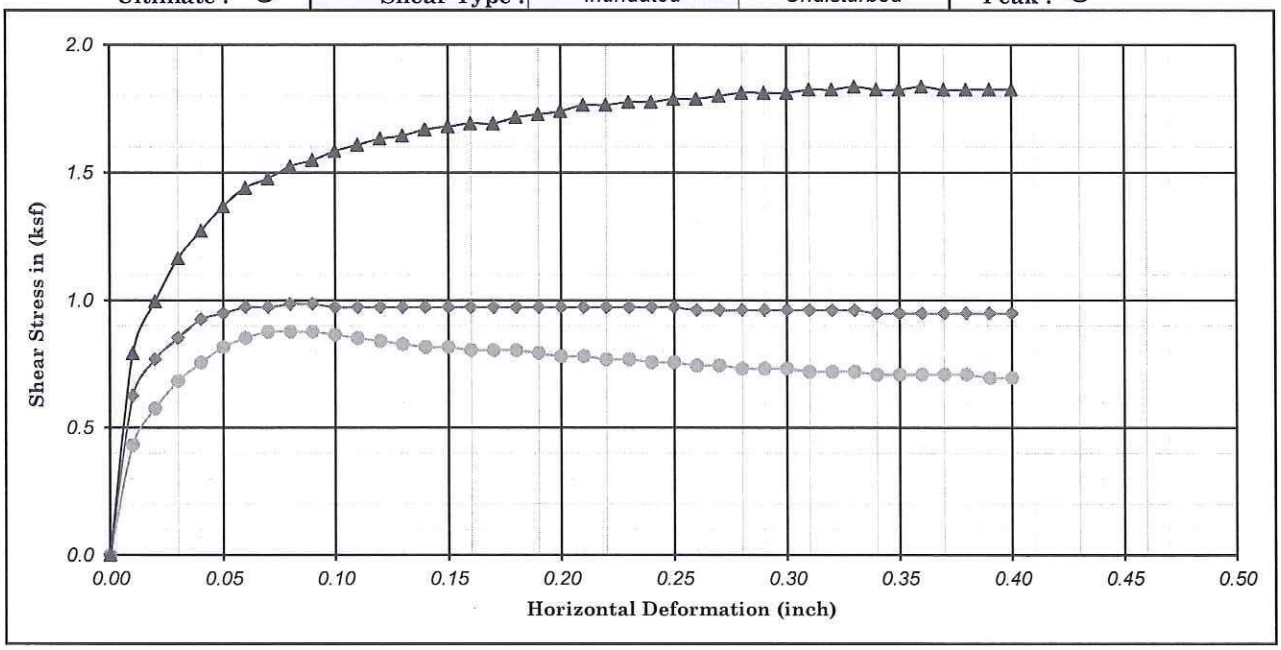
Project No. : 10-133 | Date : 06/09/11 | Figure No. :



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-035		Strength Intercept (C) :	0.45	(ksf)	Peak	0.33	(ksf)	Ultimate	
Sample No. : D-3			21.55	(kPa)		15.80	(kPa)		
Depth (ft/m) : 15.0	0.00	Friction Angle (ϕ) :	18.53	Degree		18.44	Degree		
Description : Yellowish brown, Lean CLAY (CL)						Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	33.89	87.00	13.69	0.94	1.00	47.88	0.88	41.94	0.70	33.32
◆	33.36	88.55	13.94	0.90	2.00	95.76	0.98	47.11	0.95	45.39
▲	29.73	92.58	14.57	0.82	4.00	191.52	1.84	87.91	1.68	80.44

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

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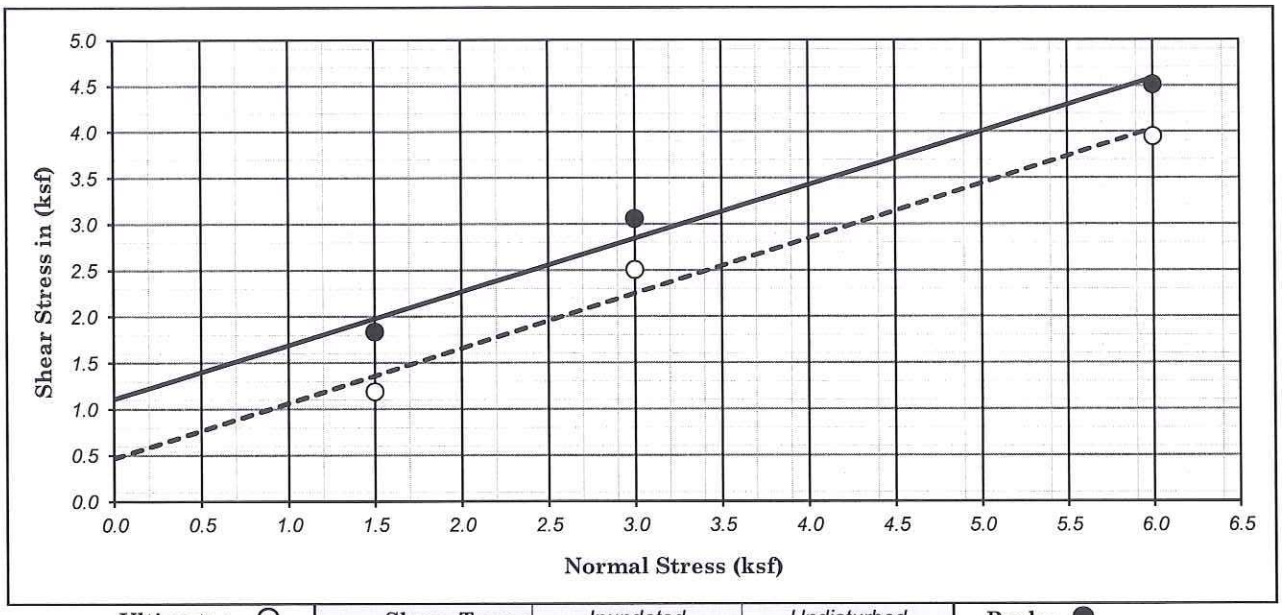
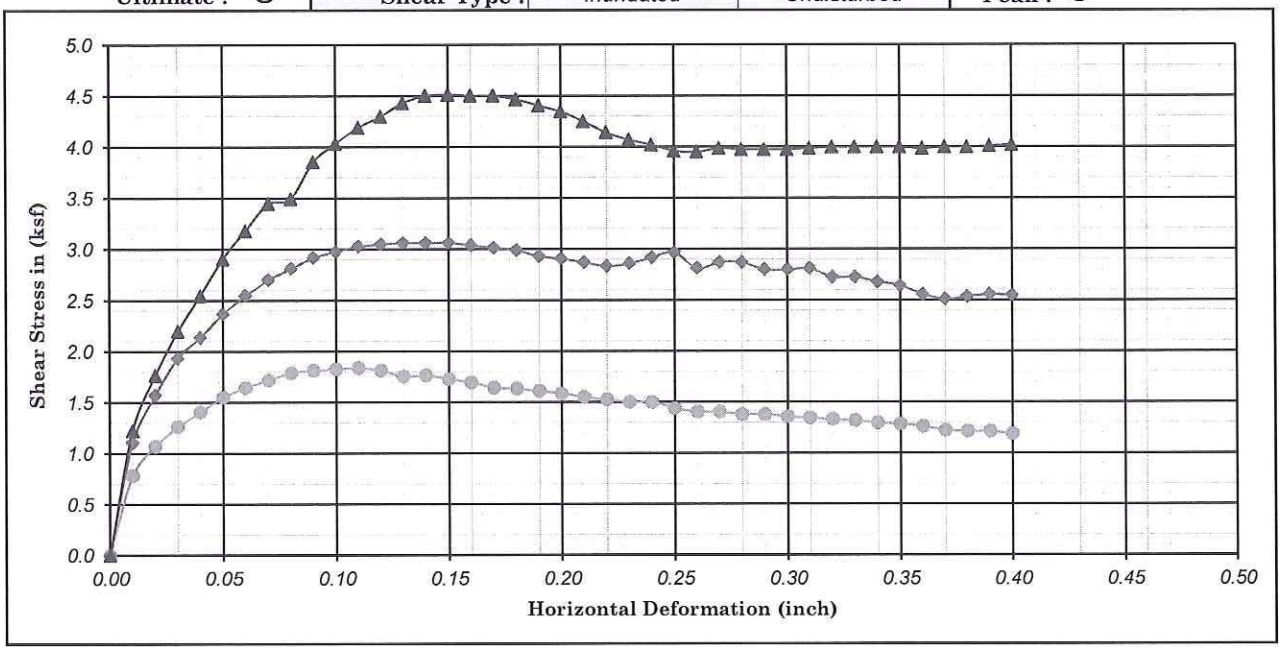
DIRECT SHEAR TEST (ASTM D-3080)

Figure No. :

Project No. : 10-133 | **Date :** 06/09/11



Ultimate : ○	Shear Type :	Inundated	Undisturbed	Peak : ●



Boring No. : R-11-035		Strength Intercept (C) :	1.11	(ksf)	Peak	0.47	(ksf)	Ultimate	
Sample No. : D-5			53.15	(kPa)		22.41	(kPa)		
Depth (ft/m) : 25.0	0.00	Friction Angle (ϕ) :	30.06	Degree		30.72	Degree		
Description : Dark olive-brown, CLAYEY SAND with GRAVEL (SC)						Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	17.52	119.58	18.82	0.41	1.50	71.82	1.84	87.91	1.19	56.88
◆	16.86	116.90	18.40	0.44	3.00	143.64	3.06	146.51	2.51	120.08
▲	16.88	118.41	18.64	0.42	6.00	287.28	4.51	216.03	3.95	189.03

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-880 Operational and Safety Improvement

DIRECT SHEAR TEST (ASTM D-3080)

Figure No. :

Project No. : 10-133	Date : 06/09/11

Appendix C

Design Calculations

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-001
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
California

Computed by: SP
Checked by:

Date: 03/30/12
Date:

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework,* Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils.* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60},* ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 27 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 22 ft MSL
Water Level at Investigation = 13.6 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	0.314
Post-liquefaction Settlement (in)	0.355
Total Settlement (in)	**0.668**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ_{MOIST}	γ_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1n})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.16	26.8	115.0	115.0	135.4	1.8	1.3	1	21	231	0.00	1.00	231	0.009	0.009	0.009	0.009	1.38	SAND	0.5	1.70	217.6	1.00	217.6	non-LIQ	1.000	0.46	0.430	Above Water	0.12	135601	215.2	0.00	0.00	0.000	NA	NA	0.000
0.33	26.7	115.0	115.0	206.8	2.8	1.3	1	33	245	0.00	1.00	245	0.019	0.019	0.019	0.019	1.38	SAND	0.5	1.70	332.3	1.00	332.3	non-LIQ	0.999	0.46	0.430	Above Water	0.12	87827	315.5	0.01	0.00	0.000	NA	NA	0.000
0.49	26.5	115.0	115.0	198.4	3.0	1.5	2	32	198	0.00	1.00	198	0.028	0.028	0.028	0.028	1.46	SAND	0.5	1.70	318.7	1.00	318.7	non-LIQ	0.999	0.46	0.430	Above Water	0.12	69281	358.1	0.01	0.00	0.000	NA	NA	0.000
0.66	26.3	115.0	115.0	148.7	2.4	1.6	4	25	132	0.00	1.00	132	0.038	0.038	0.038	0.038	1.55	SAND	0.5	1.70	238.9	1.00	238.9	non-LIQ	0.998	0.46	0.430	Above Water	0.12	57944	362.7	0.01	0.00	0.000	NA	NA	0.000
0.82	26.2	115.0	115.0	65.6	1.9	2.2	8	16	74	0.30	1.01	75	0.047	0.047	0.047	0.047	1.79	SAND	0.5	1.70	137.5	1.10	151.6	0.40	0.998	0.46	0.430	Above Water	0.13	50868	333.4	0.03	0.01	0.000	NA	NA	0.000
0.98	26.0	115.0	115.0	49.8	2.4	4.8	20	11	46	3.60	1.08	54	0.056	0.056	0.056	0.056	2.23	SAND	0.5	1.70	79.9	1.74	138.9	0.33	0.998	0.46	0.430	Above Water	0.13	45709	312.3	0.05	0.02	0.001	NA	NA	0.000
1.15	25.9	115.0	115.0	42.7	2.4	5.7	24	10	39	4.19	1.11	47	0.066	0.066	0.066	0.066	2.34	SAND	0.5	1.70	68.5	2.09	143.4	0.35	0.997	0.46	0.430	Above Water	0.13	41526	318.1	0.07	0.03	0.001	NA	NA	0.000
1.31	25.7	115.0	115.0	36.0	2.0	5.5	26	8	31	4.39	1.12	39	0.075	0.075	0.075	0.075	2.39	SAND	0.5	1.70	57.9	2.27	131.6	0.29	0.997	0.46	0.430	Above Water	0.13	38404	316.3	0.09	0.05	0.002	NA	NA	0.000
1.48	25.5	115.0	115.0	29.7	1.5	5.2	28	7	25	4.55	1.14	33	0.085	0.085	0.085	0.085	2.43	SAND	0.5	1.70	47.7	2.46	117.1	0.23	0.997	0.46	0.430	Above Water	0.13	35693	310.9	0.14	0.10	0.004	NA	NA	0.000
1.64	25.4	115.0	115.0	25.5	1.3	4.9	29	6	21	4.67	1.15	28	0.094	0.094	0.094	0.094	2.47	SAND	0.5	1.70	41.0	2.63	107.7	0.20	0.996	0.46	0.430	Above Water	0.13	33560	307.7	0.19	0.18	0.007	NA	NA	0.000
1.80	25.2	115.0	115.0	22.8	1.1	4.8	31	6	18	4.78	1.16	26	0.104	0.104	0.104	0.104	2.51	SAND	0.5	1.70	36.6	2.82	103.3	0.18	0.996	0.46	0.430	Above Water	0.13	31737	307.4	0.25	0.27	0.011	NA	NA	0.000
1.97	25.0	115.0	115.0	17.9	0.8	4.7	35	5	14	4.97	1.20	22	0.113	0.113	0.113	0.113	2.59	SAND	0.5	1.70	26.8	3.26	93.7	0.16	0.995	0.46	0.430	Above Water	0.13	30065	296.2	0.41	0.60	0.024	NA	NA	0.000
2.13	24.9	115.0	115.0	16.3	0.8	4.2	33	5	13	4.90	1.18	21	0.122	0.122	0.122	0.122	2.56	SAND	0.5	1.70	29.3	3.09	90.5	0.15	0.995	0.46	0.430	Above Water	0.13	28688	304.5	0.44	0.67	0.026	NA	NA	0.000
2.30	24.7	115.0	115.0	19.0	0.7	3.8	32	5	13	4.80	1.17	20	0.132	0.132	0.132	0.132	2.52	SAND	0.5	1.70	30.6	2.87	87.8	0.14	0.995	0.46	0.430	Above Water	0.13	27397	314.8	0.45	0.70	0.029	NA	NA	0.000
2.46	24.5	115.0	115.0	19.2	0.7	3.8	32	5	13	4.84	1.17	20	0.141	0.141	0.141	0.141	2.53	SAND	0.5	1.70	30.9	2.94	90.8	0.15	0.994	0.46	0.430	Above Water	0.13	26313	323.7	0.47	0.74	0.029	NA	NA	0.000
2.62	24.4	115.0	115.0	19.5	0.8	4.0	33	5	13	4.89	1.18	20	0.151	0.151	0.151	0.151	2.55	SAND	0.5	1.70	31.4	3.05	95.6	0.16	0.994	0.46	0.430	Above Water	0.13	25337	333.3	0.48	0.76	0.029	NA	NA	0.000
2.79	24.2	115.0	115.0	18.7	0.8	4.0	34	5	12	4.94	1.19	19	0.160	0.160	0.160	0.160	2.58	SAND	0.5	1.70	30.1	3.18	95.8	0.16	0.993	0.46	0.430	Above Water	0.13	24399	337.0	0.54	0.93	0.038	NA	NA	0.000
2.95	24.1	115.0	115.0	23.4	0.3	1.5	20	5	13	3.54	1.08	17	0.170	0.170	0.170	0.170	2.22	SAND	0.5	1.70	37.6	1.71	64.4	0.10	0.993	0.46	0.430	Above Water	0.13	23596	350.3	0.51	0.84	0.032	NA	NA	0.000
3.12	23.9	115.0	115.0	17.4	0.4	2.2	28	4	10	4.57	1.14	16	0.179	0.179	0.179	0.179	2.44	SAND	0.5	1.70	28.0	2.49	69.6	0.11	0.993	0.46	0.430	Above Water	0.13	22816	334.1	0.81	1.76	0.072	NA	NA	0.000
3.28	23.7	115.0	115.0	74.6	2.4	3.2	17	15	37	2.98	1.06	42	0.189	0.189	0.189	0.189	2.13	SAND	0.5	1.70	119.8	1.52	182.1	non-LIQ	0.992	0.46	0.430	Above Water	0.13	22142	527.7	0.09	0.04	0.002	NA	NA	0.000
3.44	23.6	115.0	115.0	34.5	2.0	5.7	33	9	20	4.86	1.18	28	0.198	0.198	0.198	0.198	2.54	SAND	0.5	1.70	55.5	2.99	166.0	non-LIQ	0.992	0.46	0.430	Above Water	0.13	21518	440.6	0.22	0.21	0.008	NA	NA	0.000
3.61	23.4	115.0	115.0	9.0	0.7	8.1	47	3	6	5.00	1.20	12	0.208	0.208	0.208	0.208	2.83	non-LIQ CLAY	1	1.70	NA	5.00	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.77	23.2	115.0	115.0	10.6	0.6	5.3	38	3	6	5.00	1.20	12	0.217	0.217	0.217	0.217	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.94	23.1	115.0	115.0	14.1	0.7	4.8	39	4	8	5.00	1.20	15	0.227	0.227	0.227	0.227	2.68	SILT	0.7	1.70	22.7	3.85	87.4	0.14	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.10	22.9	115.0	115.0	11.8	0.7	6.2	40	3	7	5.00	1.20	13	0.236	0.236	0.236	0.236	2.69	non-LIQ CLAY	1	1.70	NA	3.95	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.27	22.7	115.0	115.0	10.7	0.7	6.5	43	3	6	5.00	1.20	12	0.246	0.246	0.246	0.246	2.75	non-LIQ CLAY	1	1.70	NA	4.38	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.43	22.6	115.0	115.0	11.2	0.6	5.7	41	3	6	5.00	1.20	12	0.255	0.255	0.255	0.255	2.70	non-LIQ CLAY	1	1.70	NA	4.03	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.59	22.4	115.0	115.0	11.1	0.7	6.0	42	3	6	5.00	1.20	12	0.264	0.264	0.264	0.264	2.74	non-LIQ CLAY	1	1.70	NA	4.26	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.76	22.2	115.0	115.0	12.3	0.7	5.6	40	3	6	5.00	1.20	13	0.274	0.274	0.274	0.274	2.69	non-LIQ CLAY	1	1.70	NA	3.93	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.92	22.1	115.0	115.0	10.7	0.7	6.3	45	3	6	5.00	1.20	12	0.283	0.283	0.283	0.283	2.78	non-LIQ CLAY	1	1.70	NA	4.63	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.09	21.9	115.0	115.0	11.7	0.5	4.5	39	3	6	5.00	1.20	12	0.293	0.293	0.293	0.290	2.66	non-LIQ CLAY	1	1.70	NA	3.74	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.25	21.8	115.0	115.0	11.5	0.6	5.3	42	3	6	5.00	1.20	12	0.302	0.302	0.302	0.297	2.73	non-LIQ CLAY	1	1.70	NA	4.21	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.41	21.6	115.0	115.0	10.0	0.6	6.1	47	3	5	5.00	1.20	11	0.311	0.311	0.311	0.306	2.83	non-LIQ CLAY	1	1.70	NA	5.00	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.58	21.4	115.0	115.0	10.8	0.8	7.6	51	3	6	5.00	1.20	12	0.321	0.321	0.321	0.316	2.88	non-LIQ CLAY	1	1.70	NA	5.52	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.74	21.3	115.0	115.0	16.8	0.8	4.6	40	5	8	5.00	1.20	15	0.330	0.330	0.330	0.325	2.70	non-LIQ CLAY	1	1.70	NA	3.97	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.91	21.1	115.0	115.0	13.4	0.9	6.4	45	4	7	5.00	1.20	13	0.340	0.340	0.340	0.335	2.77	non-LIQ CLAY	1	1.70	NA	4.57	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.07	20.9	115.0	115.0	12.8	0.6	4.4	40	3	6	5.00	1.20	12	0.349	0.349	0.349	0.344	2.68	non-LIQ CLAY	1	1.70	NA	3.88	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.23	20.8	115.0	115.0	7.0	0.5	6.7	60	2	4	5.00	1.20	10	0.358	0.358	0.358	0.353	3.02	non-LIQ CLAY	1	1.70	NA	7.00	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.40	20.6	115.0	115.0	7.8	0.0	0.5	38	2	3	5.00	1.20	9	0.368	0.368	0.368	0.363	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.56	20.4	115.0	115.0	37.3	0.1	0.3	9	7	11	0.43	1.01	12	0.377	0.377	0.377	0.372	1.82	SAND	0.5	1.67	59.1	1.12	66.2	0.11	0.985	0.46	0.430	0.25	NA	NA	NA	NA	NA	0.000	12	2.310	0.044
6.73	20.3	115.0	115.0	40.9	0.9	2.1	22	9	15	3.88	1.09	20	0.387	0.387	0.387	0.382	2.28	SAND	0.5	1.65	63.9	1.87	119.8	0.24	0.984	0.46	0.430	0.56	NA	NA	NA	NA	NA	0.000	17	1.765	0.036
6.89	20.1	115.0	115.0	30.5	1.4	4.6	38	8	13	5.00	1.20	21	0.396	0.396	0.396	0.391	2.65	SILT	0.7	1.70	49.0	3.65	178.7	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	20.0	115.0	115.0	27.3	1.4	5.0	36	7	11	5.00	1.20	19	0.405	0.405	0.405	0.400	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.22	19.8	115.0	115.0	18.6	1.0	5.2	39	5	8	5.00	1.20	14	0.415	0.415	0.415	0.410	2.67	non-LIQ CLAY	1	1.70	NA	3.78	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.38	19.6	115.0	115.0	17.7	0.8	4.5	38	5	7	5.00	1.20	14	0.424	0.424	0.424	0.419	2.65	non-LIQ CLAY	1	1.70	NA	3.64	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.55	19.5	115.0	115.0	15.2	0.6	4.0	39	4	6	5.00	1.20	13	0.434	0.434	0.434	0.429	2.67	non-LIQ CLAY	1	1.70	NA	3.76	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.71	19.3	115.0	115.0	12.7	0.5	3.9	42	3	5	5.00	1.20	11	0.443	0.443	0.443	0.438	2.73	non-LIQ CLAY	1	1.70	NA	4.20	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	19.1	115.0	115.0	12.7	0.6	4.4	44	4	5	5.00	1.20	12	0.453	0.453	0.453	0.448	2.77	non-LIQ CLAY	1	1.70	NA	4.54	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.04	19.0	115.0	115.0	11.4	0.5	4.6	48	3	5	5.00	1.20	11	0.462	0.462	0.462	0.457	2.83	non-LIQ CLAY	1	1.70	NA	5.06	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	18.8	115.0	115.0	7.6	0.5	6.7	65	3	4	5.00	1.20	10	0.472	0.472	0.472	0.467	3.09	non-LIQ CLAY	1	1.70	NA	7.79	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	18.6	115.0	115.0	7.7	0.5	5.8	62	3	4	5.00	1.20	10	0.481	0.481	0.481	0.476	3.05	non-LIQ CLAY	1	1.70	NA	7.34	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-2

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
8.53	18.5	115.0	115.0	6.2	0.4	5.7	68	2	3	5.00	1.20	9	0.490	0.490	0.490	0.485	3.14	non-LIQ CLAY	1	1.70	NA	8.40	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.69	18.3	115.0	115.0	3.6	0.3	7.5	94	2	2	5.00	1.20	8	0.500	0.500	0.500	0.495	3.45	non-LIQ CLAY	1	1.70	NA	13.12	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.86	18.1	115.0	115.0	4.0	0.2	4.5	79	2	2	5.00	1.20	8	0.509	0.509	0.509	0.504	3.27	non-LIQ CLAY	1	1.70	NA	10.30	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.02	18.0	115.0	115.0	4.9	0.2	4.2	71	2	2	5.00	1.20	8	0.519	0.519	0.519	0.514	3.17	non-LIQ CLAY	1	1.70	NA	8.82	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	17.8	115.0	115.0	7.1	0.3	3.8	59	2	3	5.00	1.20	9	0.528	0.528	0.528	0.523	3.00	non-LIQ CLAY	1	1.70	NA	6.75	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	17.7	115.0	115.0	8.2	0.3	4.3	57	3	4	5.00	1.20	9	0.538	0.538	0.538	0.533	2.98	non-LIQ CLAY	1	1.70	NA	6.55	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	17.5	115.0	115.0	8.3	0.5	5.8	63	3	4	5.00	1.20	10	0.547	0.547	0.547	0.542	3.07	non-LIQ CLAY	1	1.70	NA	7.58	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	17.3	115.0	115.0	9.5	0.6	6.5	63	3	4	5.00	1.20	10	0.557	0.557	0.557	0.551	3.06	non-LIQ CLAY	1	1.70	NA	7.44	non-LIQ	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	17.2	115.0	115.0	7.6	0.5	7.1	71	3	4	5.00	1.20	9	0.566	0.566	0.566	0.561	3.17	non-LIQ CLAY	1	1.70	NA	8.90	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	17.0	115.0	115.0	9.3	0.5	5.4	60	3	4	5.00	1.20	10	0.576	0.576	0.576	0.570	3.03	non-LIQ CLAY	1	1.70	NA	7.05	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	16.8	115.0	115.0	9.8	0.5	5.1	58	3	4	5.00	1.20	10	0.585	0.585	0.585	0.580	2.99	non-LIQ CLAY	1	1.70	NA	6.68	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	16.7	115.0	115.0	7.5	0.5	7.2	73	3	4	5.00	1.20	9	0.594	0.594	0.594	0.589	3.20	non-LIQ CLAY	1	1.70	NA	9.22	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	16.5	115.0	115.0	6.8	0.5	6.9	76	3	3	5.00	1.20	9	0.604	0.604	0.604	0.598	3.24	non-LIQ CLAY	1	1.70	NA	9.76	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	16.3	115.0	115.0	6.7	0.5	6.8	76	3	3	5.00	1.20	9	0.613	0.613	0.613	0.608	3.24	non-LIQ CLAY	1	1.70	NA	9.88	non-LIQ	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	16.2	115.0	115.0	9.2	0.4	4.8	61	3	4	5.00	1.20	10	0.623	0.623	0.623	0.617	3.03	non-LIQ CLAY	1	1.70	NA	7.08	non-LIQ	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.99	16.0	115.0	115.0	6.8	0.4	6.4	75	3	3	5.00	1.20	9	0.632	0.632	0.632	0.627	3.23	non-LIQ CLAY	1	1.67	NA	9.62	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	15.9	115.0	115.0	5.0	0.4	7.2	89	2	3	5.00	1.20	8	0.641	0.641	0.641	0.636	3.40	non-LIQ CLAY	1	1.65	NA	12.25	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	15.7	115.0	115.0	4.6	0.3	6.2	90	2	2	5.00	1.20	8	0.651	0.651	0.651	0.646	3.40	non-LIQ CLAY	1	1.63	NA	12.33	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.48	15.5	115.0	115.0	3.7	0.2	6.5	101	2	2	5.00	1.20	8	0.660	0.660	0.660	0.655	3.52	non-LIQ CLAY	1	1.60	NA	14.45	non-LIQ	non-LIQ	0.973	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	15.4	115.0	115.0	4.4	0.3	6.1	92	2	2	5.00	1.20	8	0.670	0.670	0.670	0.665	3.43	non-LIQ CLAY	1	1.58	NA	12.78	non-LIQ	non-LIQ	0.973	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	15.2	115.0	115.0	5.2	0.3	5.1	82	2	3	5.00	1.20	8	0.679	0.679	0.679	0.674	3.32	non-LIQ CLAY	1	1.56	NA	10.97	non-LIQ	non-LIQ	0.972	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	15.0	115.0	115.0	4.5	0.2	5.3	88	2	2	5.00	1.20	8	0.689	0.689	0.689	0.684	3.39	non-LIQ CLAY	1	1.54	NA	12.10	non-LIQ	non-LIQ	0.972	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	14.9	115.0	115.0	4.2	0.2	4.9	91	2	2	5.00	1.20	8	0.698	0.698	0.698	0.693	3.41	non-LIQ CLAY	1	1.52	NA	12.52	non-LIQ	non-LIQ	0.972	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	14.7	115.0	115.0	4.2	0.2	5.5	94	2	2	5.00	1.20	8	0.707	0.707	0.707	0.702	3.45	non-LIQ CLAY	1	1.50	NA	13.14	non-LIQ	non-LIQ	0.971	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	14.5	115.0	115.0	4.8	0.3	5.8	90	2	3	5.00	1.20	8	0.717	0.717	0.717	0.712	3.40	non-LIQ CLAY	1	1.48	NA	12.35	non-LIQ	non-LIQ	0.971	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	14.4	115.0	115.0	4.9	0.1	2.8	75	2	2	5.00	1.20	8	0.726	0.726	0.726	0.721	3.22	non-LIQ CLAY	1	1.46	NA	9.59	non-LIQ	non-LIQ	0.971	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	14.0	115.0	115.0	63.8	1.2	2.0	20	14	16	3.54	1.08	21	0.745	0.745	0.745	0.735	2.22	SAND	0.5	1.19	71.9	1.71	123.0	0.25	0.970	0.45	0.420	0.60	NA	NA	NA	NA	NA	0.000	18	1.688	0.067
13.12	13.9	115.0	115.0	68.1	1.3	1.9	19	14	17	3.36	1.07	22	0.754	0.754	0.754	0.749	2.19	SAND	0.5	1.18	76.2	1.64	124.8	0.26	0.969	0.45	0.420	0.62	NA	NA	NA	NA	NA	0.000	19	1.623	0.031
13.62	13.4	115.0	115.0	3.4	0.1	3.4	97	2	2	5.00	1.20	7	0.783	0.776	0.783	0.768	3.48	non-LIQ CLAY	1	1.36	NA	13.76	non-LIQ	non-LIQ	0.968	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	13.1	115.0	115.0	28.6	0.9	3.2	36	7	9	5.00	1.20	15	0.802	0.785	0.802	0.785	2.62	non-LIQ CLAY	1	1.35	NA	3.43	non-LIQ	non-LIQ	0.967	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.11	12.9	115.0	115.0	35.2	1.3	3.6	35	9	10	5.00	1.20	18	0.811	0.789	0.811	0.789	2.60	non-LIQ CLAY	1	1.34	NA	3.33	non-LIQ	non-LIQ	0.967	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	12.7	115.0	115.0	36.9	1.3	3.5	35	9	11	5.00	1.20	18	0.821	0.793	0.821	0.793	2.60	non-LIQ CLAY	1	1.33	NA	3.33	non-LIQ	non-LIQ	0.967	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	12.6	115.0	115.0	37.8	1.4	3.8	35	10	11	5.00	1.20	18	0.830	0.798	0.830	0.798	2.60	non-LIQ CLAY	1	1.33	NA	3.30	non-LIQ	non-LIQ	0.966	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	12.4	115.0	115.0	41.9	1.3	3.2	36	11	12	5.00	1.20	20	0.839	0.802	0.839	0.802	2.61	non-LIQ CLAY	1	1.32	NA	3.39	non-LIQ	non-LIQ	0.966	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	12.2	115.0	115.0	42.0	1.3	3.0	37	11	13	5.00	1.20	20	0.849	0.806	0.849	0.806	2.64	non-LIQ CLAY	1	1.31	NA	3.56	non-LIQ	non-LIQ	0.966	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	12.1	115.0	115.0	41.9	1.1	2.7	29	10	11	4.64	1.15	18	0.858	0.811	0.858	0.811	2.46	SAND	0.5	1.14	45.3	2.58	116.8	0.23	0.965	0.47	0.440	0.52	NA	NA	NA	NA	NA	0.000	13	2.150	0.044
15.09	11.9	115.0	115.0	42.4	1.4	3.2	36	11	12	5.00	1.20	20	0.868	0.815	0.868	0.815	2.62	non-LIQ CLAY	1	1.30	NA	3.45	non-LIQ	non-LIQ	0.965	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.26	11.7	115.0	115.0	47.7	1.5	3.2	33	12	14	4.90	1.18	21	0.877	0.819	0.877	0.819	2.56	SAND	0.5	1.14	51.2	3.09	158.2	0.45	0.964	0.48	0.450	1.00	NA	NA	NA	NA	NA	0.000	17	1.770	0.036
15.42	11.6	115.0	115.0	49.3	1.5	3.0	33	12	14	4.88	1.18	21	0.887	0.824	0.887	0.824	2.55	SAND	0.5	1.13	52.9	3.03	160.4	non-LIQ	0.964	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	11.4	115.0	115.0	47.5	1.5	3.1	32	12	13	4.80	1.17	20	0.896	0.828	0.896	0.828	2.52	SAND	0.5	1.13	50.7	2.87	145.7	0.37	0.964	0.48	0.450	0.82	NA	NA	NA	NA	NA	0.000	16	1.863	0.036
15.75	11.3	115.0	115.0	49.3	1.6	3.2	33	12	14	4.90	1.18	21	0.906	0.832	0.906	0.832	2.56	SAND	0.5	1.13	52.5	3.09	162.3	non-LIQ	0.963	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	11.1	115.0	115.0	50.2	1.7	3.4	33	13	14	4.88	1.18	22	0.915	0.837	0.915	0.837	2.55	SAND	0.5	1.12	53.4	3.03	162.0	non-LIQ	0.963	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	10.9	115.0	115.0	50.2	1.7	3.4	33	13	14	4.88	1.18	21	0.925	0.841	0.925	0.841	2.55	SAND	0.5	1.12	53.2	3.03	161.6	non-LIQ	0.963	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	10.8	115.0	115.0	50.6	1.9	3.8	36	13	15	5.00	1.20	23	0.934	0.845	0.934	0.845	2.62	non-LIQ CLAY	1	1.25	NA	3.45	non-LIQ	non-LIQ	0.962	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	10.6	115.0	115.0	49.3	1.8	3.7	36	13	14	5.00	1.20	22	0.943	0.849	0.943	0.849	2.61	non-LIQ CLAY	1	1.25	NA	3.39	non-LIQ	non-LIQ	0.962	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	10.4	115.0	115.0	50.4	1.9	3.7	35	13	14	5.00	1.20	22	0.953	0.854	0.953	0.854	2.60	non-LIQ CLAY	1	1.24	NA	3.33	non-LIQ	non-LIQ	0.961	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	10.3	115.0	115.0	53.1	2.1	4.0	35	14	15	5.00	1.20	23	0.962	0.858	0.962	0.858	2.60	non-LIQ CLAY	1	1.23	NA	3.33	non-LIQ	non-LIQ	0.961	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	10.1	115.0	115.0	54.4	2.1	3.9	35	14	15	5.00	1.20	23	0.972	0.863	0.972	0.863	2.60	non-LIQ CLAY	1	1.23	NA	3.33	non-LIQ	non-LIQ	0.961	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	9.9	115.0	115.0	51.7	2.0	3.9	36	13	15	5.00	1.20	23	0.981	0.867	0.981	0.867	2.62	non-LIQ CLAY	1	1.22	NA	3.45	non-LIQ	non-LIQ	0.960	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	9.8	115.0	115.0	51.9	2.1	4.0	36	13	15	5.00	1.20	23	0.990	0.871	0.990	0.871	2.62	non-LIQ CLAY	1	1.21	NA	3.45	non-LIQ	non-LIQ	0.960	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	9.6	115.0	115.0	50.7	2.6	5.1	35	13	14	5.00	1.20	22	1.000	0.875	1.000	0.875	2.60	non-LIQ CLAY	1	1.21	NA	3.33	non-LIQ	non-LIQ	0.959	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	9.5	115.0	115.0	65.8	3.3	4.9	32	16	18	4.82	1.17	26	1.009	0.880	1.009	0.880	2.53	SAND	0.5	1.10	68.2	2.91	198.7	non-LIQ	0.959	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	9.3	115.0	115.0	66.8	3.7	5.6	34	17	18	4.91	1.19	27	1.019	0.884	1.019	0.884	2.56	SAND	0.5	1.09	69.0	3.11	215.0	non-LIQ	0.959	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	9.1	115.0	115.0	60.0	3.3	5.4	35	15	17	4.97	1.20	25	1.028	0.888	1.028	0.888	2.59	SAND	0.5	1.09	61.9	3.26	201.5	non-LIQ	0.958	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	9.0	115.0	115.0	53.7	2.5	4.7	34	14	15	4.93	1.19	22	1.037	0.893	1.037	0.893	2.57	SAND	0.5	1.09	55.2	3.16	174.4	non-LIQ	0.958	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	8.8	115.0	115.0	46.1	2.0	4.4	36	12	13	5.00	1.20	20	1.047	0.897	1.047	0.897	2.61	SILT	0.7	1.12	48.9	3.39	165.8	non-LIQ	0.958	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	8.6	115.0	115.0	48.7	2.4	5.0	36	13	14	5.00	1.20	21	1.056	0.901	1.056	0.901	2.61	SILT	0.7	1.12	51.4	3.41	175.4	non-LIQ	0.957	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	8.5	115.0	115.0	60.5	3.7	6.1	36	15	17	5.00	1.20	25	1.066	0.906	1.066	0.906	2.60	non-LIQ CLAY	1	1.17	NA	3.35	non-LIQ	non-LIQ	0.957	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	8.3	115.0	115.0	85.8	4.4	5.1	29	21	22	4.65	1.15	30	1.075	0.910	1.075	0.910	2.47	SAND	0.5	1.08	87.5	2.60	227.8	non-LIQ	0.956	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	8.1	115.0	115.0	64.1	4.5	7.0	37	17	18	5.00	1.20	27	1.084	0.914	1.084	0.914	2.64	non-LIQ CLAY	1	1.16	NA	3.57	non-LIQ	non-LIQ	0.956	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.03	8.0	115.0	115.0	70.8	4.3	6.1	34	18	19	4.95	1.19	28	1.094	0.919	1.094	0.919	2.58	SAND	0.5	1.07	71.8	3.22	231.1	non-LIQ	0.956	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	7.8	115.0	115.0	70.3	4.8	6.8	36	18	19	5.00	1.20	28	1.103	0.923	1.103	0.923	2.61	non-LIQ CLAY	1	1.15	NA	3.37	non-LIQ	non-LIQ	0.955	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	7.6	115.0	115.0	95.8	4.8	5.0	28	23	24	4.54	1.14	32	1.113	0.927	1.113	0.927	2.43	SAND	0.5	1.07	96.7	2.45	237.0	non-LIQ	0.955	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	7.5	115.0	115.0	71.8	5.4	7.5	37	19	20	5.00	1.20	29	1.122	0.931	1.122	0.931	2.64	non-LIQ CLAY	1	1.14	NA	3.55	non-LIQ	non-LIQ	0.954	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	7.3	115.0	115.0	70.7	4.9	6.9	36	18	19	5.00	1.20	28	1.132	0.936	1.132	0.936	2.61	non-LIQ CLAY	1	1.13	NA	3.42	non-LIQ	non-LIQ	0.954	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	7.2	115.0	115.0	68.0	4.9	7.2	37	18	19	5.00	1.20	28	1.141	0.940	1.141	0.940	2.64	non-LIQ CLAY	1	1.13	NA	3.56	non-LIQ	non-LIQ	0.954	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	7.0	115.0	115.0	86.9	4.5	5.1	29	21	22	4.67	1.15	30	1.151	0.944	1.151	0.944	2.47	SAND	0.5	1.06	87.0	2.63	228.7	non-LIQ	0.953	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	6.8	115.0	115.0	63.3	3.9	6.1	36	16	17	5.00	1.20	26	1.160	0.949	1.160	0.949	2.61	non-LIQ CLAY	1	1.12	NA	3.37	non-LIQ	non-LIQ	0.953	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	6.7	115.0	115.0	84.3	3.9	4.6	28	20	21	4.59	1.14	29	1.170	0.953	1.170	0.953	2.45	SAND	0.5	1.05	84.0	2.51	210.9	non-LIQ	0.953	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	6.5	115.0	115.0	73.3	4.3	5.8	34	18	19	4.91	1.18	28	1.179	0.957	1.179	0.957	2.56	SAND	0.5	1.05	72.8	3.11	226.4	non-LIQ	0.952	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	6.3	115.0	115.0	64.4	3.4	5.2	34	16	17	4.92	1.19	25	1.189	0.962	1.189	0.962	2.57	SAND	0.5	1.05	63.9	3.12	199.5	non-LIQ	0.952	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	6.2	115.0	115.0	41.1	2.8	6.7	44	12	12	5.00	1.20	19	1.198	0.966	1.198	0.966	2.77	non-LIQ CLAY	1	1.10	NA	4.56	non-LIQ	non-LIQ	0.951	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	6.0	115.0	115.0	44.7	2.5	5.6	40	12	12	5.00	1.20	20	1.208	0.970	1.208	0.970	2.69	non-LIQ CLAY	1	1.09	NA	3.91	non-LIQ	non-LIQ	0.951	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	5.8	115.0	115.0	62.4	3.7	5.9	36	16	17	5.00	1.20	25	1.217	0.975	1.217	0.975	2.60	non-LIQ CLAY	1	1.09	NA	3.35	non-LIQ	non-LIQ	0.951	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	5.7	115.0	115.0	146.2	5.3	3.7	20	31	33	3.55	1.08	39	1.226	0.979	1.226	0.979	2.22	SAND	0.5	1.04	143.6	1.71	246.2	non-LIQ	0.950	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	5.5	115.0	115.0	173.1	6.3	3.6	18	37	38	3.26	1.07	44	1.236	0.983	1.236	0.983	2.17	SAND	0.5	1.04	169.7	1.61	272.5	non-LIQ	0.950	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	5.4	115.0	115.0	146.2	5.8	4.0	21	32	33	3.73	1.08	39	1.245	0.987	1.245	0.987	2.25	SAND	0.5	1.04	143.1	1.80	257.1	non-LIQ	0.950	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	5.2	115.0	115.0	99.9	4.8	4.8	27	23	24	4.50	1.13	32	1.255	0.992	1.255	0.992	2.42	SAND	0.5	1.03	97.5	2.39	233.2	non-LIQ	0.949	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	5.0	115.0	115.0	79.3	3.8	4.7	30	19	20	4.69	1.15	27	1.264	0.996	1.264	0.996	2.48	SAND	0.5	1.03	77.3	2.67	206.1	non-LIQ	0.949	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	4.9	115.0	115.0	105.5	3.3	3.1	21	23	24	3.80	1.09	30	1.274	1.001	1.274	1.001	2.26	SAND	0.5	1.03	102.6	1.83	167.7	non-LIQ	0.948	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	4.7	115.0	115.0	137.7	4.1	3.0	18	29	30	3.20	1.07	35	1.283	1.005	1.283	1.005	2.17	SAND	0.5	1.03	133.5	1.59	211.7	non-LIQ	0.948	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	4.5	115.0	115.0	160.2	4.5	2.8	16	33	34	2.78	1.05	38	1.292	1.009	1.292	1.009	2.11	SAND	0.5	1.02	155.0	1.47	227.7	non-LIQ	0.948	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.64	4.4	115.0	115.0	116.6	4.1	3.5	22	26	26	3.86	1.09	32	1.302	1.014	1.302	1.014	2.27	SAND	0.5	1.02	112.6	1.87	210.0	non-LIQ	0.947	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	4.2	115.0	115.0	170.3	5.4	3.2	17	35	36	2.97	1.06	41	1.311	1.018	1.311	1.018	2.13	SAND	0.5	1.02	164.1	1.52	249.0	non-LIQ	0.947	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	4.0	115.0	115.0	175.0	5.1	2.9	16	36	36	2.70	1.05	41	1.321	1.022	1.321	1.022	2.10	SAND	0.5	1.02	168.2	1.45	244.1	non-LIQ	0.946	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	3.9	115.0	115.0	129.1	5.5	4.3	23	29	29	4.06	1.10	36	1.330	1.026	1.330	1.026	2.31	SAND	0.5	1.02	123.8	1.99	246.3	non-LIQ	0.946	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
23.29	3.7	115.0	115.0	113.3	4.1	3.6	22	25	25	3.97	1.10	32	1.339	1.031	1.339	1.031	2.29	SAND	0.5	1.01	108.5	1.93	209.5	non-LIQ	0.946	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	3.5	115.0	115.0	114.8	3.5	3.1	20	25	25	3.65	1.08	31	1.349	1.035	1.349	1.035	2.24	SAND	0.5	1.01	109.7	1.76	192.7	non-LIQ	0.945	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	3.4	115.0	115.0	180.9	4.4	2.4	14	36	36	2.10	1.04	40	1.358	1.039	1.358	1.039	2.03	SAND	0.5	1.01	172.5	1.34	230.4	non-LIQ	0.945	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	3.2	115.0	115.0	129.8	4.2	3.3	20	28	28	3.56	1.08	34	1.368	1.044	1.368	1.044	2.22	SAND	0.5	1.01	123.5	1.72	212.3	non-LIQ	0.945	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	3.1	115.0	115.0	82.8	3.6	4.4	28	20	20	4.59	1.14	27	1.377	1.048	1.377	1.048	2.45	SAND	0.5	1.00	78.6	2.52	198.0	non-LIQ	0.944	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	2.9	115.0	115.0	71.7	2.8	3.9	29	17	17	4.61	1.14	24	1.386	1.052	1.386	1.052	2.45	SAND	0.5	1.00	67.9	2.55	173.2	non-LIQ	0.944	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	2.7	115.0	115.0	45.7	1.5	3.4	36	12	12	5.00	1.20	19	1.396	1.057	1.396	1.057	2.61	non-LIQ CLAY	1	1.00	NA	3.39	non-LIQ	non-LIQ	0.943	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	2.6	115.0	115.0	17.6	0.6	3.7	54	5	5	5.00	1.20	11	1.405	1.061	1.405	1.061	2.93	non-LIQ CLAY	1	1.00	NA	5.95	non-LIQ	non-LIQ	0.943	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.61	2.4	115.0	115.0	11.5	0.3	2.6	60	4	4	5.00	1.20	9	1.415	1.065	1.415	1.065	3.02	non-LIQ CLAY	1	0.99	NA	6.96	non-LIQ	non-LIQ	0.943	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	2.2	115.0	115.0	11.2	0.3	2.5	60	4	4	5.00	1.20	9	1.424	1.070	1.424	1.070	3.02	non-LIQ CLAY	1	0.99	NA	6.98	non-LIQ	non-LIQ	0.942	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	2.1	115.0	115.0	12.2	0.3	2.6	58	4	4	5.00	1.20	10	1.433	1.074	1.433	1.074	2.99	non-LIQ CLAY	1	0.99	NA	6.62	non-LIQ	non-LIQ	0.942	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	1.9	115.0	115.0	13.1	0.3	2.5	55	4	4	5.00	1.20	10	1.443	1.078	1.443	1.078	2.95	non-LIQ CLAY	1	0.98	NA	6.21	non-LIQ	non-LIQ	0.941	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	1.7	115.0	115.0	12.4	0.3	2.5	57	4	4	5.00	1.20	10	1.452	1.082	1.452	1.082	2.98	non-LIQ CLAY	1	0.98	NA	6.51	non-LIQ	non-LIQ	0.941	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	1.6	115.0	115.0	12.2	0.3	2.5	58	4	4	5.00	1.20	10	1.462	1.087	1.462	1.087	2.99	non-LIQ CLAY	1	0.97	NA	6.60	non-LIQ	non-LIQ	0.941	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	1.4	115.0	115.0	12.2	0.3	2.7	59	4	4	5.00	1.20	10	1.471	1.091	1.471	1.091	3.01	non-LIQ CLAY	1	0.97	NA	6.85	non-LIQ	non-LIQ	0.940	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	1.3	115.0	115.0	13.5	0.4	2.9	57	4	4	5.00	1.20	10	1.481	1.095	1.481	1.095	2.98	non-LIQ CLAY	1	0.97	NA	6.57	non-LIQ	non-LIQ	0.940	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	1.1	115.0	115.0	17.3	0.4	2.5	49	5	5	5.00	1.20	11	1.490	1.100	1.490	1.100	2.84	non-LIQ CLAY	1	0.96	NA	5.17	non-LIQ	non-LIQ	0.940	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	0.9	115.0	115.0	20.5	0.5	2.4	44	6	6	5.00	1.20	12	1.500	1.104	1.500	1.104	2.77	non-LIQ CLAY	1	0.96	NA	4.53	non-LIQ	non-LIQ	0.939	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	0.8	115.0	115.0	24.6	0.8	3.1	44	7	7	5.00	1.20	13	1.509	1.108	1.509	1.108	2.77	non-LIQ CLAY	1	0.95	NA	4.51	non-LIQ	non-LIQ	0.939	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	0.6	115.0	115.0	27.4	1.1	4.1	46	8	8	5.00	1.20	14	1.519	1.113	1.519	1.113	2.80	non-LIQ CLAY	1	0.95	NA	4.82	non-LIQ	non-LIQ	0.938	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	0.4	115.0	115.0	28.8	1.3	4.4	47	8	8	5.00	1.20	15	1.528	1.117	1.528	1.117	2.81	non-LIQ CLAY	1	0.95	NA	4.87	non-LIQ	non-LIQ	0.938	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	0.3	115.0	115.0	27.5	1.4	4.9	50	8	8	5.00	1.20	14	1.538	1.121	1.538	1.121	2.86	non-LIQ CLAY	1	0.94	NA	5.34	non-LIQ	non-LIQ	0.938	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	0.1	115.0	115.0	27.3	1.5	5.4	51	8	8	5.00	1.20	15	1.547	1.126	1.547	1.126	2.89	non-LIQ CLAY	1	0.94	NA	5.62	non-LIQ	non-LIQ	0.937	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-0.1	115.0	115.0	26.1	2.2	8.3	61	9	8	5.00	1.20	15	1.557	1.130	1.557	1.130	3.04	non-LIQ CLAY	1	0.94	NA	7.21	non-LIQ	non-LIQ	0.937	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-0.2	115.0	115.0	33.7	2.9	8.5	56	11	10	5.00	1.20	17	1.566	1.134	1.566	1.134	2.96	non-LIQ CLAY	1	0.93	NA	6.33	non-LIQ	non-LIQ	0.937	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-0.4	115.0	115.0	93.1	4.5	4.8	29	22	21	4.63	1.14	29	1.576	1.139	1.576	1.139	2.46	SAND	0.5	0.96	84.8	2.57	217.7	non-LIQ	0.936	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-0.6	115.0	115.0	108.5	5.8	5.4	29	26	25	4.61	1.14	33	1.585	1.143	1.585	1.143	2.45	SAND	0.5	0.96	98.6	2.55	251.3	non-LIQ	0.936	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-0.7	115.0	115.0	114.3	6.6	5.8	29	27	26	4.65	1.15	35	1.594	1.147	1.594	1.147	2.47	SAND	0.5	0.96	103.7	2.61	270.3	non-LIQ	0.935	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-0.9	115.0	115.0	140.6	7.3	5.2	25	32	31	4.34	1.12	39	1.604	1.152	1.604	1.152	2.38	SAND	0.5	0.96	127.4	2.22	283.1	non-LIQ	0.935	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-1.1	115.0	115.0	145.8	7.5	5.1	25	33	32	4.28	1.11	40	1.613	1.156	1.613	1.156	2.36	SAND	0.5	0.96	131.9	2.16	285.2	non-LIQ	0.935	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-1.2	115.0	115.0	135.1	7.2	5.4	26	31	30	4.42	1.13	38	1.623	1.160	1.623	1.160	2.40	SAND	0.5	0.95	121.9	2.30	281.0	non-LIQ	0.934	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-1.4	115.0	115.0	129.2	5.6	4.4	24	29	28	4.17	1.11	35	1.632	1.164	1.632	1.164	2.34	SAND	0.5	0.95	116.3	2.07	241.3	non-LIQ	0.934	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-1.5	115.0	115.0	88.4	4.7	5.3	31	22	21	4.79	1.16	29	1.641	1.169	1.641	1.169	2.51	SAND	0.5	0.95	79.5	2.83	225.3	non-LIQ	0.933	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-1.7	115.0	115.0	50.9	2.4	4.6	38	13	13	5.00	1.20	20	1.651	1.173	1.651	1.173	2.65	non-LIQ CLAY	1	0.90	NA	3.65	non-LIQ	non-LIQ	0.933	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-1.9	115.0	115.0	24.7	1.0	4.1	50	7	7	5.00	1.20	13	1.660	1.177	1.660	1.177	2.86	non-LIQ CLAY	1	0.90	NA	5.35	non-LIQ	non-LIQ	0.933	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-2.0	115.0	115.0	22.0	0.5	2.4	44	6	6	5.00	1.20	12	1.670	1.182	1.670	1.182	2.77	non-LIQ CLAY	1	0.90	NA	4.53	non-LIQ	non-LIQ	0.932	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-2.2	115.0	115.0	24.0	0.6	2.6	44	7	6	5.00	1.20	13	1.679	1.186	1.679	1.186	2.76	non-LIQ CLAY	1	0.89	NA	4.45	non-LIQ	non-LIQ	0.932	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-2.4	115.0	115.0	22.1	0.6	2.7	46	6	6	5.00	1.20	12	1.688	1.190	1.688	1.190	2.80	non-LIQ CLAY	1	0.89	NA	4.77	non-LIQ	non-LIQ	0.932	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-2.5	115.0	115.0	20.1	0.6	2.8	49	6	6	5.00	1.20	12	1.698	1.195	1.698	1.195	2.85	non-LIQ CLAY	1	0.89	NA	5.21	non-LIQ	non-LIQ	0.931	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-2.7	115.0	115.0	22.1	0.6	2.5	45	6	6	5.00	1.20	12	1.707	1.199	1.707	1.199	2.79	non-LIQ CLAY	1	0.88	NA	4.66	non-LIQ	non-LIQ	0.931	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-2.9	115.0	115.0	24.3	0.6	2.6	44	7	6	5.00	1.20	13	1.717	1.203	1.717	1.203	2.76	non-LIQ CLAY	1	0.88	NA	4.47	non-LIQ	non-LIQ	0.930	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-3.0	115.0	115.0	24.0	0.8	3.1	47	7	6	5.00	1.20	13	1.726	1.208	1.726	1.208	2.81	non-LIQ CLAY	1	0.88	NA	4.90	non-LIQ	non-LIQ	0.930	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-3.2	115.0	115.0	21.7	0.7	3.3	50	6	6	5.00	1.20	12	1.735	1.212	1.735	1.212	2.87	non-LIQ CLAY	1	0.87	NA	5.38	non-LIQ	non-LIQ	0.928	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-3.4	115.0	115.0	18.2	0.7	3.9	58	6	5	5.00	1.20	11	1.745	1.216	1.745	1.216	2.99	non-LIQ CLAY	1	0.87	NA	6.59	non-LIQ	non-LIQ	0.927	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-3.5	115.0	115.0	14.4	0.6	4.2	66	5	5	5.00	1.20	10	1.754	1.220	1.754	1.220	3.11	non-LIQ CLAY	1	0.87	NA	7.99	non-LIQ	non-LIQ	0.926	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-3.7	115.0	115.0	12.1	0.6	4.9	75	4	4	5.00	1.20	10	1.764	1.225	1.764	1.225	3.23	non-LIQ CLAY	1	0.86	NA	9.61	non-LIQ	non-LIQ	0.924	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-3.8	115.0	115.0	11.5	0.7	6.3	82	5	4	5.00	1.20	10	1.773	1.229	1.773	1.229	3.31	non-LIQ CLAY	1	0.86	NA	10.91	non-LIQ	non-LIQ	0.923	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-4.0	115.0	115.0	13.4	1.1	8.1	83	5	5	5.00	1.20	11	1.783	1.233	1.783	1.233	3.32	non-LIQ CLAY	1	0.86	NA	11.04	non-LIQ	non-LIQ	0.922	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.17	-4.2	115.0	115.0	16.8	1.2	6.9	72	6	6	5.00	1.20	12	1.792	1.238	1.792	1.238	3.19	non-LIQ CLAY	1	0.85	NA	9.07	non-LIQ	non-LIQ	0.920	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.33	-4.3	115.0	115.0	15.7	0.9	6.0	71	6	5	5.00	1.20	11	1.801	1.242	1.801	1.242	3.18	non-LIQ CLAY	1	0.85	NA	8.91	non-LIQ	non-LIQ	0.919	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.50	-4.5	115.0	115.0	12.8	0.7	5.6	76	5	4	5.00	1.20	10	1.811	1.247	1.811	1.247	3.24	non-LIQ CLAY	1	0.85	NA	9.66	non-LIQ	non-LIQ	0.918	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.66	-4.7	115.0	115.0	11.8	0.6	5.1	77.3	4.5	4.1	5.0	1.2	10.0	1.82	1.25	1.82	1.25	3.25	non-LIQ CLAY	1	0.85	NA	10.02	non-LIQ	non-LIQ	0.916	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.82	-4.8	115.0	115.0	10.2	0.5	5.3	84.2	4.1	3.8	5.0	1.2	10.0	1.83	1.25	1.83	1.25	3.34	non-LIQ CLAY	1	0.84	NA	11.30	non-LIQ	non-LIQ	0.915	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.99	-5.0	115.0	115.0	8.5	0.5	5.5	93.5	3.7	3.4	5.0	1.2	9.0	1.84	1.26	1.84	1.26	3.44	non-LIQ CLAY	1	0.84	NA	13.05	non-LIQ	non-LIQ	0.914	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.15	-5.2	115.0	115.0	8.0	0.4	5.3	95.2	3.6	3.3	5.0	1.2	9.0	1.85	1.26	1.85	1.26	3.46	non-LIQ CLAY	1	0.84	NA	13.37	non-LIQ	non-LIQ	0.912	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.32	-5.3	115.0	115.0	7.3	0.4	5.6	101.4	3.5	3.2	5.0	1.2	9.0	1.86	1.27	1.86	1.27	3.53	non-LIQ CLAY	1	0.83	NA	14.56	non-LIQ	non-LIQ	0.911	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.48	-5.5	115.0	115.0	7.2	0.4	5.3	100.9	3.4	3.1	5.0	1.2	9.0	1.87	1.27	1.87	1.27	3.52	non-LIQ CLAY	1	0.83	NA	14.48	non-LIQ	non-LIQ	0.910	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.64	-5.6	115.0	115.0	8.1	0.4	5.0	93.8	3.6	3.3	5.0	1.2	9.0	1.88	1.28	1.88	1.28	3.45	non-LIQ CLAY	1	0.83	NA	13.11	non-LIQ	non-LIQ	0.908	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.81	-5.8	115.0	115.0	9.5	0.5	4.8	85.7	3.9	3.6	5.0	1.2	9.0	1.89	1.28	1.89	1.28	3.35	non-LIQ CLAY	1	0.83	NA	11.57	non-LIQ	non-LIQ	0.907	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.97	-6.0	115.0	115.0	10.8	0.5	4.7	80.2	4.2	3.8	5.0	1.2	10.0	1.90	1.29	1.90	1.29	3.29	non-LIQ CLAY	1	0.82	NA	10.55	non-LIQ	non-LIQ	0.906	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-6.1	115.0	115.0	11.8	0.5	4.5	76.0	4.4	4.0	5.0	1.2	10.0	1.91	1.29	1.91	1.29	3.24	non-LIQ CLAY	1	0.82	NA	9.79	non-LIQ	non-LIQ	0.904	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-6.3	115.0	115.0	12.8	0.6	4.4	72.8	4.7	4.2	5.0	1.2	10.0	1.91	1.29	1.91	1.29	3.20	non-LIQ CLAY	1	0.82	NA	9.22	non-LIQ	non-LIQ	0.903	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-6.5	115.0	115.0	14.9	0.6	4.1	66.1	5.1	4.6	5.0	1.2	11.0	1.92	1.30	1.92	1.30	3.11	non-LIQ CLAY	1	0.82	NA	8.03	non-LIQ	non-LIQ	0.902	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-6.6	115.0	115.0	15.7	0.6	3.8	63.4	5.3	4.7	5.0	1.2	11.0	1.93	1.30	1.93	1.30	3.07	non-LIQ CLAY	1	0.81	NA	7.57	non-LIQ	non-LIQ	0.900	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-6.8	115.0	115.0	17.7	0.6	3.6	58.9	5.7	5.1	5.0	1.2	11.0	1.94	1.31	1.94	1.31	3.01	non-LIQ CLAY	1	0.81	NA	6.81	non-LIQ	non-LIQ	0.899	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-7.0	115.0	115.0	19.0	0.7	3.6	57.2	6.0	5.4	5.0	1.2	11.0	1.95	1.31	1.95	1.31	2.98	non-LIQ CLAY	1	0.81	NA	6.54	non-LIQ	non-LIQ	0.898	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-7.1	115.0	115.0	20.9	0.9	4.1	57.0	6.6	5.9	5.0	1.2	12.0	1.96	1.32	1.96	1.32	2.98	non-LIQ CLAY	1	0.80	NA	6.49	non-LIQ	non-LIQ	0.896	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-7.3	115.0	115.0	22.8	1.0	4.4	56.2	7.1	6.4	5.0	1.2	13.0	1.97	1.32	1.97	1.32	2.97	non-LIQ CLAY	1	0.80	NA	6.36	non-LIQ	non-LIQ	0.895	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-7.5	115.0	115.0	22.9	1.2	5.1	58.9	7.4	6.6	5.0	1.2	13.0	1.98	1.32	1.98	1.32	3.01	non-LIQ CLAY	1	0.80	NA	6.81	non-LIQ	non-LIQ	0.894	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-7.6	115.0	115.0	23.6	1.2	5.3	58.9	7.6	6.8	5.0	1.2	13.0	1.99	1.33	1.99	1.33	3.01	non-LIQ CLAY	1	0.80	NA	6.81	non-LIQ	non-LIQ	0.892	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-7.8	115.0	115.0	25.1	1.3	5.1	56.7	7.9	7.0	5.0	1.2	13.0	2.00	1.33	2.00	1.33	2.97	non-LIQ CLAY	1	0.79	NA	6.46	non-LIQ	non-LIQ	0.891	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-7.9	115.0	115.0	25.7	1.3	5.1	56.2	8.0	7.2	5.0	1.2	14.0	2.01	1.34	2.01	1.34	2.97	non-LIQ CLAY	1	0.79	NA	6.38	non-LIQ	non-LIQ	0.890	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-8.1	115.0	115.0	25.4	1.3	5.2	56.9	8.0	7.1	5.0	1.2	14.0	2.02	1.34	2.02	1.34	2.98	non-LIQ CLAY	1	0.79	NA	6.49	non-LIQ	non-LIQ	0.888	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-8.3	115.0	115.0	23.1	1.2	5.3	60.0	7.5	6.6	5.0	1.2	13.0	2.03	1.35	2.03	1.35	3.02	non-LIQ CLAY	1	0.79	NA	6.99	non-LIQ	non-LIQ	0.887	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-8.4	115.0	115.0	20.7	1.1	5.3	62.8	6.9	6.1	5.0	1.2	12.0	2.04	1.35	2.04	1.35	3.06	non-LIQ CLAY	1	0.78	NA	7.47	non-LIQ	non-LIQ	0.886	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-8.6	115.0	115.0	19.1	1.0	5.1	64.4	6.4	5.7	5.0	1.2	12.0	2.05	1.35	2.05	1.35	3.08	non-LIQ CLAY	1	0.78	NA	7.74	non-LIQ	non-LIQ	0.884	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-8.8	115.0	115.0	18.3	0.9	4.7	64.1	6.2	5.4	5.0	1.2	12.0	2.06	1.36	2.06	1.36	3.08	non-LIQ CLAY	1	0.78	NA	7.68	non-LIQ	non-LIQ	0.883	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-8.9	115.0	115.0	17.8	0.8	4.4	64.0	6.0	5.3	5.0	1.2	11.0	2.07	1.36	2.07	1.36	3.08	non-LIQ CLAY	1	0.78	NA	7.67	non-LIQ	non-LIQ	0.882	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-9.1	115.0	115.0	18.7	0.8	4.3	62.0	6.2	5.4	5.0	1.2	12.0	2.08	1.37	2.08	1.37	3.05	non-LIQ CLAY	1	0.77	NA	7.32	non-LIQ	non-LIQ	0.880	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-9.3	115.0	115.0	19.8	0.9	4.5	61.2	6.5	5.7	5.0	1.2	12.0	2.08	1.37	2.08	1.37	3.04	non-LIQ CLAY	1	0.77	NA	7.20	non-LIQ	non-LIQ	0.879	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-9.4	115.0	115.0	20.9	0.9	4.3	59.2	6.7	5.9	5.0	1.2	12.0	2.09	1.38	2.09	1.38	3.01	non-LIQ CLAY	1	0.77	NA	6.86	non-LIQ	non-LIQ	0.878	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-9.6	115.0	115.0	19.6	0.9	4.6	62.3	6.5	5.7	5.0	1.2	12.0	2.10	1.38	2.10	1.38	3.06	non-LIQ CLAY	1	0.77	NA	7.38	non-LIQ	non-LIQ	0.876	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-9.8	115.0	115.0	19.5	0.9	4.7	62.9	6.5	5.7	5.0	1.2	12.0	2.11	1.38	2.11	1.38	3.06	non-LIQ CLAY	1	0.76	NA	7.49	non-LIQ	non-LIQ	0.875	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-9.9	115.0	115.0	21.3	0.9	4.4	59.1	6.9	6.0	5.0	1.2	12.0	2.12	1.39	2.12	1.39	3.01	non-LIQ CLAY	1	0.76	NA	6.84	non-LIQ	non-LIQ	0.874	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-10.1	115.0	115.0	20.5	0.9	4.5	60.7	6.7	5.8	5.0	1.2	12.0	2.13	1.39	2.13	1.39	3.03	non-LIQ CLAY	1	0.76	NA	7.12	non-LIQ	non-LIQ	0.872	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.24	-10.2	115.0	115.0	19.4	0.9	4.5	62.4	6.4	5.6	5.0	1.2	12.0	2.14	1.40	2.14	1.40	3.06	non-LIQ CLAY	1	0.76	NA	7.40	non-LIQ	non-LIQ	0.871	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.40	-10.4	115.0	115.0	18.5	0.8	4.4	63.4	6.2	5.4	5.0	1.2	11.0	2.15	1.40	2.15	1.40	3.07	non-LIQ CLAY	1	0.75	NA	7.57	non-LIQ	non-LIQ	0.870	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.57	-10.6	115.0	115.0	17.5	0.8	4.5	65.9	6.0	5.2	5.0	1.2	11.0	2.16	1.41	2.16	1.41	3.11	non-LIQ CLAY	1	0.75	NA	8.01	non-LIQ	non-LIQ	0.868	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.73	-10.7	115.0	115.0	17.4	0.8	4.6	66.6	6.0	5.2	5.0	1.2	11.0	2.17	1.41	2.17	1.41	3.12	non-LIQ CLAY	1	0.75	NA	8.13	non-LIQ	non-LIQ	0.867	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

C-4

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_{td}	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ'_{MOIST}	γ'_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$							G_{max}	γ	ε_{vol}	ΔS			ε	ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)			(%)	(in)
37.89	-10.9	115.0	115.0	17.9	0.8	4.3	64.5	6.0	5.2	5.0	1.2	11.0	2.18	1.41	2.18	1.41	3.09	non-LIQ CLAY	1	0.75	NA	7.76	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-11.1	115.0	115.0	19.7	0.8	3.8	59.5	6.4	5.5	5.0	1.2	12.0	2.19	1.42	2.19	1.42	3.02	non-LIQ CLAY	1	0.75	NA	6.92	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-11.2	115.0	115.0	20.0	0.8	4.0	59.9	6.5	5.6	5.0	1.2	12.0	2.20	1.42	2.20	1.42	3.02	non-LIQ CLAY	1	0.74	NA	6.97	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-11.4	115.0	115.0	21.0	0.8	4.0	58.6	6.7	5.8	5.0	1.2	12.0	2.21	1.43	2.21	1.43	3.00	non-LIQ CLAY	1	0.74	NA	6.77	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-11.6	115.0	115.0	22.2	0.8	3.7	56.0	6.9	5.9	5.0	1.2	12.0	2.22	1.43	2.22	1.43	2.96	non-LIQ CLAY	1	0.74	NA	6.33	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-11.7	115.0	115.0	22.8	0.8	3.7	55.3	7.1	6.1	5.0	1.2	12.0	2.23	1.44	2.23	1.44	2.95	non-LIQ CLAY	1	0.74	NA	6.22	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-11.9	115.0	115.0	24.1	1.1	4.4	57.1	7.6	6.5	5.0	1.2	13.0	2.24	1.44	2.24	1.44	2.98	non-LIQ CLAY	1	0.73	NA	6.51	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-12.0	115.0	115.0	28.3	1.5	5.3	56.3	8.9	7.6	5.0	1.2	14.0	2.24	1.44	2.24	1.44	2.97	non-LIQ CLAY	1	0.73	NA	6.39	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.21	-12.2	115.0	115.0	30.3	1.3	4.4	51.5	9.1	7.8	5.0	1.2	14.0	2.25	1.45	2.25	1.45	2.89	non-LIQ CLAY	1	0.73	NA	5.63	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-12.4	115.0	115.0	25.0	1.1	4.4	56.4	7.8	6.7	5.0	1.2	13.0	2.26	1.45	2.26	1.45	2.97	non-LIQ CLAY	1	0.73	NA	6.41	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.53	-12.5	115.0	115.0	23.6	0.9	3.9	55.9	7.4	6.3	5.0	1.2	13.0	2.27	1.46	2.27	1.46	2.96	non-LIQ CLAY	1	0.73	NA	6.32	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-12.7	115.0	115.0	26.1	1.1	4.3	54.9	8.1	6.9	5.0	1.2	13.0	2.28	1.46	2.28	1.46	2.95	non-LIQ CLAY	1	0.72	NA	6.15	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-12.9	115.0	115.0	31.5	1.2	3.9	48.8	9.2	7.8	5.0	1.2	14.0	2.29	1.47	2.29	1.47	2.85	non-LIQ CLAY	1	0.72	NA	5.21	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-13.0	115.0	115.0	31.8	1.6	5.2	53.6	9.7	8.3	5.0	1.2	15.0	2.30	1.47	2.30	1.47	2.93	non-LIQ CLAY	1	0.72	NA	5.96	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-13.2	115.0	115.0	32.1	2.1	6.5	58.0	10.2	8.7	5.0	1.2	15.0	2.31	1.48	2.31	1.48	2.99	non-LIQ CLAY	1	0.72	NA	6.66	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-13.4	115.0	115.0	40.9	1.8	4.5	45.7	11.6	9.8	5.0	1.2	17.0	2.32	1.48	2.32	1.48	2.80	non-LIQ CLAY	1	0.72	NA	4.75	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-13.5	115.0	115.0	31.1	1.6	5.1	54.3	9.6	8.1	5.0	1.2	15.0	2.33	1.48	2.33	1.48	2.94	non-LIQ CLAY	1	0.71	NA	6.06	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.68	-13.7	115.0	115.0	29.3	1.3	4.4	52.8	8.9	7.5	5.0	1.2	14.0	2.34	1.49	2.34	1.49	2.91	non-LIQ CLAY	1	0.71	NA	5.83	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.85	-13.9	115.0	115.0	26.6	1.3	4.4	53.7	8.7	7.4	5.0	1.2	14.0	2.35	1.49	2.35	1.49	2.93	non-LIQ CLAY	1	0.71	NA	5.97	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-14.0	115.0	115.0	28.2	1.3	4.4	54.2	8.7	7.3	5.0	1.2	14.0	2.36	1.50	2.36	1.50	2.94	non-LIQ CLAY	1	0.71	NA	6.05	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-14.2	115.0	115.0	29.0	1.4	4.7	54.6	8.9	7.5	5.0	1.2	14.0	2.37	1.50	2.37	1.50	2.94	non-LIQ CLAY	1	0.71	NA	6.12	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.34	-14.3	115.0	115.0	28.9	1.5	5.1	56.3	9.1	7.6	5.0	1.2	14.0	2.38	1.51	2.38	1.51	2.97	non-LIQ CLAY	1	0.70	NA	6.39	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-14.5	115.0	115.0	28.3	1.6	5.5	58.3	9.0	7.6	5.0	1.2	14.0	2.39	1.51	2.39	1.51	3.00	non-LIQ CLAY	1	0.70	NA	6.72	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-14.7	115.0	115.0	29.1	1.5	5.3	57.1	9.2	7.7	5.0	1.2	14.0	2.40	1.51	2.40	1.51	2.98	non-LIQ CLAY	1	0.70	NA	6.52	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-14.6	115.0	115.0	28.8	1.4	4.8	55.4	8.9	7.5	5.0	1.2	14.0	2.41	1.52	2.41	1.52	2.95	non-LIQ CLAY	1	0.70	NA	6.23	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-15.0	115.0	115.0	26.2	1.3	4.5	54.9	8.7	7.3	5.0	1.2	14.0	2.41	1.52	2.41	1.52	2.95	non-LIQ CLAY	1	0.70	NA	6.16	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-15.2	115.0	115.0	29.6	1.3	4.3	52.9	9.0	7.5	5.0	1.2	14.0	2.42	1.53	2.42	1.53	2.91	non-LIQ CLAY	1	0.69	NA	5.84	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.32	-15.3	115.0	115.0	29.9	1.3	4.4	53.1	9.1	7.6	5.0	1.2	14.0	2.43	1.53	2.43	1.53	2.92	non-LIQ CLAY	1	0.69	NA	5.87	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.49	-15.5	115.0	115.0	29.5	1.3	4.4	53.5	9.0	7.5	5.0	1.2	14.0	2.44	1.54	2.44	1.54	2.92	non-LIQ CLAY	1	0.69	NA	5.93	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-15.7	115.0	115.0	29.9	1.3	4.4	53.2	9.1	7.5	5.0	1.2	14.0	2.45	1.54	2.45	1.54	2.92	non-LIQ CLAY	1	0.69	NA	5.89	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-15.8	115.0	115.0	30.2	1.3	4.3	52.6	9.1	7.6	5.0	1.2	14.0	2.46	1.54	2.46	1.54	2.91	non-LIQ CLAY	1	0.69	NA	5.80	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-16.0	115.0	115.0	29.5	1.2	4.2	53.0	9.0	7.4	5.0	1.2	14.0	2.47	1.55	2.47	1.55	2.92	non-LIQ CLAY	1	0.68	NA	5.85	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.14	-16.1	115.0	115.0	28.3	1.2	4.2	54.1	8.7	7.2	5.0	1.2	14.0	2.48	1.55	2.48	1.55	2.93	non-LIQ CLAY	1	0.68	NA	6.03	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-16.3	115.0	115.0	27.6	1.0	3.6	52.1	8.3	6.9	5.0	1.2	13.0	2.49	1.56	2.49	1.56	2.90	non-LIQ CLAY	1	0.68	NA	5.71	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-16.5	115.0	115.0	26.9	1.3	4.7	57.6	8.5	7.0	5.0	1.2	13.0	2.50	1.56	2.50	1.56	2.99	non-LIQ CLAY	1	0.68	NA	6.60	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-16.6	115.0	115.0	22.6	1.3	5.7	66.5	7.8	6.4	5.0	1.2	13.0	2.51	1.57	2.51	1.57	3.11	non-LIQ CLAY	1	0.68	NA	8.11	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-16.8	115.0	115.0	26.4	1.3	4.9	59.2	8.5	7.0	5.0	1.2	13.0	2.52	1.57	2.52	1.57	3.01	non-LIQ CLAY	1	0.67	NA	6.87	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-17.0	115.0	115.0	25.8	1.3	5.1	60.5	8.4	6.9	5.0	1.2	13.0	2.53	1.57	2.53	1.57	3.03	non-LIQ CLAY	1	0.67	NA	7.07	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.13	-17.1	115.0	115.0	25.5	1.3	5.1	60.9	8.3	6.8	5.0	1.2	13.0	2.54	1.58	2.54	1.58	3.04	non-LIQ CLAY	1	0.67	NA	7.14	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.29	-17.3	115.0	115.0	24.7	1.2	5.0	61.7	8.1	6.6	5.0	1.2	13.0	2.55	1.58	2.55	1.58	3.05	non-LIQ CLAY	1	0.67	NA	7.27	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.46	-17.5	115.0	115.0	23.8	1.1	4.8	61.8	7.8	6.4	5.0	1.2	13.0	2.56	1.59	2.56	1.59	3.05	non-LIQ CLAY	1	0.67	NA	7.30	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.62	-17.6	115.0	115.0	23.6	1.1	4.7	61.8	7.8	6.3	5.0	1.2	13.0	2.57	1.59	2.57	1.59	3.05	non-LIQ CLAY	1	0.66	NA	7.30	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.78	-17.8	115.0	115.0	23.3	1.1	4.8	62.4	7.7	6.3	5.0	1.2	13.0	2.57	1.60	2.57	1.60	3.06	non-LIQ CLAY	1	0.66	NA	7.41	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.95	-18.0	115.0	115.0	22.0	1.1	4.8	64.4	7.4	6.0	5.0	1.2	12.0	2.58	1.60	2.58	1.60	3.08	non-LIQ CLAY	1	0.66	NA	7.74	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-18.1	115.0	115.0	21.0	1.0	4.6	65.1	7.1	5.8	5.0	1.2	12.0	2.59	1.60	2.59	1.60	3.09	non-LIQ CLAY	1	0.66	NA	7.86	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-18.3	115.0	115.0	20.6	0.9	4.5	65.3	7.0	5.7	5.0	1.2	12.0	2.60	1.61	2.60	1.61	3.10	non-LIQ CLAY	1	0.66	NA	7.90	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-18.4	115.0	115.0	20.0	0.9	4.6	67.0	6.9	5.6	5.0	1.2	12.0	2.61	1.61	2.61	1.61	3.12	non-LIQ CLAY	1	0.66	NA	8.19	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-18.6	115.0	115.0	19.9	0.9	4.5	66.6	6.9	5.5	5.0	1.2	12.0	2.62	1.62	2.62	1.62	3.12	non-LIQ CLAY	1	0.65	NA	8.12	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-18.8	115.0	115.0	19.8	0.9	4.4	66.4	6.8	5.5	5.0	1.2	12.0	2.63	1.62	2.63	1.62	3.11	non-LIQ CLAY	1	0.65	NA	8.08	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-18.9	115.0	115.0	20.1	0.9	4.6	67.1	6.9	5.6	5.0	1.2	12.0	2.64	1.63	2.64	1.63	3.12	non-LIQ CLAY	1	0.65	NA	8.20	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-19.1	115.0	115.0	21.5	1.0	4.9	66.0	7.4	5.9	5.0	1.2	12.0	2.65	1.63	2.65	1.63	3.11	non-LIQ CLAY	1	0.65	NA	8.02	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-19.3	115.0	115.0	23.9	1.2	5.2	64.1	8.1	6.5	5.0	1.2	13.0	2.66	1.63	2.66	1.63	3.08	non-LIQ CLAY	1	0.65	NA	7.69	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-19.4	115.0	115.0	31.0	1.7	5.6	58.5	9.9	8.0	5.0	1.2	15.0	2.67	1.64	2.67	1.64	3.00	non-LIQ CLAY	1	0.65	NA	6.75	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-19.6	115.0	115.0	50.1	3.3	6.7	51.0	14.9	12.0	5.0	1.2	19.0	2.68	1.64	2.68	1.64	2.88	non-LIQ CLAY	1	0.64	NA	5.54	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-19.8	115.0	115.0	84.6	4.1	4.8	36.0	21.8	17.4	5.0	1.2	26.0	2.69	1.65	2.69	1.65	2.61	non-LIQ CLAY	1	0.64	NA	3.41	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-19.9	115.0	115.0	161.7	5.8	3.2	18.6	38.5	30.8	3.4	1.1	36.0	2.70	1.65	2.70	1.65	2.19	SAND	0.5	0.80	137	1.64	225	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-20.1	115.0	115.0	275.6	6.2	2.2	11.7	53.3	42.6	1.5	1.0	45.0	2.71	1.66	2.71	1.66	1.95	SAND	0.5	0.80	208	1.24	259	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-20.2	115.0	115.0	271.4	4.7	1.7	9.6	50.8	40.5	0.7	1.0	42.0	2.72	1.66	2.72	1.66	1.87	SAND	0.5	0.80	205	1.16	237	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.41	-20.4	115.0	115.0	303.7	2.7	0.9	4.7	52.1	41.6	0.0	1.0	42.0	2.73	1.66	2.73	1.66	1.62	SAND	0.5	0.80	229	1.00	229	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-20.6	115.0	115.0	281.1	2.3	0.8	4.7	48.3	38.4	0.0	1.0	38.0	2.74	1.67	2.74	1.67	1.62	SAND	0.5	0.80	211	1.00	211	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-20.7	115.0	115.0	269.1	2.6	1.0	5.9	47.3	37.6	0.0	1.0	38.0	2.75	1.67	2.75	1.67	1.69	SAND	0.5	0.80	202	1.03	208	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-20.9	115.0	115.0	247.7	3.3	1.3	8.4	45.4	36.1	0.4	1.0	37.0	2.75	1.68	2.75	1.68	1.81	SAND	0.5	0.79	186	1.12	207	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-21.1	115.0	115.0	249.3	3.4	1.4	8.4	45.7	36.3	0.4	1.0	37.0	2.76	1.68	2.76	1.68	1.81	SAND	0.5	0.79	187	1.12	209	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-21.2	115.0	115.0	245.0	1.8	0.7	5.0	42.3	33.5	0.0	1.0	33.0	2.77	1.69	2.77	1.69	1.64	SAND	0.5	0.79	183	1.00	183	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-21.4	115.0	115.0	251.2	4.4	1.7	10.3	47.5	37.6	1.0	1.0	39.0	2.78	1.69	2.78	1.69	1.90	SAND	0.5	0.79	188	1.18	222	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-21.6	115.0	115.0	262.8	4.1	1.6	9.1	48.8	38.6	0.6	1.0	40.0	2.79	1.70	2.79	1.70	1.85	SAND	0.5	0.79	196	1.14	224	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.72	-21.7	115.0	115.0	217.8	5.3	2.4	14.3	43.6	34.4	2.3	1.0	38.0	2.80	1.70	2.80	1.70	2.05	SAND	0.5	0.79	162	1.37	222	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-21.9	115.0	115.0	275.7	6.6	2.4	12.4	53.8	42.4	1.7	1.0	46.0	2.81	1.70	2.81	1.70	1.98	SAND	0.5	0.79	205	1.27	262	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-22.1	115.0	115.0	291.3	8.2	2.8	13.6	57.8	45.5	2.1	1.0	49.0	2.82	1.71	2.82	1.71	2.02	SAND	0.5	0.79	217	1.33	288	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-22.2	115.0	115.0	170.9	7.7	4.5	23.6	38.5	30.2	4.1	1.1	36.0	2.83	1.71	2.83	1.71	2.33	SAND	0.5	0.79	127	2.04	259	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-22.4	115.0	115.0	90.1	5.6	6.2	39.6	24.1	18.9	5.0	1.2	28.0	2.84	1.72	2.84	1.72	2.68	non-LIQ CLAY	1	0.62	NA	3.89	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-22.5	115.0	115.0	122.9	2.9	2.4	19.5	26.4	20.7	3.5	1.1	26.0	2.85	1.72	2.85	1.72	2.21	SAND	0.5	0.78	91	1.70	155	0.428	0.771	0.590	0.550	0.78	NA	NA	NA	NA	0.00	23.00	1.37	0.03
49.70	-22.7	115.0	115.0	81.1	2.1	2.6	25.2	18.6	14.6	4.3	1.1	21.0	2.86	1.73	2.86	1.73	2.37	SAND	0.5	0.78	60	2.19	131	0.291	0.770	0.590	0.550	0.53	NA	NA	NA	NA	0.00	17.00	1.78	0.03
49.87	-22.9	115.0	115.0	48.8	2.3	4.7	46.1	13.9	10.9	5.0	1.2	18.0	2.87	1.73	2.87	1.73	2.60	non-LIQ CLAY	1	0.61	NA	4.81	non-LIQ	non-LIQ	non-LIQ	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1] C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines (Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-002

Emean (%)	75			Present Ground El.	26.6	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.0	=Field Water Table Depth	Acc. max =	0.710	g			Earthq. M=	7.3		
C_E	1.25			Future Ground El.	26.6	C_B	1.00	120	21.6	=Design Water El.	13.6	=Field Water El.						Cm=	1.07		

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-		-	-	-	-				-	-	-	-	-	-	-	-	-	-	-	-
5	21.6	21	CL	90.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	24	34	1.00	High N	0.00	LARGE	high N
10	16.6	17	CL	85.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	29	39	1.00	High N	0.00	LARGE	high N
15	11.6	9	CL	88.0	0.90	0.84	1.12	0.85	1.00	0.67	2	2	0.97	0.59	0.68	7	14	1.00	0.15	0.16	0.23	Fines
20	6.6	18	CL	75.0	1.20	0.98	1.03	0.95	1.20	1.00	1	1	0.95	0.73	0.72	26	37	1.00	High N	0.00	LARGE	high N
25	1.6	31	CL	95.0	1.50	1.13	0.96	0.95	1.00	0.67	2	2	0.94	0.88	0.74	24	33	1.00	High N	0.00	LARGE	high N
30	-3.4	34	CL	88.0	1.80	1.27	0.91	1.00	1.20	1.00	1	1	0.93	1.02	0.76	46	60	1.00	High N	0.00	LARGE	high N
35	-8.4	32	CL	95.0	2.10	1.41	0.86	1.00	1.00	0.67	2	2	0.89	1.16	0.74	23	32	0.98	High N	0.00	LARGE	high N
40	-13.4	35	SC	20.0	2.40	1.56	0.82	1.00	1.20	1.00	1	1	0.85	1.31	0.72	43	50	0.96	High N	0.00	LARGE	high N
45	-18.4	26	CL	55.0	2.70	1.70	0.78	1.00	1.00	0.67	2	2	0.81	1.45	0.69	17	25	0.94	0.30	0.30	0.43	Fines
50	-23.4	21	CL	87.0	3.00	1.85	0.75	1.00	1.20	1.00	1	1	0.77	1.60	0.67	24	33	0.92	High N	0.00	LARGE	high N
55	-28.4	44	GC	40.0	3.30	1.99	0.72	1.00	1.00	0.67	2	2	0.73	1.74	0.64	27	37	0.90	High N	0.00	LARGE	high N
60	-33.4	44	CL	95.0	3.60	2.13	0.70	1.00	1.20	1.00	1	1	0.69	1.88	0.60	46	60	0.88	High N	0.00	LARGE	high N
65	-38.4	42	CL	85.0	3.90	2.28	0.68	1.00	1.00	0.67	2	2	0.64	2.03	0.57	24	33	0.88	High N	0.00	LARGE	high N
70	-43.4	46	CL	90.0	4.20	2.42	0.66	1.00	1.20	1.00	1	1	0.60	2.17	0.54	45	59	0.87	High N	0.00	LARGE	high N

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-003
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
California

Computed by: SP
Checked by:

Date: 03/30/12
Date:

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework,* Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60},* ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 25.3 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 20.3 ft MSL
Water Level at Investigation = 13.6 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	1.288
Post-liquefaction Settlement (in)	0.268
Total Settlement (in)	**1.556**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_{fs}	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
													σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1Ncs}	Kc	$(q_{c1n})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)	$\gamma^{'}_{MOIST}$	$\gamma^{'}_{SAT}$	(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.49	24.8	115.0	115.0	1.9	0.2	7.8	39	1	3	5.00	1.20	9	0.028	0.028	0.028	0.028	2.66	non-LIQ CLAY	1	1.70	NA	3.85	non-LIQ	non-LIQ	0.999	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
0.66	24.6	115.0	115.0	12.6	0.1	0.7	13	2	13	1.80	1.04	15	0.038	0.038	0.038	0.038	1.99	SAND	0.5	1.70	20.3	1.29	26.2	0.07	0.998	0.46	0.430	Above Water	0.12	57944	167.9	0.49	0.77	0.031	NA	NA	0.000
0.82	24.5	115.0	115.0	8.6	0.1	1.5	24	2	9	4.19	1.11	14	0.047	0.047	0.047	0.047	2.34	SAND	0.5	1.70	13.9	2.09	29.0	0.07	0.998	0.46	0.430	Above Water	0.13	50868	166.8	1.09	2.60	0.100	NA	NA	0.000
0.98	24.3	115.0	115.0	8.2	0.1	1.1	23	2	8	4.05	1.10	13	0.056	0.056	0.056	0.056	2.31	SAND	0.5	1.70	13.2	1.98	26.2	0.07	0.998	0.46	0.430	Above Water	0.13	45709	173.3	1.56	4.49	0.172	NA	NA	0.000
1.15	24.2	115.0	115.0	8.6	0.1	0.9	22	2	8	3.98	1.10	12	0.066	0.066	0.066	0.066	2.30	SAND	0.5	1.70	13.8	1.94	26.7	0.07	0.997	0.46	0.430	Above Water	0.13	41526	185.3	1.69	5.09	0.208	NA	NA	0.000
1.31	24.0	115.0	115.0	8.6	0.1	1.5	28	2	8	4.52	1.13	13	0.075	0.075	0.075	0.075	2.43	SAND	0.5	1.70	13.8	2.43	33.4	0.08	0.997	0.46	0.430	Above Water	0.13	38404	197.2	1.69	5.15	0.198	NA	NA	0.000
1.48	23.8	115.0	115.0	7.3	0.1	0.8	26	2	6	4.36	1.12	11	0.085	0.085	0.085	0.085	2.38	SAND	0.5	1.70	11.7	2.24	26.2	0.07	0.997	0.46	0.430	Above Water	0.13	35693	193.1	3.18	12.99	0.530	NA	NA	0.000
1.64	23.7	115.0	115.0	7.3	0.1	1.9	36	2	6	5.00	1.20	13	0.094	0.094	0.094	0.094	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.996	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.80	23.5	115.0	115.0	10.0	0.3	2.8	29	2	8	4.61	1.14	13	0.104	0.104	0.104	0.104	2.45	SILT	0.7	1.70	16.1	2.55	41.1	0.08	0.996	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.97	23.3	115.0	115.0	12.5	0.6	5.0	36	3	10	5.00	1.20	17	0.113	0.113	0.113	0.113	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.13	23.2	115.0	115.0	23.9	0.9	3.8	28	6	17	4.58	1.14	24	0.122	0.122	0.122	0.122	2.44	SAND	0.5	1.70	38.5	2.50	95.2	0.16	0.995	0.46	0.430	Above Water	0.13	28688	327.2	0.29	0.34	0.013	NA	NA	0.000
2.30	23.0	115.0	115.0	22.9	1.0	4.2	31	6	16	4.74	1.16	23	0.132	0.132	0.132	0.132	2.50	SAND	0.5	1.70	36.8	2.75	101.2	0.18	0.995	0.46	0.430	Above Water	0.13	27397	333.5	0.32	0.41	0.017	NA	NA	0.000
2.46	22.8	115.0	115.0	21.0	1.0	4.9	36	5	15	5.00	1.20	23	0.141	0.141	0.141	0.141	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.62	22.7	115.0	115.0	21.9	1.1	5.1	36	6	15	5.00	1.20	23	0.151	0.151	0.151	0.151	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.79	22.5	115.0	115.0	22.6	1.4	6.1	36	6	15	5.00	1.20	23	0.160	0.160	0.160	0.160	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.95	22.4	115.0	115.0	24.4	1.6	6.7	36	6	16	5.00	1.20	24	0.170	0.170	0.170	0.170	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.12	22.2	115.0	115.0	29.4	1.9	6.4	36	8	18	5.00	1.20	27	0.179	0.179	0.179	0.179	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.28	22.0	115.0	115.0	36.3	2.0	5.6	31	9	21	4.78	1.16	29	0.189	0.189	0.189	0.189	2.51	SAND	0.5	1.70	58.4	2.83	165.1	non-LIQ	0.992	0.46	0.430	Above Water	0.13	22142	438.9	0.20	0.18	0.007	NA	NA	0.000
3.44	21.9	115.0	115.0	34.3	2.4	7.0	37	9	21	5.00	1.20	30	0.198	0.198	0.198	0.198	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.61	21.7	115.0	115.0	60.1	3.3	5.4	26	14	31	4.37	1.12	39	0.208	0.208	0.208	0.208	2.36	SAND	0.5	1.70	96.6	2.25	217.2	non-LIQ	0.992	0.46	0.430	Above Water	0.13	20904	525.6	0.11	0.06	0.002	NA	NA	0.000
3.77	21.5	115.0	115.0	76.0	3.4	4.5	21	17	37	3.81	1.09	44	0.217	0.217	0.217	0.217	2.26	SAND	0.5	1.70	122.2	1.84	224.4	non-LIQ	0.991	0.46	0.430	Above Water	0.13	20367	566.5	0.09	0.04	0.002	NA	NA	0.000
3.94	21.4	115.0	115.0	89.6	2.8	3.1	16	18	40	2.69	1.05	44	0.227	0.227	0.227	0.227	2.10	SAND	0.5	1.70	144.0	1.45	208.5	non-LIQ	0.991	0.46	0.430	Above Water	0.13	19835	593.4	0.08	0.03	0.001	NA	NA	0.000
4.10	21.2	115.0	115.0	93.5	2.3	2.4	13	18	39	1.90	1.04	42	0.236	0.236	0.236	0.236	2.00	SAND	0.5	1.70	150.3	1.30	195.9	non-LIQ	0.990	0.46	0.430	Above Water	0.13	19367	602.6	0.08	0.04	0.001	NA	NA	0.000
4.27	21.0	115.0	115.0	97.8	2.6	2.6	14	19	40	2.08	1.04	44	0.246	0.246	0.246	0.246	2.02	SAND	0.5	1.70	157.1	1.33	209.3	non-LIQ	0.990	0.46	0.430	Above Water	0.13	18901	621.6	0.08	0.03	0.001	NA	NA	0.000
4.43	20.9	115.0	115.0	102.6	2.0	1.9	11	19	40	1.07	1.02	42	0.255	0.255	0.255	0.255	1.91	SAND	0.5	1.70	164.8	1.20	197.2	non-LIQ	0.990	0.46	0.430	Above Water	0.13	18488	630.1	0.08	0.03	0.001	NA	NA	0.000
4.59	20.7	115.0	115.0	118.2	3.0	2.5	12	23	46	1.66	1.03	49	0.264	0.264	0.264	0.264	1.98	SAND	0.5	1.70	189.9	1.27	241.2	non-LIQ	0.989	0.46	0.430	Above Water	0.13	18099	674.2	0.07	0.02	0.001	NA	NA	0.000
4.76	20.5	115.0	115.0	163.9	3.0	1.8	8	30	58	0.23	1.01	59	0.274	0.274	0.274	0.274	1.78	SAND	0.5	1.70	263.3	1.09	287.3	non-LIQ	0.989	0.46	0.430	Above Water	0.13	17708	742.7	0.05	0.01	0.001	NA	NA	0.000
4.92	20.4	115.0	115.0	99.1	3.2	3.3	16	20	40	2.86	1.06	45	0.283	0.283	0.283	0.283	2.12	SAND	0.5	1.70	159.3	1.49	237.2	non-LIQ	0.989	0.46	0.430	Above Water	0.13	17360	662.9	0.09	0.04	0.001	NA	NA	0.000
5.09	20.2	115.0	115.0	55.5	2.2	3.9	24	13	24	4.16	1.11	31	0.293	0.293	0.293	0.290	2.34	SAND	0.5	1.70	89.2	2.07	184.3	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.25	20.1	115.0	115.0	29.8	1.5	5.0	36	8	14	5.00	1.20	22	0.302	0.302	0.302	0.297	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.41	19.9	115.0	115.0	23.6	0.8	3.5	35	6	11	5.00	1.20	18	0.311	0.311	0.311	0.306	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.58	19.7	115.0	115.0	23.3	0.7	3.1	38	6	11	5.00	1.20	18	0.321	0.321	0.321	0.316	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.74	19.6	115.0	115.0	23.7	0.7	2.9	36	6	11	5.00	1.20	18	0.330	0.330	0.330	0.325	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.91	19.4	115.0	115.0	24.0	0.7	2.9	36	6	11	5.00	1.20	18	0.340	0.340	0.340	0.335	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.07	19.2	115.0	115.0	25.6	0.8	3.2	37	7	12	5.00	1.20	19	0.349	0.349	0.349	0.344	2.64	non-LIQ CLAY	1	1.70	NA	3.58	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.23	19.1	115.0	115.0	27.1	0.9	3.3	37	7	12	5.00	1.20	20	0.358	0.358	0.358	0.353	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.40	18.9	115.0	115.0	27.4	1.0	3.5	38	7	12	5.00	1.20	20	0.368	0.368	0.368	0.363	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.56	18.7	115.0	115.0	30.3	1.1	3.6	37	8	13	5.00	1.20	21	0.377	0.377	0.377	0.372	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.73	18.6	115.0	115.0	34.1	1.2	3.4	34	9	14	4.95	1.19	22	0.387	0.387	0.387	0.382	2.56	SAND	0.5	1.65	53.3	3.21	170.8	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.89	18.4	115.0	115.0	34.2	1.2	3.5	35	9	14	4.97	1.20	22	0.396	0.396	0.396	0.391	2.59	SAND	0.5	1.63	52.8	3.27	172.5	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	18.3	115.0	115.0	35.9	1.4	3.8	36	9	15	5.00	1.20	23	0.405	0.405	0.405	0.400	2.61	SAND	0.5	1.62	54.8	3.39	185.8	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.22	18.1	115.0	115.0	38.6	1.5	3.8	34	10	16	4.95	1.19	24	0.415	0.415	0.415	0.410	2.58	SAND	0.5	1.60	58.3	3.21	186.8	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.38	17.9	115.0	115.0	38.5	1.4	3.6	34	10	15	4.93	1.19	23	0.424	0.424	0.424	0.419	2.57	SAND	0.5	1.58	57.4	3.15	180.7	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.55	17.8	115.0	115.0	35.6	1.0	2.8	32	9	14	4.83	1.17	21	0.434	0.434	0.434	0.429	2.53	SAND	0.5	1.56	52.5	2.92	153.6	0.42	0.982	0.46	0.430	0.97	NA	NA	NA	NA	NA	0.000	17	1.765	0.036
7.71	17.6	115.0	115.0	35.8	1.2	3.3	34	9	14	4.93	1.19	21	0.443	0.443	0.443	0.438	2.57	SAND	0.5	1.54	52.3	3.15	164.5	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	17.4	115.0	115.0	29.1	2.0	7.0	38	8	12	5.00	1.20	19	0.453	0.453	0.453	0.448	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.04	17.3	115.0	115.0	85.1	4.0	4.7	24	19	29	4.22	1.11	37	0.462	0.462	0.462	0.457	2.35	SAND	0.5	1.51	121.6	2.12	257.3	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	17.1	115.0	115.0	113.3	4.4	3.9	19	24	36	3.50	1.08	43	0.472	0.472	0.472	0.467	2.21	SAND	0.5	1.50	160.4	1.69	271.8	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	16.9	115.0	115.0	110.7	3.8	3.4	18	23	35	3.27	1.07	40	0.481	0.481	0.481	0.476	2.18	SAND	0.5	1.48	155.1	1.61	249.6	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.53	16.8	115.0	115.0	160.5	4.3	2.4	11	35	51	1.20	1.03	53	0.490	0.490	0.490	0.485	1.92	SAND	0.5	1.47	250.6	1.21	303.8	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.69	16.6	115.0	115.0	160.6	4.6	2.8	13	32	46	2.04	1.04	50	0.500	0.500	0.500	0.495	2.02	SAND	0.5	1.46	220.8	1.33	292.7	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-7

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
8.86	16.4	115.0	115.0	127.5	4.6	3.6	18	27	39	3.20	1.07	44	0.509	0.509	0.509	0.504	2.16	SAND	0.5	1.44	173.6	1.58	275.0	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.02	16.3	115.0	115.0	120.3	4.8	4.0	20	26	37	3.54	1.08	43	0.519	0.519	0.519	0.514	2.22	SAND	0.5	1.43	162.4	1.71	277.5	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	16.1	115.0	115.0	103.2	4.5	4.4	22	23	32	3.95	1.09	39	0.528	0.528	0.528	0.523	2.29	SAND	0.5	1.42	138.1	1.92	265.0	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	16.0	115.0	115.0	76.7	4.0	5.2	28	18	25	4.54	1.14	33	0.538	0.538	0.538	0.533	2.43	SAND	0.5	1.40	101.7	2.45	248.9	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	15.8	115.0	115.0	60.1	3.2	5.3	31	15	20	4.76	1.16	28	0.547	0.547	0.547	0.542	2.50	SAND	0.5	1.39	79.0	2.79	220.5	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	15.6	115.0	115.0	99.5	3.0	3.0	18	21	29	3.27	1.07	34	0.557	0.557	0.557	0.551	2.18	SAND	0.5	1.38	129.7	1.61	208.5	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	15.5	115.0	115.0	198.8	4.6	2.3	11	38	52	1.07	1.02	54	0.566	0.566	0.566	0.561	1.91	SAND	0.5	1.37	256.9	1.20	307.3	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	15.3	115.0	115.0	200.8	4.1	2.0	9	37	51	0.69	1.02	52	0.576	0.576	0.576	0.570	1.86	SAND	0.5	1.36	257.3	1.15	296.8	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	15.1	115.0	115.0	122.4	3.8	3.1	17	25	34	3.03	1.06	39	0.585	0.585	0.585	0.580	2.14	SAND	0.5	1.35	155.6	1.54	238.9	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	15.0	115.0	115.0	123.0	5.2	4.2	21	27	36	3.72	1.08	42	0.594	0.594	0.594	0.589	2.25	SAND	0.5	1.33	155.2	1.79	278.2	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	14.8	115.0	115.0	95.4	4.2	4.4	24	21	28	4.13	1.10	36	0.604	0.604	0.604	0.598	2.33	SAND	0.5	1.32	119.3	2.04	244.0	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	14.6	115.0	115.0	89.0	4.7	5.3	27	21	27	4.49	1.13	35	0.613	0.613	0.613	0.608	2.42	SAND	0.5	1.31	110.5	2.39	263.7	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	14.5	115.0	115.0	138.4	4.8	3.4	17	29	38	3.11	1.06	43	0.623	0.623	0.623	0.617	2.15	SAND	0.5	1.30	170.5	1.56	265.7	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.99	14.3	115.0	115.0	112.2	4.1	3.6	20	24	31	3.60	1.08	37	0.632	0.632	0.632	0.627	2.23	SAND	0.5	1.29	137.2	1.73	237.8	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	14.2	115.0	115.0	87.7	2.1	2.3	17	18	24	3.11	1.06	28	0.641	0.641	0.641	0.636	2.15	SAND	0.5	1.28	106.5	1.56	165.8	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	14.0	115.0	115.0	42.8	1.1	2.5	26	10	13	4.42	1.13	19	0.651	0.651	0.651	0.646	2.40	SAND	0.5	1.27	51.5	2.31	118.9	0.24	0.974	0.45	0.420	0.56	NA	NA	NA	NA	NA	0.000	15	1.924	0.039
11.48	13.8	115.0	115.0	17.7	0.6	3.3	41	5	6	5.00	1.20	12	0.660	0.660	0.660	0.655	2.71	non-LIQ CLAY	1	1.60	NA	4.05	non-LIQ	non-LIQ	0.973	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	13.7	115.0	115.0	16.3	0.4	2.5	39	4	5	5.00	1.20	12	0.670	0.670	0.670	0.665	2.66	non-LIQ CLAY	1	1.58	NA	3.74	non-LIQ	non-LIQ	0.973	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	13.5	115.0	115.0	15.1	0.4	2.6	41	4	5	5.00	1.20	11	0.679	0.676	0.679	0.674	2.70	non-LIQ CLAY	1	1.57	NA	4.03	non-LIQ	non-LIQ	0.972	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	13.3	115.0	115.0	14.4	0.4	2.6	42	4	5	5.00	1.20	11	0.689	0.680	0.689	0.680	2.73	non-LIQ CLAY	1	1.56	NA	4.19	non-LIQ	non-LIQ	0.972	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	13.2	115.0	115.0	14.2	0.4	2.6	42	4	5	5.00	1.20	11	0.698	0.684	0.698	0.684	2.73	non-LIQ CLAY	1	1.55	NA	4.24	non-LIQ	non-LIQ	0.972	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	13.0	115.0	115.0	13.7	0.4	2.7	44	4	5	5.00	1.20	11	0.707	0.689	0.707	0.689	2.76	non-LIQ CLAY	1	1.54	NA	4.49	non-LIQ	non-LIQ	0.971	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	12.8	115.0	115.0	13.0	0.3	2.7	45	4	5	5.00	1.20	10	0.717	0.693	0.717	0.693	2.78	non-LIQ CLAY	1	1.53	NA	4.61	non-LIQ	non-LIQ	0.971	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	12.7	115.0	115.0	12.4	0.4	2.8	47	4	4	5.00	1.20	10	0.726	0.697	0.726	0.697	2.81	non-LIQ CLAY	1	1.52	NA	4.91	non-LIQ	non-LIQ	0.971	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.80	12.5	115.0	115.0	11.6	0.3	2.8	49	3	4	5.00	1.20	10	0.736	0.702	0.736	0.702	2.84	non-LIQ CLAY	1	1.51	NA	5.17	non-LIQ	non-LIQ	0.970	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	12.3	115.0	115.0	11.3	0.3	2.8	49	3	4	5.00	1.20	10	0.745	0.706	0.745	0.706	2.85	non-LIQ CLAY	1	1.50	NA	5.27	non-LIQ	non-LIQ	0.970	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.12	12.2	115.0	115.0	12.0	0.3	2.7	47	3	4	5.00	1.20	10	0.754	0.710	0.754	0.710	2.82	non-LIQ CLAY	1	1.49	NA	4.97	non-LIQ	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	12.0	115.0	115.0	11.9	0.4	3.0	49	3	4	5.00	1.20	10	0.764	0.715	0.764	0.715	2.86	non-LIQ CLAY	1	1.48	NA	5.29	non-LIQ	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	11.9	115.0	115.0	12.3	0.3	2.8	48	4	4	5.00	1.20	10	0.773	0.719	0.773	0.719	2.83	non-LIQ CLAY	1	1.47	NA	5.03	non-LIQ	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	11.7	115.0	115.0	12.7	0.4	2.9	48	4	4	5.00	1.20	10	0.783	0.723	0.783	0.723	2.83	non-LIQ CLAY	1	1.46	NA	5.01	non-LIQ	non-LIQ	0.968	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	11.5	115.0	115.0	12.5	0.4	3.0	49	4	4	5.00	1.20	10	0.792	0.727	0.792	0.727	2.85	non-LIQ CLAY	1	1.45	NA	5.20	non-LIQ	non-LIQ	0.968	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	11.4	115.0	115.0	11.9	0.3	2.8	49	3	4	5.00	1.20	10	0.802	0.732	0.802	0.732	2.85	non-LIQ CLAY	1	1.45	NA	5.23	non-LIQ	non-LIQ	0.967	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.11	11.2	115.0	115.0	11.4	0.3	2.9	51	3	4	5.00	1.20	10	0.811	0.736	0.811	0.736	2.88	non-LIQ CLAY	1	1.44	NA	5.52	non-LIQ	non-LIQ	0.967	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	11.0	115.0	115.0	11.2	0.3	3.0	52	3	4	5.00	1.20	10	0.821	0.740	0.821	0.740	2.90	non-LIQ CLAY	1	1.43	NA	5.68	non-LIQ	non-LIQ	0.967	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	10.9	115.0	115.0	11.3	0.4	3.1	52	3	4	5.00	1.20	10	0.830	0.745	0.830	0.745	2.90	non-LIQ CLAY	1	1.42	NA	5.74	non-LIQ	non-LIQ	0.966	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	10.7	115.0	115.0	13.9	0.5	3.4	49	4	5	5.00	1.20	11	0.839	0.749	0.839	0.749	2.85	non-LIQ CLAY	1	1.41	NA	5.23	non-LIQ	non-LIQ	0.966	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	10.5	115.0	115.0	16.4	0.5	3.2	44	5	5	5.00	1.20	12	0.849	0.753	0.849	0.753	2.77	non-LIQ CLAY	1	1.40	NA	4.56	non-LIQ	non-LIQ	0.966	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	10.4	115.0	115.0	14.4	0.5	3.6	49	4	5	5.00	1.20	11	0.858	0.758	0.858	0.758	2.86	non-LIQ CLAY	1	1.40	NA	5.29	non-LIQ	non-LIQ	0.965	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.09	10.2	115.0	115.0	13.6	0.4	2.9	47	4	5	5.00	1.20	11	0.868	0.762	0.868	0.762	2.82	non-LIQ CLAY	1	1.39	NA	4.97	non-LIQ	non-LIQ	0.965	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.26	10.0	115.0	115.0	13.6	0.3	2.3	44	4	4	5.00	1.20	10	0.877	0.766	0.877	0.766	2.77	non-LIQ CLAY	1	1.38	NA	4.56	non-LIQ	non-LIQ	0.964	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.42	9.9	115.0	115.0	13.1	0.3	2.3	45	4	4	5.00	1.20	10	0.887	0.771	0.887	0.771	2.78	non-LIQ CLAY	1	1.37	NA	4.61	non-LIQ	non-LIQ	0.964	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	9.7	115.0	115.0	14.6	0.3	2.1	42	4	5	5.00	1.20	11	0.896	0.775	0.896	0.775	2.72	non-LIQ CLAY	1	1.37	NA	4.15	non-LIQ	non-LIQ	0.964	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.75	9.6	115.0	115.0	13.5	0.3	2.2	44	4	4	5.00	1.20	10	0.906	0.779	0.906	0.779	2.76	non-LIQ CLAY	1	1.36	NA	4.48	non-LIQ	non-LIQ	0.963	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	9.4	115.0	115.0	14.3	0.3	2.3	43	4	5	5.00	1.20	11	0.915	0.783	0.915	0.783	2.75	non-LIQ CLAY	1	1.35	NA	4.39	non-LIQ	non-LIQ	0.963	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	9.2	115.0	115.0	16.3	0.3	1.8	38	4	5	5.00	1.20	11	0.925	0.788	0.925	0.788	2.65	non-LIQ CLAY	1	1.34	NA	3.65	non-LIQ	non-LIQ	0.963	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	9.1	115.0	115.0	15.3	0.3	2.1	41	4	5	5.00	1.20	11	0.934	0.792	0.934	0.792	2.72	non-LIQ CLAY	1	1.34	NA	4.12	non-LIQ	non-LIQ	0.962	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	8.9	115.0	115.0	17.9	0.6	3.3	45	5	6	5.00	1.20	12	0.943	0.796	0.943	0.796	2.77	non-LIQ CLAY	1	1.33	NA	4.57	non-LIQ	non-LIQ	0.962	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	8.7	115.0	115.0	27.4	1.1	3.8	39	7	8	5.00	1.20	15	0.953	0.801	0.953	0.801	2.67	non-LIQ CLAY	1	1.32	NA	3.77	non-LIQ	non-LIQ	0.961	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	8.6	115.0	115.0	28.8	0.9	3.0	36	7	8	5.00	1.20	15	0.962	0.805	0.962	0.805	2.61	non-LIQ CLAY	1	1.31	NA	3.39	non-LIQ	non-LIQ	0.961	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	8.4	115.0	115.0	19.9	0.5	2.7	40	5	6	5.00	1.20	12	0.972	0.810	0.972	0.810	2.69	non-LIQ CLAY	1	1.31	NA	3.92	non-LIQ	non-LIQ	0.961	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	8.2	115.0	115.0	16.5	0.6	3.5	48	5	5	5.00	1.20	12	0.981	0.814	0.981	0.814	2.83	non-LIQ CLAY	1	1.30	NA	5.06	non-LIQ	non-LIQ	0.960	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	8.1	115.0	115.0	19.4	1.6	8.4	61	6	7	5.00	1.20	14	0.990	0.818	0.990	0.818	3.03	non-LIQ CLAY	1	1.29	NA	7.09	non-LIQ	non-LIQ	0.960	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	7.9	115.0	115.0	44.7	2.2	5.0	35	11	13	5.00	1.20	21	1.000	0.822	1.000	0.822	2.60	non-LIQ CLAY	1	1.29	NA	3.33	non-LIQ	non-LIQ	0.959	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	7.8	115.0	115.0	33.8	1.8	5.4	41	9	10	5.00	1.20	17	1.009	0.827	1.009	0.827	2.71	non-LIQ CLAY	1	1.28	NA	4.09	non-LIQ	non-LIQ	0.959	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	7.6	115.0	115.0	23.0	1.0	4.5	45	6	7	5.00	1.20	14	1.019	0.831	1.019	0.831	2.79	non-LIQ CLAY	1	1.27	NA	4.67	non-LIQ	non-LIQ	0.959	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	7.4	115.0	115.0	22.2	0.6	2.9	39	6	7	5.00	1.20	13	1.028	0.835	1.028	0.835	2.68	non-LIQ CLAY	1	1.27	NA	3.83	non-LIQ	non-LIQ	0.958	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	7.3	115.0	115.0	20.5	0.6	3.1	42	6	6	5.00	1.20	13	1.037	0.839	1.037	0.839	2.72	non-LIQ CLAY	1	1.26	NA	4.17	non-LIQ	non-LIQ	0.958	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	7.1	115.0	115.0	19.8	0.6	2.9	42	5	6	5.00	1.20	12	1.047	0.844	1.047	0.844	2.73	non-LIQ CLAY	1	1.25	NA	4.19	non-LIQ	non-LIQ	0.958	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	6.9	115.0	115.0	19.8	0.6	2.8	41	5	6	5.00	1.20	12	1.056	0.848	1.056	0.848	2.71	non-LIQ CLAY	1	1.25	NA	4.11	non-LIQ	non-LIQ	0.957	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	6.8	115.0	115.0	20.3	0.5	2.7	40	5	6	5.00	1.20	12	1.066	0.853	1.066	0.853	2.70	non-LIQ CLAY	1	1.24	NA	3.96	non-LIQ	non-LIQ	0.957	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	6.6	115.0	115.0	20.8	0.6	2.8	41	6	6	5.00	1.20	12	1.075	0.857	1.075	0.857	2.71	non-LIQ CLAY	1	1.23	NA	4.03	non-LIQ	non-LIQ	0.956	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	6.4	115.0	115.0	23.0	0.6	2.6	38	6	7	5.00	1.20	13	1.084	0.861	1.084	0.861	2.65	non-LIQ CLAY	1	1.23	NA	3.63	non-LIQ	non-LIQ	0.956	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.03	6.3	115.0	115.0	23.3	0.6	2.7	38	6	7	5.00	1.20	13	1.094	0.866	1.094	0.866	2.65	non-LIQ CLAY	1	1.22	NA	3.68	non-LIQ	non-LIQ	0.956	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	6.1	115.0	115.0	21.3	0.6	2.9	41	6	6	5.00	1.20	13	1.103	0.870	1.103	0.870	2.71	non-LIQ CLAY	1	1.22	NA	4.09	non-LIQ	non-LIQ	0.955	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	5.9	115.0	115.0	19.1	0.6	3.1	44	5	6	5.00	1.20	12	1.113	0.874	1.113	0.874	2.77	non-LIQ CLAY	1	1.21	NA	4.50	non-LIQ	non-LIQ	0.955	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	5.8	115.0	115.0	17.4	0.5	3.0	46	5	5	5.00	1.20	11	1.122	0.878	1.122	0.878	2.80	non-LIQ CLAY	1	1.20	NA	4.77	non-LIQ	non-LIQ	0.954	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	5.6	115.0	115.0	17.1	0.5	2.9	46	5	5	5.00	1.20	11	1.132	0.883	1.132	0.883	2.80	non-LIQ CLAY	1	1.20	NA	4.79	non-LIQ	non-LIQ	0.954	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	5.5	115.0	115.0	16.4	0.5	2.8	46	5	5	5.00	1.20	11	1.141	0.887	1.141	0.887	2.81	non-LIQ CLAY	1	1.19	NA	4.84	non-LIQ	non-LIQ	0.954	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	5.3	115.0	115.0	15.4	0.4	2.9	48	4	5	5.00	1.20	11	1.151	0.891	1.151	0.891	2.84	non-LIQ CLAY	1	1.19	NA	5.12	non-LIQ	non-LIQ	0.953	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	5.1	115.0	115.0	14.1	0.4	2.9	51	4	5	5.00	1.20	10	1.160	0.896	1.160	0.896	2.88	non-LIQ CLAY	1	1.18	NA	5.50	non-LIQ	non-LIQ	0.953	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	5.0	115.0	115.0	13.5	0.4	2.9	52	4	4	5.00	1.20	10	1.170	0.900	1.170	0.900	2.90	non-LIQ CLAY	1	1.18	NA	5.69	non-LIQ	non-LIQ	0.953	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	4.8	115.0	115.0	14.0	0.5	3.6	55	4	5	5.00	1.20	11	1.179	0.904	1.179	0.904	2.94	non-LIQ CLAY	1	1.17	NA	6.15	non-LIQ	non-LIQ	0.952	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	4.6	115.0	115.0	18.6	0.8	4.6	52	6	6	5.00	1.20	12	1.189	0.909	1.189	0.909	2.90	non-LIQ CLAY	1	1.16	NA	5.73	non-LIQ	non-LIQ	0.952	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	4.5	115.0	115.0	24.8	1.1	4.6	46	7	8	5.00	1.20	14	1.198	0.913	1.198	0.913	2.80	non-LIQ CLAY	1	1.16	NA	4.81	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	4.3	115.0	115.0	22.3	1.4	6.2	54	7	7	5.00	1.20	14	1.208	0.917	1.208	0.917	2.93	non-LIQ CLAY	1	1.15	NA	6.04	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	4.1	115.0	115.0	24.9	1.6	6.5	53	8	8	5.00	1.20	15	1.217	0.922	1.217	0.922	2.91	non-LIQ CLAY	1	1.15	NA	5.81	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	4.0	115.0	115.0	29.8	1.6	5.5	46	8	9	5.00	1.20	16	1.226	0.926	1.226	0.926	2.80	non-LIQ CLAY	1	1.14	NA	4.79	non-LIQ	non-LIQ	0.950	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	3.8	115.0	115.0	23.2	1.4	6.2	53	7	8	5.00	1.20	14	1.236	0.930	1.236	0.930	2.92	non-LIQ CLAY	1	1.14	NA	5.90	non-LIQ	non-LIQ	0.950	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	3.7	115.0	115.0	23.0	1.5	6.7	55	7	8	5.00	1.20	14	1.245	0.934	1.245	0.934	2.95	non-LIQ CLAY	1	1.13	NA	6.22	non-LIQ	non-LIQ	0.950	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	3.5	115.0	115.0	28.8	1.7	5.8	48	8	9	5.00	1.20	16	1.255	0.939	1.255	0.939	2.83	non-LIQ CLAY	1	1.13	NA	5.05	non-LIQ	non-LIQ	0.949	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	3.3	115.0	115.0	27.9	1.6	5.6	48	8	9	5.00	1.20	15	1.264	0.943	1.264	0.943	2.84	non-LIQ CLAY	1	1.12	NA	5.10	non-LIQ	non-LIQ	0.949	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	3.2	115.0	115.0	25.4	1.2	4.9	47	7	8	5.00	1.20	14	1.274	0.948	1.274	0.948	2.82	non-LIQ CLAY	1	1.12	NA	5.00	non-LIQ	non-LIQ	0.948	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	3.0	115.0	115.0	25.0	1.1	4.2	45	7	7	5.00	1.20	14	1.283	0.952	1.283	0.952	2.79	non-LIQ CLAY	1	1.11	NA	4.71	non-LIQ	non-LIQ	0.948	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	2.8	115.0	115.0	22.6	1.1	4.9	50	7	7	5.00	1.20	13	1.292	0.956	1.292	0.956	2.87	non-LIQ CLAY	1	1.11	NA	5.45	non-LIQ	non-LIQ	0.948	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.64	2.7	115.0	115.0	20.0	1.0	5.0	53	6	6	5.00	1.20	13	1.302	0.960	1.302	0.960	2.92	non-LIQ CLAY	1	1.10	NA	5.91	non-LIQ	non-LIQ	0.947	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	2.5	115.0	115.0	17.7	0.8	4.5	55	5	6	5.00	1.20	12	1.311	0.965	1.311	0.965	2.94	non-LIQ CLAY	1	1.10	NA	6.12	non-LIQ	non-LIQ	0.947	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-8

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							σ_v (tsf)	σ_v' (tsf)	σ_v (tsf)	σ_v' (tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$								(tsf)	(%)	(%)	(in)		(%)	(in)
22.97	2.3	115.0	115.0	17.5	0.6	3.4	50	5	5	5.00	1.20	11	1.321	0.969	1.321	0.969	2.87	non-LIQ CLAY	1	1.09	NA	5.40	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	2.2	115.0	115.0	18.5	0.7	3.6	50	5	6	5.00	1.20	12	1.330	0.973	1.330	0.973	2.87	non-LIQ CLAY	1	1.09	NA	5.36	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.29	2.0	115.0	115.0	15.9	0.7	4.2	56	5	5	5.00	1.20	11	1.339	0.978	1.339	0.978	2.97	non-LIQ CLAY	1	1.08	NA	6.39	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	1.8	115.0	115.0	18.7	0.6	3.3	49	5	6	5.00	1.20	12	1.349	0.982	1.349	0.982	2.84	non-LIQ CLAY	1	1.08	NA	5.17	non-LIQ	non-LIQ	0.945	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	1.7	115.0	115.0	19.3	0.6	3.2	47	6	6	5.00	1.20	12	1.358	0.986	1.358	0.986	2.82	non-LIQ CLAY	1	1.07	NA	4.99	non-LIQ	non-LIQ	0.945	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	1.5	115.0	115.0	21.1	0.7	3.4	46	6	6	5.00	1.20	12	1.368	0.991	1.368	0.991	2.80	non-LIQ CLAY	1	1.07	NA	4.81	non-LIQ	non-LIQ	0.945	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	1.4	115.0	115.0	25.0	0.9	3.4	43	7	7	5.00	1.20	14	1.377	0.995	1.377	0.995	2.75	non-LIQ CLAY	1	1.06	NA	4.36	non-LIQ	non-LIQ	0.944	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	1.2	115.0	115.0	26.5	1.0	3.7	43	7	8	5.00	1.20	14	1.386	0.999	1.386	0.999	2.75	non-LIQ CLAY	1	1.06	NA	4.35	non-LIQ	non-LIQ	0.944	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	1.0	115.0	115.0	25.8	0.9	3.6	44	7	7	5.00	1.20	14	1.396	1.004	1.396	1.004	2.76	non-LIQ CLAY	1	1.05	NA	4.44	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	0.9	115.0	115.0	24.8	0.9	3.4	44	7	7	5.00	1.20	13	1.405	1.008	1.405	1.008	2.76	non-LIQ CLAY	1	1.05	NA	4.43	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.61	0.7	115.0	115.0	24.4	0.9	3.6	45	7	7	5.00	1.20	13	1.415	1.012	1.415	1.012	2.78	non-LIQ CLAY	1	1.05	NA	4.60	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	0.5	115.0	115.0	24.6	1.0	3.9	46	7	7	5.00	1.20	14	1.424	1.016	1.424	1.016	2.80	non-LIQ CLAY	1	1.04	NA	4.78	non-LIQ	non-LIQ	0.942	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	0.4	115.0	115.0	23.7	1.0	4.1	47	7	7	5.00	1.20	13	1.433	1.021	1.433	1.021	2.83	non-LIQ CLAY	1	1.04	NA	5.01	non-LIQ	non-LIQ	0.942	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	0.2	115.0	115.0	21.9	0.9	3.9	49	6	6	5.00	1.20	13	1.443	1.025	1.443	1.025	2.85	non-LIQ CLAY	1	1.03	NA	5.18	non-LIQ	non-LIQ	0.941	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	0.0	115.0	115.0	22.1	0.8	3.6	47	6	6	5.00	1.20	13	1.452	1.029	1.452	1.029	2.82	non-LIQ CLAY	1	1.03	NA	4.96	non-LIQ	non-LIQ	0.941	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	-0.1	115.0	115.0	22.6	0.8	3.3	46	6	6	5.00	1.20	13	1.462	1.034	1.462	1.034	2.79	non-LIQ CLAY	1	1.02	NA	4.73	non-LIQ	non-LIQ	0.941	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	-0.3	115.0	115.0	22.4	0.7	3.2	45	6	6	5.00	1.20	13	1.471	1.038	1.471	1.038	2.79	non-LIQ CLAY	1	1.02	NA	4.69	non-LIQ	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	-0.4	115.0	115.0	21.0	0.6	3.0	46	6	6	5.00	1.20	12	1.481	1.042	1.481	1.042	2.80	non-LIQ CLAY	1	1.02	NA	4.77	non-LIQ	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	-0.6	115.0	115.0	18.2	0.6	3.1	50	5	5	5.00	1.20	11	1.490	1.047	1.490	1.047	2.87	non-LIQ CLAY	1	1.01	NA	5.37	non-LIQ	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	-0.8	115.0	115.0	15.7	0.5	3.5	56	5	5	5.00	1.20	11	1.500	1.051	1.500	1.051	2.96	non-LIQ CLAY	1	1.01	NA	6.28	non-LIQ	non-LIQ	0.939	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	-0.9	115.0	115.0	15.2	0.6	3.7	58	5	5	5.00	1.20	11	1.509	1.055	1.509	1.055	2.99	non-LIQ CLAY	1	1.00	NA	6.61	non-LIQ	non-LIQ	0.939	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	-1.1	115.0	115.0	15.8	0.5	3.4	55	5	5	5.00	1.20	11	1.519	1.060	1.519	1.060	2.95	non-LIQ CLAY	1	1.00	NA	6.21	non-LIQ	non-LIQ	0.938	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	-1.3	115.0	115.0	15.4	0.5	3.3	56	5	5	5.00	1.20	11	1.528	1.064	1.528	1.064	2.96	non-LIQ CLAY	1	0.99	NA	6.28	non-LIQ	non-LIQ	0.938	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	-1.4	115.0	115.0	15.9	0.5	3.1	54	5	5	5.00	1.20	11	1.538	1.068	1.538	1.068	2.93	non-LIQ CLAY	1	0.99	NA	5.96	non-LIQ	non-LIQ	0.938	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	-1.6	115.0	115.0	16.4	0.5	2.8	52	5	5	5.00	1.20	11	1.547	1.073	1.547	1.073	2.89	non-LIQ CLAY	1	0.99	NA	5.63	non-LIQ	non-LIQ	0.937	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-1.8	115.0	115.0	16.0	0.5	3.0	53	5	5	5.00	1.20	11	1.557	1.077	1.557	1.077	2.92	non-LIQ CLAY	1	0.98	NA	5.86	non-LIQ	non-LIQ	0.937	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-1.9	115.0	115.0	16.8	0.5	3.2	53	5	5	5.00	1.20	11	1.566	1.081	1.566	1.081	2.92	non-LIQ CLAY	1	0.98	NA	5.87	non-LIQ	non-LIQ	0.937	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-2.1	115.0	115.0	18.7	0.6	3.1	50	6	5	5.00	1.20	12	1.576	1.086	1.576	1.086	2.86	non-LIQ CLAY	1	0.97	NA	5.36	non-LIQ	non-LIQ	0.936	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-2.3	115.0	115.0	19.9	0.7	3.3	50	6	6	5.00	1.20	12	1.585	1.090	1.585	1.090	2.86	non-LIQ CLAY	1	0.97	NA	5.36	non-LIQ	non-LIQ	0.936	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-2.4	115.0	115.0	21.8	0.7	3.4	48	6	6	5.00	1.20	12	1.594	1.094	1.594	1.094	2.84	non-LIQ CLAY	1	0.97	NA	5.11	non-LIQ	non-LIQ	0.935	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-2.6	115.0	115.0	23.1	0.8	3.5	47	7	7	5.00	1.20	13	1.604	1.099	1.604	1.099	2.82	non-LIQ CLAY	1	0.96	NA	4.98	non-LIQ	non-LIQ	0.935	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-2.8	115.0	115.0	23.1	0.8	3.6	48	7	7	5.00	1.20	13	1.613	1.103	1.613	1.103	2.84	non-LIQ CLAY	1	0.96	NA	5.10	non-LIQ	non-LIQ	0.935	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-2.9	115.0	115.0	24.6	0.9	3.7	47	7	7	5.00	1.20	13	1.623	1.107	1.623	1.107	2.82	non-LIQ CLAY	1	0.96	NA	4.96	non-LIQ	non-LIQ	0.934	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-3.1	115.0	115.0	26.3	1.0	3.6	44	8	8	5.00	1.20	14	1.632	1.111	1.632	1.111	2.76	non-LIQ CLAY	1	0.95	NA	4.46	non-LIQ	non-LIQ	0.934	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-3.2	115.0	115.0	30.7	1.1	3.7	43	8	8	5.00	1.20	15	1.641	1.116	1.641	1.116	2.74	non-LIQ CLAY	1	0.95	NA	4.28	non-LIQ	non-LIQ	0.933	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-3.4	115.0	115.0	29.3	1.1	3.9	44	8	8	5.00	1.20	15	1.651	1.120	1.651	1.120	2.77	non-LIQ CLAY	1	0.94	NA	4.56	non-LIQ	non-LIQ	0.933	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-3.6	115.0	115.0	29.7	1.1	3.7	44	8	8	5.00	1.20	15	1.660	1.124	1.660	1.124	2.76	non-LIQ CLAY	1	0.94	NA	4.44	non-LIQ	non-LIQ	0.933	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-3.7	115.0	115.0	29.3	1.1	3.7	44	8	8	5.00	1.20	14	1.670	1.129	1.670	1.129	2.76	non-LIQ CLAY	1	0.94	NA	4.43	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-3.9	115.0	115.0	29.0	1.1	3.7	44	8	8	5.00	1.20	14	1.679	1.133	1.679	1.133	2.77	non-LIQ CLAY	1	0.93	NA	4.50	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-4.1	115.0	115.0	27.6	1.0	3.8	46	8	8	5.00	1.20	14	1.688	1.137	1.688	1.137	2.79	non-LIQ CLAY	1	0.93	NA	4.72	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-4.2	115.0	115.0	27.4	1.1	3.8	46	8	8	5.00	1.20	14	1.698	1.142	1.698	1.142	2.80	non-LIQ CLAY	1	0.93	NA	4.78	non-LIQ	non-LIQ	0.931	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-4.4	115.0	115.0	29.0	1.1	3.7	44	8	8	5.00	1.20	14	1.707	1.146	1.707	1.146	2.77	non-LIQ CLAY	1	0.92	NA	4.53	non-LIQ	non-LIQ	0.931	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-4.6	115.0	115.0	26.8	1.2	4.0	46	8	8	5.00	1.20	14	1.717	1.150	1.717	1.150	2.80	non-LIQ CLAY	1	0.92	NA	4.76	non-LIQ	non-LIQ	0.930	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-4.7	115.0	115.0	26.6	1.2	4.2	47	8	8	5.00	1.20	14	1.726	1.155	1.726	1.155	2.82	non-LIQ CLAY	1	0.92	NA	4.93	non-LIQ	non-LIQ	0.930	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-4.9	115.0	115.0	29.1	1.3	4.3	47	8	8	5.00	1.20	15	1.735	1.159	1.735	1.159	2.82	non-LIQ CLAY	1	0.91	NA	4.93	non-LIQ	non-LIQ	0.928	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-5.1	115.0	115.0	32.8	1.0	3.1	39	9	8	5.00	1.20	15	1.745	1.163	1.745	1.163	2.68	non-LIQ CLAY	1	0.91	NA	3.86	non-LIQ	non-LIQ	0.927	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-5.2	115.0	115.0	27.1	0.8	2.9	42	7	7	5.00	1.20	13	1.754	1.167	1.754	1.167	2.73	non-LIQ CLAY	1	0.91	NA	4.24	non-LIQ	non-LIQ	0.926	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-5.4	115.0	115.0	23.0	0.8	3.5	49	7	6	5.00	1.20	13	1.764	1.172	1.764	1.172	2.85	non-LIQ CLAY	1	0.90	NA	5.20	non-LIQ	non-LIQ	0.924	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-5.5	115.0	115.0	23.3	0.8	3.5	49	7	6	5.00	1.20	13	1.773	1.176	1.773	1.176	2.85	non-LIQ CLAY	1	0.90	NA	5.22	non-LIQ	non-LIQ	0.923	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-5.7	115.0	115.0	23.9	0.9	3.6	49	7	7	5.00	1.20	13	1.783	1.180	1.783	1.180	2.85	non-LIQ CLAY	1	0.90	NA	5.22	non-LIQ	non-LIQ	0.922	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.17	-5.9	115.0	115.0	23.2	0.8	3.3	48	7	6	5.00	1.20	13	1.792	1.185	1.792	1.185	2.83	non-LIQ CLAY	1	0.89	NA	5.08	non-LIQ	non-LIQ	0.920	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.33	-6.0	115.0	115.0	21.6	0.7	3.4	50.3	6.4	6.0	5.0	1.2	12.0	1.80	1.19	1.80	1.19	2.87	non-LIQ CLAY	1	0.89	NA	5.43	non-LIQ	non-LIQ	0.919	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.50	-6.2	115.0	115.0	20.5	0.7	3.4	52.0	6.2	5.8	5.0	1.2	12.0	1.81	1.19	1.81	1.19	2.90	non-LIQ CLAY	1	0.89	NA	5.69	non-LIQ	non-LIQ	0.918	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.66	-6.4	115.0	115.0	20.5	0.6	3.1	50.1	6.1	5.7	5.0	1.2	12.0	1.82	1.20	1.82	1.20	2.87	non-LIQ CLAY	1	0.88	NA	5.40	non-LIQ	non-LIQ	0.916	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.82	-6.5	115.0	115.0	19.9	0.6	3.2	51.4	6.0	5.6	5.0	1.2	12.0	1.83	1.20	1.83	1.20	2.89	non-LIQ CLAY	1	0.88	NA	5.61	non-LIQ	non-LIQ	0.915	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.99	-6.7	115.0	115.0	20.0	0.7	3.3	52.0	6.0	5.6	5.0	1.2	12.0	1.84	1.21	1.84	1.21	2.90	non-LIQ CLAY	1	0.88	NA	5.70	non-LIQ	non-LIQ	0.914	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.15	-6.9	115.0	115.0	16.7	0.7	3.7	55.9	5.8	5.5	5.0	1.2	12.0	1.85	1.21	1.85	1.21	2.96	non-LIQ CLAY	1	0.87	NA	6.32	non-LIQ	non-LIQ	0.912	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.32	-7.0	115.0	115.0	19.1	0.7	3.6	55.1	5.9	5.5	5.0	1.2	12.0	1.86	1.22	1.86	1.22	2.95	non-LIQ CLAY	1	0.87	NA	6.20	non-LIQ	non-LIQ	0.911	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.48	-7.2	115.0	115.0	19.0	0.7	3.6	55.3	5.9	5.5	5.0	1.2	12.0	1.87	1.22	1.87	1.22	2.95	non-LIQ CLAY	1	0.87	NA	6.22	non-LIQ	non-LIQ	0.910	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.64	-7.3	115.0	115.0	19.2	0.7	3.5	54.5	5.9	5.5	5.0	1.2	12.0	1.88	1.22	1.88	1.22	2.94	non-LIQ CLAY	1	0.86	NA	6.10	non-LIQ	non-LIQ	0.908	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.81	-7.5	115.0	115.0	19.2	0.7	3.8	56.2	6.0	5.6	5.0	1.2	12.0	1.89	1.23	1.89	1.23	2.97	non-LIQ CLAY	1	0.86	NA	6.37	non-LIQ	non-LIQ	0.907	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.97	-7.7	115.0	115.0	19.9	0.7	3.7	54.8	6.1	5.7	5.0	1.2	12.0	1.90	1.23	1.90	1.23	2.94	non-LIQ CLAY	1	0.86	NA	6.14	non-LIQ	non-LIQ	0.906	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-7.8	115.0	115.0	19.8	0.7	3.6	54.4	6.1	5.6	5.0	1.2	12.0	1.91	1.24	1.91	1.24	2.94	non-LIQ CLAY	1	0.86	NA	6.08	non-LIQ	non-LIQ	0.904	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-8.0	115.0	115.0	19.9	0.8	3.9	55.8	6.2	5.7	5.0	1.2	12.0	1.91	1.24	1.91	1.24	2.96	non-LIQ CLAY	1	0.85	NA	6.30	non-LIQ	non-LIQ	0.903	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-8.2	115.0	115.0	19.4	0.7	3.8	56.4	6.1	5.6	5.0	1.2	12.0	1.92	1.25	1.92	1.25	2.97	non-LIQ CLAY	1	0.85	NA	6.40	non-LIQ	non-LIQ	0.902	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-8.3	115.0	115.0	18.4	0.7	4.0	58.7	5.9	5.4	5.0	1.2	11.0	1.93	1.25	1.93	1.25	3.00	non-LIQ CLAY	1	0.85	NA	6.78	non-LIQ	non-LIQ	0.900	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-8.5	115.0	115.0	19.9	0.7	3.5	54.4	6.1	5.6	5.0	1.2	12.0	1.94	1.25	1.94	1.25	2.94	non-LIQ CLAY	1	0.84	NA	6.08	non-LIQ	non-LIQ	0.899	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-8.7	115.0	115.0	19.9	0.7	3.5	54.5	6.1	5.6	5.0	1.2	12.0	1.95	1.26	1.95	1.26	2.94	non-LIQ CLAY	1	0.84	NA	6.09	non-LIQ	non-LIQ	0.898	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-8.8	115.0	115.0	20.0	0.7	3.5	54.7	6.2	5.6	5.0	1.2	12.0	1.96	1.26	1.96	1.26	2.94	non-LIQ CLAY	1	0.84	NA	6.12	non-LIQ	non-LIQ	0.896	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-9.0	115.0	115.0	19.9	0.7	3.8	56.0	6.2	5.7	5.0	1.2	12.0	1.97	1.27	1.97	1.27	2.96	non-LIQ CLAY	1	0.84	NA	6.33	non-LIQ	non-LIQ	0.895	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-9.2	115.0	115.0	22.5	1.1	5.0	58.0	7.1	6.5	5.0	1.2	13.0	1.98	1.27	1.98	1.27	2.99	non-LIQ CLAY	1	0.83	NA	6.66	non-LIQ	non-LIQ	0.894	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-9.3	115.0	115.0	27.8	1.1	4.0	48.9	8.1	7.4	5.0	1.2	14.0	1.99	1.28	1.99	1.28	2.85	non-LIQ CLAY	1	0.83	NA	5.22	non-LIQ	non-LIQ	0.892	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-9.5	115.0	115.0	28.0	2.5	9.1	64.9	9.5	8.6	5.0	1.2	15.0	2.00	1.28	2.00	1.28	3.09	non-LIQ CLAY	1	0.83	NA	7.82	non-LIQ	non-LIQ	0.891	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-9.6	115.0	115.0	54.9	3.8	7.0	45.2	15.5	14.0	5.0	1.2	22.0	2.01	1.28	2.01	1.28	2.79	non-LIQ CLAY	1	0.82	NA	4.67	non-LIQ	non-LIQ	0.890	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-9.8	115.0	115.0	78.6	5.2	6.6	38.5	20.8	18.8	5.0	1.2	28.0	2.02	1.29	2.02	1.29	2.66	non-LIQ CLAY	1	0.82	NA	3.73	non-LIQ	non-LIQ	0.888	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-10.0	115.0	115.0	123.5	5.7	4.6	25.9	28.6	25.8	4.4	1.1	33.0	2.03	1.29	2.03	1.29	2.39	SAND	0.5	0.90	106	2.26	239	non-LIQ	0.887	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-10.1	115.0	115.0	101.8	5.4	5.4	30.3	24.7	22.3	4.7	1.2	30.0	2.04	1.30	2.04	1.30	2.49	SAND	0.5	0.90	87	2.72	236	non-LIQ	0.886	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-10.3	115.0	115.0	87.0	4.9	5.7	33.2	21.8	19.6	4.9	1.2	28.0	2.05	1.30	2.05	1.30	2.55	SAND	0.5	0.90	74	3.06	227	non-LIQ	0.884	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-10.5	115.0	115.0	67.4	4.3	6.4	40.5	18.1	16.3	5.0	1.2	25.0	2.06	1.31	2.06	1.31	2.70	non-LIQ CLAY	1	0.81	NA	4.01	non-LIQ	non-LIQ	0.883	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-10.6	115.0	115.0	79.4	4.0	5.1	32.9	19.8	17.8	4.9	1.2	26.0	2.07	1.31	2.07	1.31	2.55	SAND	0.5	0.90	67	3.02	204	non-LIQ	0.882	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-10.8	115.0	115.0	95.9	5.3	5.5	31.6	23.6	21.2	4.8	1.2	30.0	2.08	1.31	2.08	1.31	2.52	SAND	0.5	0.90	81	2.87	234	non-LIQ	0.880	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-11.0	115.0	115.0	149.6	6.4	4.3	22.8	33.4	29.9	4.0	1.1	37.0	2.08	1.32	2.08	1.32	2.31	SAND	0.5	0.90	127	1.98	250	non-LIQ	0.879	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-11.1	115.0	115.0	164.2	6.3	3.8	20.6	35.7	31.9	3.7	1.1	38.0	2.09	1.32	2.09	1.32	2.25	SAND	0.5	0.89	139	1.79	248	non-LIQ	0.878	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-11.3	115.0	115.0	174.7	7.0	4.0	20.6	37.9	33.9	3.7	1.1	40.0	2.10	1.33	2.10	1.33	2.25	SAND	0.5	0.89	147	1.79	263	non-LIQ	0.876	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-11.5	115.0	115.0	171.4	5.6	3.3	18.4	36.3	32.3	3.3	1.1	38.0	2.11	1.33	2.11	1.33	2.18	SAND	0.5	0.89	144	1.62	234	non-LIQ	0.875	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-11.6	115.0	115.0	168.4	6.8	4.0	21.1	36.8	32.8	3.8	1.1	39.0	2.12	1.34	2.12	1.34	2.26	SAND	0.5	0.89	142	1.83	259	non-LIQ	0.874	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-11.8	115.0	115.0	172.0	4.7	2.7	16.4	35.4	31.5	2.9	1.1	36.0	2.13	1.34	2.13	1.34	2.12	SAND	0.5	0.89	144	1.49	215	non-LIQ	0.872	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.24	-11.9	115.0	115.0	169.9	4.4	2.6	16.1	34.9	30.9	2.8	1.1	35.0	2.14	1.34	2.14	1.34	2.11	SAND	0.5	0.89	142	1.47	209	non-LIQ	0.871	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.40	-12.1	115.0	115.0	238.3	4.4	1.8	10.3	45.1	39.9	1.0	1.0	42.0	2.15	1.35	2.15	1.35	1.90	SAND	0.5	0.89	200	1.19	237	non-LIQ	0.870	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

C-9

C-10

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
37.57	-12.3	115.0	115.0	174.9	5.2	3.0	17.2	36.5	32.2	3.1	1.1	37.0	2.16	1.35	2.16	1.35	2.15	SAND	0.5	0.88	146	1.54	226	non-LIQ	0.868	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.73	-12.4	115.0	115.0	128.1	5.3	4.1	24.2	29.0	25.6	4.2	1.1	33.0	2.17	1.36	2.17	1.36	2.34	SAND	0.5	0.88	107	2.10	224	non-LIQ	0.867	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.89	-12.6	115.0	115.0	145.0	5.2	3.6	21.2	31.8	28.0	3.8	1.1	34.0	2.18	1.36	2.18	1.36	2.26	SAND	0.5	0.88	121	1.84	222	non-LIQ	0.866	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-12.8	115.0	115.0	241.8	4.7	2.0	10.8	46.1	40.5	1.1	1.0	43.0	2.19	1.37	2.19	1.37	1.91	SAND	0.5	0.88	201	1.20	242	non-LIQ	0.864	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-12.9	115.0	115.0	469.2	4.4	0.9	2.6	76.9	67.6	0.0	1.0	68.0	2.20	1.37	2.20	1.37	1.48	SAND	0.5	0.88	390	1.00	390	non-LIQ	0.863	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-13.1	115.0	115.0	495.3	4.0	0.8	1.7	79.6	69.8	0.0	1.0	70.0	2.21	1.37	2.21	1.37	1.42	SAND	0.5	0.88	411	1.00	411	non-LIQ	0.862	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-13.3	115.0	115.0	480.3	3.4	0.7	1.3	76.3	66.8	0.0	1.0	67.0	2.22	1.38	2.22	1.38	1.38	SAND	0.5	0.88	398	1.00	398	non-LIQ	0.860	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-13.4	115.0	115.0	471.3	3.1	0.7	1.1	74.5	65.1	0.0	1.0	65.0	2.23	1.38	2.23	1.38	1.36	SAND	0.5	0.87	390	1.00	390	non-LIQ	0.859	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-13.6	115.0	115.0	352.7	2.9	0.8	3.1	58.5	51.1	0.0	1.0	51.0	2.24	1.39	2.24	1.39	1.52	SAND	0.5	0.87	291	1.00	291	non-LIQ	0.858	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-13.7	115.0	115.0	339.9	5.3	1.6	7.1	61.0	53.2	0.1	1.0	54.0	2.24	1.39	2.24	1.39	1.75	SAND	0.5	0.87	280	1.07	300	non-LIQ	0.856	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.21	-13.9	115.0	115.0	276.2	3.9	1.4	7.6	50.0	43.5	0.2	1.0	44.0	2.25	1.40	2.25	1.40	1.77	SAND	0.5	0.87	227	1.09	247	non-LIQ	0.855	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-14.1	115.0	115.0	237.4	3.6	1.5	9.0	44.0	38.2	0.6	1.0	39.0	2.26	1.40	2.26	1.40	1.84	SAND	0.5	0.87	195	1.14	222	non-LIQ	0.854	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.53	-14.2	115.0	115.0	223.7	3.2	1.4	8.8	41.3	35.9	0.5	1.0	37.0	2.27	1.40	2.27	1.40	1.83	SAND	0.5	0.87	183	1.13	207	non-LIQ	0.852	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-14.4	115.0	115.0	239.6	3.6	1.5	8.9	44.3	38.4	0.5	1.0	40.0	2.28	1.41	2.28	1.41	1.83	SAND	0.5	0.87	196	1.13	222	non-LIQ	0.851	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-14.6	115.0	115.0	264.7	4.2	1.6	8.7	48.8	42.2	0.5	1.0	43.0	2.29	1.41	2.29	1.41	1.83	SAND	0.5	0.87	216	1.13	244	non-LIQ	0.850	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-14.7	115.0	115.0	305.7	4.6	1.5	7.4	55.2	47.7	0.2	1.0	48.0	2.30	1.42	2.30	1.42	1.77	SAND	0.5	0.86	250	1.08	270	non-LIQ	0.848	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-14.9	115.0	115.0	211.7	3.6	1.7	10.7	40.3	34.7	1.1	1.0	37.0	2.31	1.42	2.31	1.42	1.91	SAND	0.5	0.86	173	1.20	207	non-LIQ	0.847	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-15.1	115.0	115.0	140.0	3.4	2.4	17.2	29.2	25.1	3.1	1.1	30.0	2.32	1.43	2.32	1.43	2.15	SAND	0.5	0.86	114	1.54	176	non-LIQ	0.846	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-15.2	115.0	115.0	98.1	3.1	3.1	24.1	22.2	19.1	4.2	1.1	25.0	2.33	1.43	2.33	1.43	2.34	SAND	0.5	0.86	80	2.09	166	non-LIQ	0.844	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.68	-15.4	115.0	115.0	53.5	2.6	4.9	41.7	14.6	12.5	5.0	1.2	20.0	2.34	1.43	2.34	1.43	2.72	non-LIQ CLAY	1	0.74	NA	4.17	non-LIQ	non-LIQ	0.843	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.85	-15.6	115.0	115.0	56.7	1.6	2.9	38.4	15.0	12.8	5.0	1.2	20.0	2.35	1.44	2.35	1.44	2.66	SAND	0.5	0.86	46	3.71	171	non-LIQ	0.842	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-15.7	115.0	115.0	42.6	1.3	3.1	38.5	11.3	9.6	5.0	1.2	17.0	2.36	1.44	2.36	1.44	2.66	non-LIQ CLAY	1	0.73	NA	3.73	non-LIQ	non-LIQ	0.840	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-15.9	115.0	115.0	40.9	0.8	1.9	34.9	10.4	8.9	5.0	1.2	16.0	2.37	1.45	2.37	1.45	2.59	SAND	0.5	0.85	33	3.27	108	0.197	0.839	0.630	0.590	0.33	NA	NA	NA	NA	NA	0.00	12.00	2.31	0.04
41.34	-16.0	115.0	115.0	32.8	0.8	2.4	40.4	8.8	7.5	5.0	1.2	14.0	2.38	1.45	2.38	1.45	2.70	non-LIQ CLAY	1	0.73	NA	4.00	non-LIQ	non-LIQ	0.838	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-16.2	115.0	115.0	35.3	1.3	3.8	45.8	10.0	8.5	5.0	1.2	15.0	2.39	1.46	2.39	1.46	2.80	non-LIQ CLAY	1	0.73	NA	4.75	non-LIQ	non-LIQ	0.836	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-16.4	115.0	115.0	59.7	2.0	3.3	36.3	15.4	13.1	5.0	1.2	21.0	2.40	1.46	2.40	1.46	2.62	SAND	0.5	0.85	48	3.45	166	non-LIQ	0.835	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-16.5	115.0	115.0	62.7	1.9	3.1	34.4	15.9	13.5	4.9	1.2	21.0	2.41	1.47	2.41	1.47	2.58	SAND	0.5	0.85	50	3.21	162	non-LIQ	0.834	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-16.7	115.0	115.0	85.2	3.9	4.6	31.2	20.9	17.7	4.8	1.2	25.0	2.41	1.47	2.41	1.47	2.51	SAND	0.5	0.85	68	2.83	193	non-LIQ	0.832	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-16.9	115.0	115.0	265.0	4.3	1.6	8.9	49.0	41.6	0.5	1.0	43.0	2.42	1.47	2.42	1.47	1.84	SAND	0.5	0.85	212	1.13	241	non-LIQ	0.831	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.32	-17.0	115.0	115.0	420.4	6.6	1.6	6.2	74.2	62.8	0.0	1.0	63.0	2.43	1.48	2.43	1.48	1.70	SAND	0.5	0.85	336	1.04	350	non-LIQ	0.830	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.49	-17.2	115.0	115.0	381.5	4.4	1.2	4.8	65.6	55.4	0.0	1.0	55.0	2.44	1.48	2.44	1.48	1.62	SAND	0.5	0.84	305	1.00	305	non-LIQ	0.828	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-17.4	115.0	115.0	329.1	2.4	0.7	3.1	54.6	46.1	0.0	1.0	46.0	2.45	1.49	2.45	1.49	1.52	SAND	0.5	0.84	262	1.00	262	non-LIQ	0.827	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-17.5	115.0	115.0	297.9	2.4	0.8	3.9	50.3	42.4	0.0	1.0	42.0	2.46	1.49	2.46	1.49	1.57	SAND	0.5	0.84	237	1.00	237	non-LIQ	0.826	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-17.7	115.0	115.0	234.3	3.4	1.4	8.8	43.3	36.4	0.5	1.0	38.0	2.47	1.50	2.47	1.50	1.83	SAND	0.5	0.84	186	1.13	211	non-LIQ	0.824	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.14	-17.8	115.0	115.0	137.4	3.5	2.5	18.3	29.0	24.4	3.3	1.1	29.0	2.48	1.50	2.48	1.50	2.18	SAND	0.5	0.84	109	1.61	176	non-LIQ	0.823	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-18.0	115.0	115.0	113.2	4.0	3.5	24.1	25.6	21.5	4.2	1.1	28.0	2.49	1.50	2.49	1.50	2.34	SAND	0.5	0.84	90	2.09	187	non-LIQ	0.822	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-18.2	115.0	115.0	119.5	4.7	3.9	24.9	27.3	22.9	4.3	1.1	30.0	2.50	1.51	2.50	1.51	2.36	SAND	0.5	0.84	95	2.17	205	non-LIQ	0.820	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-18.3	115.0	115.0	200.8	4.9	2.4	14.4	40.3	33.7	2.3	1.0	38.0	2.51	1.51	2.51	1.51	2.05	SAND	0.5	0.84	159	1.38	218	non-LIQ	0.819	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-18.5	115.0	115.0	251.1	4.3	1.7	9.8	47.1	39.4	0.8	1.0	41.0	2.52	1.52	2.52	1.52	1.88	SAND	0.5	0.84	198	1.17	231	non-LIQ	0.818	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-18.7	115.0	115.0	250.3	3.9	1.6	9.1	46.5	38.8	0.6	1.0	40.0	2.53	1.52	2.53	1.52	1.85	SAND	0.5	0.83	197	1.14	225	non-LIQ	0.816	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.13	-18.8	115.0	115.0	237.5	3.0	1.3	7.9	43.2	36.0	0.3	1.0	37.0	2.54	1.53	2.54	1.53	1.79	SAND	0.5	0.83	187	1.10	205	non-LIQ	0.815	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.29	-19.0	115.0	115.0	217.8	3.4	1.6	10.0	41.0	34.1	0.9	1.0	36.0	2.55	1.53	2.55	1.53	1.88	SAND	0.5	0.83	171	1.17	201	non-LIQ	0.814	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.46	-19.2	115.0	115.0	197.5	3.8	1.9	12.4	38.6	32.0	1.7	1.0	35.0	2.56	1.53	2.56	1.53	1.98	SAND	0.5	0.83	155	1.27	198	non-LIQ	0.812	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.62	-19.3	115.0	115.0	177.5	4.6	2.6	16.3	36.5	30.3	2.8	1.1	35.0	2.57	1.54	2.57	1.54	2.12	SAND	0.5	0.83	139	1.49	207	non-LIQ	0.811	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.78	-19.5	115.0	115.0	93.0	3.7	4.0	28.5	22.1	18.3	4.6	1.1	25.0	2.57	1.54	2.57	1.54	2.45	SAND	0.5	0.83	73	2.52	184	non-LIQ	0.810	0.620	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.95	-19.7	115.0	115.0	39.4	2.5	6.3	53.8	12.1	10.0	5.0	1.2	17.0	2.58	1.55	2.58	1.55	2.93	non-LIQ CLAY	1	0.68	NA	5.99	non-LIQ	non-LIQ	0.808	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-19.8	115.0	115.0	25.4	1.3	5.2	61.0	8.3	6.9	5.0	1.2	13.0	2.59	1.55	2.59	1.55	3.04	non-LIQ CLAY	1	0.68	NA	7.16	non-LIQ	non-LIQ	0.807	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-20.0	115.0	115.0	22.8	0.9	4.1	59.5	7.4	6.1	5.0	1.2	12.0	2.60	1.56	2.60	1.56	3.02	non-LIQ CLAY	1	0.68	NA	6.92	non-LIQ	non-LIQ	0.806	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-20.1	115.0	115.0	20.3	0.8	3.9	62.1	6.7	5.5	5.0	1.2	12.0	2.61	1.56	2.61	1.56	3.05	non-LIQ CLAY	1	0.68	NA	7.35	non-LIQ	non-LIQ	0.804	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-20.3	115.0	115.0	20.8	0.7	3.5	60.0	6.7	5.5	5.0	1.2	12.0	2.62	1.56	2.62	1.56	3.02	non-LIQ CLAY	1	0.68	NA	6.99	non-LIQ	non-LIQ	0.803	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-20.5	115.0	115.0	22.4	0.7	3.0	54.9	6.9	5.7	5.0	1.2	12.0	2.63	1.57	2.63	1.57	2.95	non-LIQ CLAY	1	0.67	NA	6.16	non-LIQ	non-LIQ	0.802	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-20.6	115.0	115.0	23.0	0.7	3.2	55.5	7.1	5.9	5.0	1.2	12.0	2.64	1.57	2.64	1.57	2.95	non-LIQ CLAY	1	0.67	NA	6.25	non-LIQ	non-LIQ	0.800	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-20.8	115.0	115.0	23.0	0.7	3.1	54.7	7.1	5.8	5.0	1.2	12.0	2.65	1.58	2.65	1.58	2.94	non-LIQ CLAY	1	0.67	NA	6.13	non-LIQ	non-LIQ	0.799	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-21.0	115.0	115.0	22.6	0.7	2.9	54.6	7.0	5.7	5.0	1.2	12.0	2.66	1.58	2.66	1.58	2.94	non-LIQ CLAY	1	0.67	NA	6.12	non-LIQ	non-LIQ	0.798	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-21.1	115.0	115.0	21.5	0.6	2.8	55.3	6.7	5.4	5.0	1.2	12.0	2.67	1.59	2.67	1.59	2.95	non-LIQ CLAY	1	0.67	NA	6.23	non-LIQ	non-LIQ	0.796	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-21.3	115.0	115.0	20.1	0.6	3.0	58.5	6.4	5.2	5.0	1.2	11.0	2.68	1.59	2.68	1.59	3.00	non-LIQ CLAY	1	0.67	NA	6.75	non-LIQ	non-LIQ	0.795	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-21.5	115.0	115.0	21.2	0.8	3.9	61.7	7.0	5.7	5.0	1.2	12.0	2.69	1.59	2.69	1.59	3.05	non-LIQ CLAY	1	0.66	NA	7.27	non-LIQ	non-LIQ	0.794	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-21.6	115.0	115.0	27.3	1.0	3.6	53.2	8.3	6.8	5.0	1.2	13.0	2.70	1.60	2.70	1.60	2.92	non-LIQ CLAY	1	0.66	NA	5.89	non-LIQ	non-LIQ	0.792	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-21.8	115.0	115.0	30.5	1.1	3.5	49.9	9.0	7.3	5.0	1.2	14.0	2.71	1.60	2.71	1.60	2.87	non-LIQ CLAY	1	0.66	NA	5.37	non-LIQ	non-LIQ	0.791	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-21.9	115.0	115.0	31.2	1.1	3.4	49.2	9.1	7.4	5.0	1.2	14.0	2.72	1.61	2.72	1.61	2.85	non-LIQ CLAY	1	0.66	NA	5.27	non-LIQ	non-LIQ	0.790	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.41	-22.1	115.0	115.0	30.4	1.1	3.5	50.4	9.0	7.3	5.0	1.2	14.0	2.73	1.61	2.73	1.61	2.87	non-LIQ CLAY	1	0.66	NA	5.45	non-LIQ	non-LIQ	0.788	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-22.3	115.0	115.0	29.0	1.1	3.6	52.1	8.7	7.1	5.0	1.2	13.0	2.74	1.62	2.74	1.62	2.90	non-LIQ CLAY	1	0.65	NA	5.72	non-LIQ	non-LIQ	0.787	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-22.4	115.0	115.0	28.8	1.1	3.8	53.1	8.8	7.1	5.0	1.2	13.0	2.75	1.62	2.75	1.62	2.92	non-LIQ CLAY	1	0.65	NA	5.88	non-LIQ	non-LIQ	0.785	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-22.6	115.0	115.0	29.7	1.2	4.1	53.7	9.1	7.3	5.0	1.2	14.0	2.75	1.62	2.75	1.62	2.93	non-LIQ CLAY	1	0.65	NA	5.97	non-LIQ	non-LIQ	0.784	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-22.8	115.0	115.0	27.8	1.1	4.0	55.2	8.6	6.9	5.0	1.2	13.0	2.76	1.63	2.76	1.63	2.95	non-LIQ CLAY	1	0.65	NA	6.21	non-LIQ	non-LIQ	0.783	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-22.9	115.0	115.0	26.0	1.0	3.7	55.8	8.1	6.5	5.0	1.2	13.0	2.77	1.63	2.77	1.63	2.96	non-LIQ CLAY	1	0.65	NA	6.31	non-LIQ	non-LIQ	0.781	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-23.1	115.0	115.0	25.0	0.9	3.6	56.1	7.8	6.3	5.0	1.2	13.0	2.78	1.64	2.78	1.64	2.96	non-LIQ CLAY	1	0.65	NA	6.35	non-LIQ	non-LIQ	0.780	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-23.3	115.0	115.0	27.7	0.8	3.0	50.8	8.2	6.6	5.0	1.2	13.0	2.79	1.64	2.79	1.64	2.88	non-LIQ CLAY	1	0.64	NA	5.51	non-LIQ	non-LIQ	0.779	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.72	-23.4	115.0	115.0	26.9	0.8	3.1	52.0	8.1	6.5	5.0	1.2	13.0	2.80	1.65	2.80	1.65	2.90	non-LIQ CLAY	1	0.64	NA	5.70	non-LIQ	non-LIQ	0.778	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-23.6	115.0	115.0	24.8	0.8	3.2	54.8	7.7	6.1	5.0	1.2	12.0	2.81	1.65	2.81	1.65	2.94	non-LIQ CLAY	1	0.64	NA	6.15	non-LIQ	non-LIQ	0.776	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-23.8	115.0	115.0	24.4	0.7	3.0	54.4	7.5	6.0	5.0	1.2	12.0	2.82	1.66	2.82	1.66	2.94	non-LIQ CLAY	1	0.64	NA	6.08	non-LIQ	non-LIQ	0.775	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-23.9	115.0	115.0	25.3	0.7	2.7	51.8	7.6	6.1	5.0	1.2	12.0	2.83	1.66	2.83	1.66	2.90	non-LIQ CLAY	1	0.64	NA	5.66	non-LIQ	non-LIQ	0.774	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-24.1	115.0	115.0	24.9	0.7	2.8	52.6	7.5	6.0	5.0	1.2	12.0	2.84	1.66	2.84	1.66	2.91	non-LIQ CLAY	1	0.64	NA	5.80	non-LIQ	non-LIQ	0.772	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-24.2	115.0	115.0	24.6	0.8	3.1	54.8	7.6	6.0	5.0	1.2	12.0	2.85	1.67	2.85	1.67	2.94	non-LIQ CLAY	1	0.63	NA	6.14	non-LIQ	non-LIQ	0.771	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.70	-24.4	115.0	115.0	26.2	0.8	3.2	53.3	8.0	6.4	5.0	1.2	13.0	2.86	1.67	2.86	1.67	2.92	non-LIQ CLAY	1	0.63	NA	5.91	non-LIQ	non-LIQ	0.770	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.87	-24.6	115.0	115.0	25.6	1.0	3.8	57.5	8.1	6.4	5.0	1.2	13.0	2.87	1.68	2.87	1.68	2.98	non-LIQ CLAY	1	0.63	NA	6.58	non-LIQ	non-LIQ	0.768	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.03	-24.7	115.0	115.0	28.2	0.9	3.1	51.4	8.4	6.7	5.0	1.2	13.0	2.88	1.68	2.88	1.68	2.89	non-LIQ CLAY	1	0.63	NA	5.61	non-LIQ	non-LIQ	0.767	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.20	-24.9	115.0	115.0	24.8	0.8	3.4	56.2	7.8	6.2	5.0	1.2	12.0	2.89	1.69	2.89	1.69	2.97	non-LIQ CLAY	1	0.63	NA	6.37	non-LIQ	non-LIQ	0.765	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.36	-25.1	115.0	115.0	22.5	1.0	4.4	63.9	7.6	6.0	5.0	1.2	12.0	2.90	1.69	2.90	1.69	3.08	non-LIQ CLAY	1	0.63	NA	7.66	non-LIQ	non-LIQ	0.764	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.52	-25.2	115.0	115.0	23.9	1.3	5.6	66.9	8.3	6.5	5.0	1.2	13.0	2.90	1.69	2.90	1.69	3.12	non-LIQ CLAY	1	0.62	NA	8.18	non-LIQ	non-LIQ	0.763	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.69	-25.4	115.0	115.0	38.5	2.1	5.4	53.5	11.7	9.3	5.0	1.2	16.0	2.91	1.70	2.91	1.70	2.92	non-LIQ CLAY	1	0.62	NA	5.93	non-LIQ	non-LIQ	0.761	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.85	-25.6	115.0	115.0	78.3	2.9	3.7	30.5	19.0	15.0	4.7	1.2	22.0	2.92	1.70	2.92	1.70	2.50	SAND	0.5	0.79	58	2.75	160	non-LIQ	0.760	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.02	-25.7	115.0	115.0	75.1	2.9	3.9	31.8	18.5	14.6	4.8	1.2	22.0	2.93	1.71	2.93	1.71	2.52	SAND	0.5	0.79	56	2.90	162	non-LIQ	0.759	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.18	-25.9	115.0	115.0	60.8	2.2	3.7	37.9	16.0	12.6	5.0	1.2	20.0	2.94	1.71	2.94	1.71	2.65	non-LIQ CLAY	1	0.62	NA	3.66	non-LIQ	non-LIQ	0.757	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.35	-26.1	115.0	115.0	40.1	1.8	4.4	49.1	11.7	9.2	5.0	1.2	16.0	2.95	1.72	2.95	1.72	2.85	non-LIQ CLAY	1	0.62	NA	5.25	non-LIQ	non-LIQ	0.756	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.51	-26.2	115.0	115.0	26.4	1.9	7.0	69.5	9.3	7.3	5.0	1.2	14.0	2.96	1.72	2.96	1.72	3.15	non-LIQ CLAY	1	0.62	NA	8.62	non-LIQ	non-LIQ	0.755	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.67	-26.4	115.0	115.0	48.2	2.2	4.6	46.2	13.7	10.7	5.0	1.2	18.0	2.97	1.72	2.97	1.72	2.80	non-LIQ CLAY	1	0.61	NA	4.82	non-LIQ	non-LIQ	0.754	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.84	-26.5	115.0	115.0	112.8	2.3	2.0	18.7	23.9	18.7	3.4	1.1	23.0	2.98	1.73	2.98	1.73	2.19	SAND	0.5	0.78	83	1.64	137	0.319	0.752	0.600	0.560	0.57	NA	NA	NA	NA	NA	0.00	21.00	1.50	0.03
52.00	-26.7	115.0	115.0	140.8	2.1	1.5	13.8	28.0	21.9	2.1	1.0	25.0	2.99	1.73	2.99	1.73	2.03	SAND	0.5	0.78	104	1.34	139	0.332	0.751	0.600	0.560	0.59	NA	NA	NA	NA	NA	0.00	23.00	1.37	0.03

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							σ_v (tsf)	σ'_v (tsf)	σ_v (tsf)	σ'_v (tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1n})_{cs}$								(tsf)	(%)	(%)	(in)		(%)	(in)
52.17	-26.9	115.0	115.0	140.6	2.2	1.6	14.3	28.2	22.0	2.3	1.0	25.0	3.00	1.74	3.00	1.74	2.05	SAND	0.5	0.78	104	1.37	142	0.346	0.749	0.600	0.560	0.62	NA	NA	NA	NA	NA	0.00	23.00	1.37	0.03
52.33	-27.0	115.0	115.0	136.3	2.9	2.1	17.2	28.4	22.1	3.1	1.1	27.0	3.01	1.74	3.01	1.74	2.14	SAND	0.5	0.78	100	1.54	155	0.425	0.748	0.600	0.560	0.76	NA	NA	NA	NA	NA	0.00	23.00	1.37	0.03
52.49	-27.2	115.0	115.0	131.4	3.5	2.7	20.0	28.4	22.1	3.6	1.1	27.0	3.02	1.75	3.02	1.75	2.23	SAND	0.5	0.78	97	1.74	168	non-LIQ	0.747	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.66	-27.4	115.0	115.0	127.2	3.8	3.0	21.8	28.0	21.8	3.9	1.1	28.0	3.03	1.75	3.03	1.75	2.28	SAND	0.5	0.78	93	1.88	176	non-LIQ	0.745	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.82	-27.5	115.0	115.0	108.7	3.6	3.3	24.7	24.8	19.3	4.3	1.1	26.0	3.04	1.75	3.04	1.75	2.36	SAND	0.5	0.78	80	2.14	171	non-LIQ	0.744	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.99	-27.7	115.0	115.0	87.0	3.5	4.0	30.2	21.1	16.3	4.7	1.2	24.0	3.05	1.76	3.05	1.76	2.49	SAND	0.5	0.78	64	2.71	173	non-LIQ	0.743	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.15	-27.9	115.0	115.0	70.7	2.3	3.2	30.3	17.1	13.3	4.7	1.2	20.0	3.06	1.76	3.06	1.76	2.49	SAND	0.5	0.77	52	2.72	141	0.340	0.741	0.590	0.550	0.62	NA	NA	NA	NA	NA	0.00	15.00	1.94	0.04
53.31	-28.0	115.0	115.0	34.1	1.8	5.3	57.4	10.8	8.4	5.0	1.2	15.0	3.07	1.77	3.07	1.77	2.98	non-LIQ CLAY	1	0.60	NA	6.57	non-LIQ	non-LIQ	0.740	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.48	-28.2	115.0	115.0	26.5	1.3	5.1	63.4	8.9	6.9	5.0	1.2	13.0	3.08	1.77	3.08	1.77	3.07	non-LIQ CLAY	1	0.60	NA	7.56	non-LIQ	non-LIQ	0.739	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.64	-28.3	115.0	115.0	26.7	1.3	4.7	62.0	8.8	6.8	5.0	1.2	13.0	3.08	1.78	3.08	1.78	3.05	non-LIQ CLAY	1	0.60	NA	7.32	non-LIQ	non-LIQ	0.737	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.81	-28.5	115.0	115.0	32.4	1.1	3.4	50.7	9.6	7.4	5.0	1.2	14.0	3.09	1.78	3.09	1.78	2.88	non-LIQ CLAY	1	0.59	NA	5.50	non-LIQ	non-LIQ	0.736	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.97	-28.7	115.0	115.0	40.5	1.1	2.7	42.3	11.1	8.5	5.0	1.2	15.0	3.10	1.78	3.10	1.78	2.73	non-LIQ CLAY	1	0.59	NA	4.26	non-LIQ	non-LIQ	0.735	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.13	-28.8	115.0	115.0	44.1	1.3	3.0	41.9	12.0	9.3	5.0	1.2	16.0	3.11	1.79	3.11	1.79	2.73	non-LIQ CLAY	1	0.59	NA	4.19	non-LIQ	non-LIQ	0.733	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.30	-29.0	115.0	115.0	45.3	1.4	3.2	42.3	12.4	9.5	5.0	1.2	16.0	3.12	1.79	3.12	1.79	2.73	non-LIQ CLAY	1	0.59	NA	4.25	non-LIQ	non-LIQ	0.732	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.46	-29.2	115.0	115.0	47.5	1.9	3.9	44.6	13.3	10.2	5.0	1.2	17.0	3.13	1.80	3.13	1.80	2.78	non-LIQ CLAY	1	0.59	NA	4.58	non-LIQ	non-LIQ	0.731	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.63	-29.3	115.0	115.0	41.8	2.2	5.2	52.4	12.6	9.7	5.0	1.2	17.0	3.14	1.80	3.14	1.80	2.91	non-LIQ CLAY	1	0.59	NA	5.76	non-LIQ	non-LIQ	0.729	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.79	-29.5	115.0	115.0	34.7	1.9	5.4	57.9	11.0	8.5	5.0	1.2	15.0	3.15	1.81	3.15	1.81	2.99	non-LIQ CLAY	1	0.59	NA	6.64	non-LIQ	non-LIQ	0.728	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.95	-29.7	115.0	115.0	32.7	1.0	3.2	50.1	9.6	7.4	5.0	1.2	14.0	3.16	1.81	3.16	1.81	2.87	non-LIQ CLAY	1	0.58	NA	5.40	non-LIQ	non-LIQ	0.727	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.12	-29.8	115.0	115.0	29.5	0.6	2.2	46.7	8.4	6.4	5.0	1.2	13.0	3.17	1.81	3.17	1.81	2.81	non-LIQ CLAY	1	0.58	NA	4.69	non-LIQ	non-LIQ	0.725	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.28	-30.0	115.0	115.0	27.6	0.7	2.5	50.8	8.2	6.3	5.0	1.2	13.0	3.18	1.82	3.18	1.82	2.88	non-LIQ CLAY	1	0.58	NA	5.52	non-LIQ	non-LIQ	0.724	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.45	-30.2	115.0	115.0	28.7	0.7	2.4	48.8	8.4	6.4	5.0	1.2	13.0	3.19	1.82	3.19	1.82	2.85	non-LIQ CLAY	1	0.58	NA	5.20	non-LIQ	non-LIQ	0.723	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.61	-30.3	115.0	115.0	27.6	0.8	3.0	53.6	8.4	6.4	5.0	1.2	13.0	3.20	1.83	3.20	1.83	2.93	non-LIQ CLAY	1	0.58	NA	5.96	non-LIQ	non-LIQ	0.721	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.77	-30.5	115.0	115.0	28.8	0.9	3.0	52.5	8.7	6.6	5.0	1.2	13.0	3.21	1.83	3.21	1.83	2.91	non-LIQ CLAY	1	0.58	NA	5.77	non-LIQ	non-LIQ	0.720	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.94	-30.6	115.0	115.0	27.7	0.8	3.0	53.6	8.5	6.4	5.0	1.2	13.0	3.22	1.84	3.22	1.84	2.93	non-LIQ CLAY	1	0.58	NA	5.96	non-LIQ	non-LIQ	0.719	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.10	-30.8	115.0	115.0	26.1	0.8	3.0	55.4	8.1	6.2	5.0	1.2	12.0	3.23	1.84	3.23	1.84	2.95	non-LIQ CLAY	1	0.57	NA	6.23	non-LIQ	non-LIQ	0.717	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.27	-31.0	115.0	115.0	27.0	0.8	2.9	54.0	8.3	6.3	5.0	1.2	13.0	3.24	1.84	3.24	1.84	2.93	non-LIQ CLAY	1	0.57	NA	6.02	non-LIQ	non-LIQ	0.716	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.43	-31.1	115.0	115.0	30.5	1.3	4.2	57.0	9.6	7.3	5.0	1.2	14.0	3.24	1.85	3.24	1.85	2.98	non-LIQ CLAY	1	0.57	NA	6.49	non-LIQ	non-LIQ	0.715	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.59	-31.3	115.0	115.0	36.4	1.6	4.3	53.2	11.1	8.4	5.0	1.2	15.0	3.25	1.85	3.25	1.85	2.92	non-LIQ CLAY	1	0.57	NA	5.88	non-LIQ	non-LIQ	0.713	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.76	-31.5	115.0	115.0	37.0	1.6	4.4	52.9	11.2	8.5	5.0	1.2	15.0	3.26	1.86	3.26	1.86	2.91	non-LIQ CLAY	1	0.57	NA	5.84	non-LIQ	non-LIQ	0.712	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.92	-31.6	115.0	115.0	34.9	1.5	4.2	53.8	10.7	8.1	5.0	1.2	15.0	3.27	1.86	3.27	1.86	2.93	non-LIQ CLAY	1	0.57	NA	5.99	non-LIQ	non-LIQ	0.711	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.09	-31.8	115.0	115.0	36.2	1.4	3.8	51.2	10.8	8.1	5.0	1.2	15.0	3.28	1.87	3.28	1.87	2.89	non-LIQ CLAY	1	0.57	NA	5.58	non-LIQ	non-LIQ	0.709	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.25	-32.0	115.0	115.0	41.9	1.7	4.0	48.7	12.2	9.2	5.0	1.2	16.0	3.29	1.87	3.29	1.87	2.85	non-LIQ CLAY	1	0.57	NA	5.19	non-LIQ	non-LIQ	0.706	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.41	-32.1	115.0	115.0	47.4	1.6	3.4	43.4	13.1	9.9	5.0	1.2	17.0	3.30	1.87	3.30	1.87	2.75	non-LIQ CLAY	1	0.56	NA	4.41	non-LIQ	non-LIQ	0.707	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.58	-32.3	115.0	115.0	39.1	1.6	4.2	51.1	11.7	8.7	5.0	1.2	15.0	3.31	1.88	3.31	1.88	2.89	non-LIQ CLAY	1	0.56	NA	5.55	non-LIQ	non-LIQ	0.705	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.74	-32.4	115.0	115.0	39.8	1.7	4.2	50.9	11.9	8.9	5.0	1.2	16.0	3.32	1.88	3.32	1.88	2.88	non-LIQ CLAY	1	0.56	NA	5.52	non-LIQ	non-LIQ	0.704	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.91	-32.6	115.0	115.0	43.4	2.6	6.1	55.7	13.5	10.1	5.0	1.2	17.0	3.33	1.89	3.33	1.89	2.96	non-LIQ CLAY	1	0.56	NA	6.29	non-LIQ	non-LIQ	0.703	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.07	-32.8	115.0	115.0	67.7	3.0	4.4	40.7	18.2	13.6	5.0	1.2	21.0	3.34	1.89	3.34	1.89	2.70	non-LIQ CLAY	1	0.56	NA	4.02	non-LIQ	non-LIQ	0.701	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.23	-32.9	115.0	115.0	84.2	4.3	5.2	39.5	22.4	16.8	5.0	1.2	25.0	3.35	1.90	3.35	1.90	2.68	non-LIQ CLAY	1	0.56	NA	3.86	non-LIQ	non-LIQ	0.700	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.40	-33.1	115.0	115.0	96.8	4.4	4.6	31.3	23.7	17.7	4.8	1.2	25.0	3.36	1.90	3.36	1.90	2.51	SAND	0.5	0.75	68	2.84	194	non-LIQ	0.699	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.56	-33.3	115.0	115.0	78.4	4.7	6.0	43.3	21.7	16.2	5.0	1.2	24.0	3.37	1.91	3.37	1.91	2.75	non-LIQ CLAY	1	0.56	NA	4.40	non-LIQ	non-LIQ	0.697	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.73	-33.4	115.0	115.0	127.2	3.8	3.0	22.1	28.2	21.0	3.9	1.1	27.0	3.38	1.91	3.38	1.91	2.29	SAND	0.5	0.74	90	1.92	171	non-LIQ	0.696	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.89	-33.6	115.0	115.0	65.8	2.7	4.1	40.1	17.7	13.1	5.0	1.2	21.0	3.39	1.91	3.39	1.91	2.69	non-LIQ CLAY	1	0.55	NA	3.94	non-LIQ	non-LIQ	0.695	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.06	-33.8	115.0	115.0	39.4	1.7	4.3	52.0	11.9	8.8	5.0	1.2	16.0	3.40	1.92	3.40	1.92	2.90	non-LIQ CLAY	1	0.55	NA	5.71	non-LIQ	non-LIQ	0.693	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.22	-33.9	115.0	115.0	36.9	1.4	3.9	52.0	11.1	8.2	5.0	1.2	15.0	3.41	1.92	3.41	1.92	2.90	non-LIQ CLAY	1	0.55	NA	5.70	non-LIQ	non-LIQ	0.692	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.38	-34.1	115.0	115.0	44.2	1.5	3.4	45.3	12.5	9.2	5.0	1.2	16.0	3.41	1.93	3.41	1.93	2.79	non-LIQ CLAY	1	0.55	NA	4.68	non-LIQ	non-LIQ	0.691	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.55	-34.3	115.0	115.0	44.0	1.5	3.4	45.7	12.5	9.2	5.0	1.2	16.0	3.42	1.93	3.42	1.93	2.80	non-LIQ CLAY	1	0.55	NA	4.74	non-LIQ	non-LIQ	0.689	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.71	-34.4	115.0	115.0	41.2	1.4	3.4	47.4	11.9	8.8	5.0	1.2	16.0	3.43	1.94	3.43	1.94	2.82	non-LIQ CLAY	1	0.55	NA	4.99	non-LIQ	non-LIQ	0.688	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.88	-34.6	115.0	115.0	40.3	1.6	4.1	50.9	12.0	8.9	5.0	1.2	16.0	3.44	1.94	3.44	1.94	2.88	non-LIQ CLAY	1	0.55	NA	5.52	non-LIQ	non-LIQ	0.687	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.04	-34.7	115.0	115.0	39.5	1.8	4.5	53.1	12.0	8.9	5.0	1.2	16.0	3.45	1.94	3.45	1.94	2.92	non-LIQ CLAY	1	0.54	NA	5.88	non-LIQ	non-LIQ	0.685	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.20	-34.9	115.0	115.0	38.8	1.6	4.0	51.6	11.6	8.6	5.0	1.2	15.0	3.46	1.95	3.46	1.95	2.89	non-LIQ CLAY	1	0.54	NA	5.64	non-LIQ	non-LIQ	0.684	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.37	-35.1	115.0	115.0	36.9	1.3	3.6	50.8	11.0	8.1	5.0	1.2	15.0	3.47	1.95	3.47	1.95	2.88	non-LIQ CLAY	1	0.54	NA	5.51	non-LIQ	non-LIQ	0.683	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.53	-35.2	115.0	115.0	36.1	1.1	3.0	48.6	10.5	7.7	5.0	1.2	14.0	3.48	1.96	3.48	1.96	2.84	non-LIQ CLAY	1	0.54	NA	5.17	non-LIQ	non-LIQ	0.681	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.70	-35.4	115.0	115.0	33.6	1.0	3.1	50.9	10.0	7.4	5.0	1.2	14.0	3.49	1.96	3.49	1.96	2.88	non-LIQ CLAY	1	0.54	NA	5.53	non-LIQ	non-LIQ	0.680	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.86	-35.6	115.0	115.0	34.3	1.1	3.2	51.0	10.2	7.5	5.0	1.2	14.0	3.50	1.97	3.50	1.97	2.88	non-LIQ CLAY	1	0.54	NA	5.55	non-LIQ	non-LIQ	0.679	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.02	-35.7	115.0	115.0	35.3	1.1	3.2	50.4	10.5	7.7	5.0	1.2	14.0	3.51	1.97	3.51	1.97	2.87	non-LIQ CLAY	1	0.54	NA	5.45	non-LIQ	non-LIQ	0.677	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.19	-35.9	115.0	115.0	36.0	1.1	3.1	49.6	10.6	7.7	5.0	1.2	14.0	3.52	1.97	3.52	1.97	2.86	non-LIQ CLAY	1	0.54	NA	5.33	non-LIQ	non-LIQ	0.676	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.35	-36.1	115.0	115.0	35.4	1.0	2.9	48.8	10.3	7.6	5.0	1.2	14.0	3.53	1.98	3.53	1.98	2.85	non-LIQ CLAY	1	0.53	NA	5.20	non-LIQ	non-LIQ	0.675	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.52	-36.2	115.0	115.0	35.5	1.1	3.1	49.7	10.4	7.6	5.0	1.2	14.0	3.54	1.98	3.54	1.98	2.86	non-LIQ CLAY	1	0.53	NA	5.34	non-LIQ	non-LIQ	0.673	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.68	-36.4	115.0	115.0	38.5	1.6	4.3	53.2	11.7	8.6	5.0	1.2	15.0	3.55	1.99	3.55	1.99	2.92	non-LIQ CLAY	1	0.53	NA	5.89	non-LIQ	non-LIQ	0.672	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.84	-36.5	115.0	115.0	52.4	1.9	3.7	43.9	14.6	10.6	5.0	1.2	18.0	3.56	1.99	3.56	1.99	2.76	non-LIQ CLAY	1	0.53	NA	4.47	non-LIQ	non-LIQ	0.671	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.01	-36.7	115.0	115.0	59.1	2.0	3.4	40.2	15.8	11.5	5.0	1.2	19.0	3.57	2.00	3.57	2.00	2.69	non-LIQ CLAY	1	0.53	NA	3.96	non-LIQ	non-LIQ	0.669	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.17	-36.9	115.0	115.0	64.4	1.8	2.8	35.9	16.6	12.0	5.0	1.2	19.0	3.57	2.00	3.57	2.00	2.61	non-LIQ CLAY	1	0.53	NA	3.40	non-LIQ	non-LIQ	0.668	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.34	-37.0	115.0	115.0	56.4	1.6	2.8	38.3	14.9	10.8	5.0	1.2	18.0	3.58	2.00	3.58	2.00	2.66	non-LIQ CLAY	1	0.53	NA	3.71	non-LIQ	non-LIQ	0.667	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.50	-37.2	115.0	115.0	53.0	1.9	3.6	43.3	14.7	10.6	5.0	1.2	18.0	3.59	2.01	3.59	2.01	2.75	non-LIQ CLAY	1	0.53	NA	4.39	non-LIQ	non-LIQ	0.665	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.66	-37.4	115.0	115.0	61.5	2.1	3.4	39.8	16.4	11.9	5.0	1.2	19.0	3.60	2.01	3.60	2.01	2.69	non-LIQ CLAY	1	0.53	NA	3.90	non-LIQ	non-LIQ	0.664	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.83	-37.5	115.0	115.0	58.6	2.1	3.5	41.3	15.9	11.5	5.0	1.2	19.0	3.61	2.02	3.61	2.02	2.71	non-LIQ CLAY	1	0.52	NA	4.11	non-LIQ	non-LIQ	0.663	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.99	-37.7	115.0	115.0	64.1	4.1	6.4	49.7	18.9	13.6	5.0	1.2	21.0	3.62	2.02	3.62	2.02	2.86	non-LIQ CLAY	1	0.52	NA	5.34	non-LIQ	non-LIQ	0.661	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.16	-37.9	115.0	115.0	89.8	3.8	4.3	36.4	23.2	16.8	5.0	1.2	25.0	3.63	2.03	3.63	2.03	2.62	non-LIQ CLAY	1	0.52	NA	3.46	non-LIQ	non-LIQ	0.660	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.32	-38.0	115.0	115.0	88.3	3.1	3.6	29.5	21.2	15.3	4.7	1.2	22.0	3.64	2.03	3.64	2.03	2.47	SAND	0.5	0.72	60	2.64	159	0.453	0.659	0.550	0.510	0.89	NA	NA	NA	NA	NA	0.00	17.00	1.78	0.03
63.48	-38.2	115.0	115.0	69.9	3.2	4.6	42.1	19.1	13.8	5.0	1.2	22.0	3.65	2.03	3.65	2.03	2.73	non-LIQ CLAY	1	0.52	NA	4.22	non-LIQ	non-LIQ	0.657	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.65	-38.4	115.0	115.0	78.9	3.9	4.9	41.1	21.4	15.4	5.0	1.2	23.0	3.66	2.04	3.66	2.04	2.71	non-LIQ CLAY	1	0.52	NA	4.09	non-LIQ	non-LIQ	0.656	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.81	-38.5	115.0	115.0	131.9	5.4	4.1	26.2	30.6	22.0	4.4	1.1	29.0	3.67	2.04	3.67	2.04	2.39	SAND	0.5	0.72	90	2.29	205	non-LIQ	0.655	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.98	-38.7	115.0	115.0	136.0	6.1	4.5	27.2	31.9	22.9	4.5	1.1	30.0	3.68	2.05	3.68	2.05	2.42	SAND	0.5	0.72	92	2.39	221	non-LIQ	0.653	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.14	-38.8	115.0	115.0	144.6	5.5	3.8	24.4	32.8	23.6	4.2	1.1	30.0	3.69	2.05	3.69	2.05	2.35	SAND	0.5	0.72	98	2.11	207	non-LIQ	0.652	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.30	-39.0	115.0	115.0	194.0	6.6	3.4	19.8	41.8	30.0	3.6	1.1	36.0	3.70	2.06	3.70	2.06	2.22	SAND	0.5	0.72	132	1.73	227	non-LIQ	0.651	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.47	-39.2	115.0	115.0	226.4	6.7	2.9	16.8	46.9	33.6	3.0	1.1	39.0	3.71	2.06	3.71	2.06	2.13	SAND	0.5	0.72	153	1.52	233	non-LIQ	0.649	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.63	-39.3	115.0	115.0	199.2	9.0	4.5	23.1	44.6	31.9	4.1	1.1	39.0	3.72	2.06	3.72	2.06	2.32	SAND	0.5	0.72	135	2.00	269	non-LIQ	0.648	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.80	-39.5	115.0	115.0	201.9	8.4	4.2	22.0	44.6	31.9	3.9	1.1	39.0	3.73	2.07	3.73	2.07	2.29	SAND	0.5	0.72	136	1.90	260	non-LIQ	0.647	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.96	-39.7	115.0	115.0	206.2	6.1	3.0	17.7	43.2	30.9	3.2	1.1	36.0	3.74	2.07	3.74	2.07	2.16	SAND	0.5	0.71	139	1.57	219	non-LIQ	0.645	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.12	-39.8	115.0	115.0	199.6	4.5	2.2	15.1	40.4	28.9	2.5	1.0	33.0	3.74	2.08	3.74	2.08	2.08	SAND	0.5	0.71	135	1.41	190	non-LIQ	0.644	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.29	-40.0	115.0	115.0	189.4	5.3	2.8	17.9	39.8	28.4	3.2	1.1	33.0	3.75	2.08	3.75	2.08	2.17	SAND	0.5	0.71	128	1.59	203	non-LIQ	0.643	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.45	-40.2	115.0	115.0	182.8	6.4	3.5	20.7	39.8	28.3	3.7	1.1	34.0	3.76	2.09	3.76	2.09	2.25	SAND	0.5	0.71	123	1.80	221	non-LIQ	0.641	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.62	-40.3	115.0	115.0	168.8	6.1	3.6	22.0	37.3	26.5	3.9	1.1	33.0	3.77	2.09	3.77	2.09	2.29	SAND	0.5	0.71	113	1.91	216	non-LIQ	0.640	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.78	-40.5	115.0	115.0	138.5	7.7	5.6	30.3	33.6	23.9	4.7	1.2	32.0	3.78	2.10	3.78	2.10	2.49	SAND	0.5	0.71	93	2.73	254	non-LIQ	0.639	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.94	-40.6	115.0	115.0	145.9	8.0	5.5	29.4	35.0	24.9	4.7	1.1	33.0	3.79	2.10	3.79	2.10	2.47	SAND	0.5	0.71	98	2.63	257	non-LIQ	0.637	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.11	-40.8	115.0	115.0	159.8	8.0	5.0	27.0	37.4	26.5	4.5	1.1	34.0	3.80	2.10	3.80	2.10	2.42	SAND	0.5	0.71	107	2.38	254	non-LIQ	0.636	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.27	-41.0	115.0	115.0	163.8	6.3	3.9	23.2	36.7	26.0	4.1	1.1	33.0	3.81	2.11	3.81	2.11	2.32	SAND	0.5	0.71	110	2.01	220	non-LIQ	0.635	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.44	-41.1	115.0	115.0	105.9	5.9	5.5	38.7	28.0	19.8	5.0	1.2	29.0	3.82	2.11	3.82	2.11	2.67	non-LIQ CLAY	1	0.50	NA	3.76	non-LIQ	non-LIQ	0.633	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.60	-41.3	115.0	115.0	226.4	5.5	2.5	15.0	45.8	32.4	2.5	1.0	36.0	3.83	2.12	3.83	2.12	2.07	SAND	0.5	0.71	151	1.41	213	non-LIQ	0.632	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_{eff}	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
													σ_v	σ_v'	σ_v	σ_v'														G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$															
66.77	-41.5	115.0	115.0	322.7	4.5	1.4	7.7	58.6	41.4	0.2	1.0	42.0	3.84	2.12	3.84	2.12	1.78	SAND	0.5	0.71	215	1.09	236	non-LIQ	0.631	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.93	-41.6	115.0	115.0	316.1	5.7	1.8	9.6	59.3	41.8	0.8	1.0	44.0	3.85	2.13	3.85	2.13	1.87	SAND	0.5	0.71	211	1.17	246	non-LIQ	0.629	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.09	-41.8	115.0	115.0	303.3	6.9	2.3	12.2	59.0	41.6	1.6	1.0	45.0	3.86	2.13	3.86	2.13	1.97	SAND	0.5	0.70	202	1.26	255	non-LIQ	0.628	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.26	-42.0	115.0	115.0	283.9	7.0	2.5	13.4	56.2	39.6	2.0	1.0	43.0	3.87	2.13	3.87	2.13	2.02	SAND	0.5	0.70	189	1.32	250	non-LIQ	0.627	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.42	-42.1	115.0	115.0	291.1	5.6	1.9	10.9	55.6	39.1	1.2	1.0	41.0	3.88	2.14	3.88	2.14	1.92	SAND	0.5	0.70	194	1.21	234	non-LIQ	0.625	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.59	-42.3	115.0	115.0	333.3	5.0	1.5	8.2	60.9	42.8	0.3	1.0	44.0	3.89	2.14	3.89	2.14	1.80	SAND	0.5	0.70	221	1.11	245	non-LIQ	0.624	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.75	-42.5	115.0	115.0	351.9	6.2	1.8	9.0	65.2	45.8	0.6	1.0	47.0	3.90	2.15	3.90	2.15	1.84	SAND	0.5	0.70	233	1.14	265	non-LIQ	0.623	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.91	-42.6	115.0	115.0	313.8	6.2	2.0	10.7	59.7	41.9	1.1	1.0	44.0	3.90	2.15	3.90	2.15	1.91	SAND	0.5	0.70	208	1.20	250	non-LIQ	0.621	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.08	-42.8	115.0	115.0	300.2	7.7	2.6	13.4	59.4	41.6	2.0	1.0	45.0	3.91	2.16	3.91	2.16	2.02	SAND	0.5	0.70	199	1.32	263	non-LIQ	0.620	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.24	-42.9	115.0	115.0	263.9	6.6	2.5	14.1	52.7	36.9	2.2	1.0	41.0	3.92	2.16	3.92	2.16	2.04	SAND	0.5	0.70	175	1.36	237	non-LIQ	0.619	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.41	-43.1	115.0	115.0	224.1	6.8	3.1	17.5	46.9	32.8	3.1	1.1	38.0	3.93	2.16	3.93	2.16	2.15	SAND	0.5	0.70	148	1.56	231	non-LIQ	0.617	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.57	-43.3	115.0	115.0	268.0	7.0	2.6	14.4	53.8	37.6	2.3	1.0	42.0	3.94	2.17	3.94	2.17	2.05	SAND	0.5	0.70	177	1.38	243	non-LIQ	0.616	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.73	-43.4	115.0	115.0	333.1	6.0	1.8	9.6	62.3	43.5	0.7	1.0	45.0	3.95	2.17	3.95	2.17	1.87	SAND	0.5	0.70	220	1.16	254	non-LIQ	0.615	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.90	-43.6	115.0	115.0	350.2	5.9	1.7	8.7	64.6	45.0	0.5	1.0	46.0	3.96	2.18	3.96	2.18	1.83	SAND	0.5	0.70	231	1.13	260	non-LIQ	0.613	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.06	-43.8	115.0	115.0	394.0	4.4	1.1	5.3	68.5	47.7	0.0	1.0	48.0	3.97	2.18	3.97	2.18	1.66	SAND	0.5	0.70	259	1.01	262	non-LIQ	0.612	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.23	-43.9	115.0	115.0	474.6	3.8	0.8	2.7	78.0	54.3	0.0	1.0	54.0	3.98	2.19	3.98	2.19	1.49	SAND	0.5	0.70	312	1.00	312	non-LIQ	0.611	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.39	-44.1	115.0	115.0	500.7	5.4	1.1	4.0	84.7	58.9	0.0	1.0	59.0	3.99	2.19	3.99	2.19	1.58	SAND	0.5	0.70	329	1.00	329	non-LIQ	0.609	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.55	-44.3	115.0	115.0	427.2	5.9	1.4	6.2	75.5	52.4	0.0	1.0	53.0	4.00	2.19	4.00	2.19	1.71	SAND	0.5	0.69	280	1.04	292	non-LIQ	0.608	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-006

Emean (%)	75			Present Ground El.	27.8	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	14.2	=Field Water Table Depth	Acc. max =	0.710 g				Earthq. M=	7.3			
C_E	1.25			Future Ground El.	27.8	C_B	1.00	120	22.8	=Design Water El.	13.6	=Field Water El.						Cm=	1.07			

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-		-		-	-	-	-				-		-	-	-	-	-	-	-		-	-
5	22.8	27	CL	51.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	31	42	1.00	High N	0.00	LARGE	high N
10	17.8	24	CL	51.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	40	53	1.00	High N	0.00	LARGE	high N
15	12.8	61	GC	15.0	0.90	0.88	1.09	0.85	1.00	0.67	2	2	0.97	0.59	0.68	47	52	1.00	High N	0.00	LARGE	high N
20	7.8	4	CL	99.0	1.20	1.02	1.01	0.95	1.20	1.00	1	1	0.95	0.73	0.72	6	12	1.00	0.13	0.14	0.19	Fines
25	2.8	20	CL	51.0	1.50	1.16	0.95	0.95	1.00	0.67	2	2	0.94	0.88	0.74	15	23	1.00	0.26	0.27	0.37	Fines
30	-2.2	10	CL	51.0	1.80	1.31	0.89	1.00	1.20	1.00	1	1	0.93	1.02	0.76	13	21	1.00	0.23	0.25	0.32	Fines
35	-7.2	37	CH	51.0	2.10	1.45	0.85	1.00	1.00	0.67	2	2	0.89	1.16	0.74	26	36	0.98	High N	0.00	LARGE	high N
40	-12.2	11	CL	51.0	2.40	1.60	0.81	1.00	1.20	1.00	1	1	0.85	1.31	0.72	13	21	0.96	0.23	0.23	0.33	Fines
45	-17.2	58	CH	51.0	2.70	1.74	0.77	1.00	1.00	0.67	2	2	0.81	1.45	0.69	37	50	0.94	High N	0.00	LARGE	high N
50	-22.2	21	CL	51.0	3.00	1.88	0.74	1.00	1.20	1.00	1	1	0.77	1.60	0.67	23	33	0.92	High N	0.00	LARGE	high N
55	-27.2	50	SM	15.0	3.30	2.03	0.72	1.00	1.00	0.67	2	2	0.73	1.74	0.64	30	34	0.90	High N	0.00	LARGE	high N
60	-32.2	32	CL	52.0	3.60	2.17	0.69	1.00	1.20	1.00	1	1	0.69	1.88	0.60	33	45	0.88	High N	0.00	LARGE	high N
62	-34.2	45	CL	51.0	3.72	2.23	0.68	1.00	1.20	1.00	1	1	0.67	1.94	0.59	46	60	0.87	High N	0.00	LARGE	high N
70	-42.2	45	CL	51.0	4.20	2.46	0.65	1.00	1.00	0.67	2	2	0.60	2.17	0.54	24	34	0.87	High N	0.00	LARGE	high N

C-16

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-008

Emean (%)	75			Present Ground El.	27.5	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.5	=Field Water Table Depth	Acc. max =	0.710	g					Earthq. M=	7.3	
C_E	1.25			Future Ground El.	27.5	C_B	1.00	120	22.5	=Design Water El.	14	=Field Water El.								Cm=	1.07	

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	22.5	14	CL	51.0	0.30	0.30	1.70	0.80	1.20	1.00	1	1	0.99	0.30	0.46	29	39	1.00	High N	0.00	LARGE	high N
10	17.5	59	CL	51.0	0.60	0.60	1.32	0.85	1.00	0.67	2	2	0.98	0.44	0.61	55	71	1.00	High N	0.00	LARGE	high N
15	12.5	7	CL	51.0	0.90	0.85	1.11	0.85	1.20	1.00	1	1	0.97	0.59	0.68	10	17	1.00	0.18	0.19	0.28	Fines
20	7.5	13	SC	15.0	1.20	1.00	1.02	0.95	1.00	0.67	2	2	0.95	0.73	0.72	11	14	1.00	0.15	0.16	0.22	yes
25	2.5	6	CL	81.0	1.50	1.14	0.96	0.95	1.20	1.00	1	1	0.94	0.88	0.74	8	15	1.00	0.16	0.17	0.23	Fines
30	-2.5	25	CL	51.0	1.80	1.29	0.90	1.00	1.00	0.67	2	2	0.93	1.02	0.76	19	28	1.00	0.35	0.38	0.50	Fines
35	-7.5	16	CL	51.0	2.10	1.43	0.85	1.00	1.20	1.00	1	1	0.89	1.16	0.74	21	30	0.98	0.44	0.46	0.63	Fines
40	-12.5	20	CH	51.0	2.40	1.57	0.81	1.00	1.00	0.67	2	2	0.85	1.31	0.72	14	21	0.96	0.23	0.24	0.33	Fines
45	-17.5	35	CL	51.0	2.70	1.72	0.78	1.00	1.20	1.00	1	1	0.81	1.45	0.69	41	54	0.94	High N	0.00	LARGE	high N
50	-22.5	27	CL	51.0	3.00	1.86	0.75	1.00	1.00	0.67	2	2	0.77	1.60	0.67	17	25	0.92	0.30	0.29	0.44	Fines
60	-32.5	28	CL	51.0	3.60	2.15	0.70	1.00	1.20	1.00	1	1	0.69	1.88	0.60	29	40	0.88	High N	0.00	LARGE	high N
70	-42.5	61	SC	15.0	4.20	2.44	0.65	1.00	1.00	0.67	2	2	0.60	2.17	0.54	33	37	0.87	High N	0.00	LARGE	high N

11-7

SEISMIC SETTLEMENT CALCULATIONS — **I-880 Operational and Safety Improvements Project** — **EMI Project No. 10-133**

UNDER CONDITION, M = 7.3 ; ACC. = 0.52g

FORMULAE:

Corrected blow count $(N_1)_{60}$ = $C_N * C_s * C_E * C_R * C_B * C_{ST} * N_{6eld}$

where:

- N_{6eld} = Uncorrected field blow count
- C_N = Overburden correction factor (See Reference 1)
- C_E = Energy correction (Reference 2) = (Efficiency/60%)
- C_R = Rod Length correction
- C_s = Sampler correction (lined/unlined) (Reference 3)
- C_B = Borehole diameter correction
- C_{ST} = Sampler correction (Sampler diameter)

Efficiency = 75% C_E 1.25

Borehole Dia. (in) = 5.0 C_B 1.00

Soil Unit Weight (pcf) = 120

$K_0 = (1-\sin(\phi))$

$\sigma_m' = (1+2K_0)/3*\sigma_{0f}'$

$(K_2)_{max} = 20*(N_1)^{(1/3)}$

$G_{max} = 1000*(K_2)_{max}*(\sigma_m')^{(1/2)}$

$\gamma_{eff}*G_{eff}/G_{max} = 0.65*(a_{max}/g)*(\sigma_{0f}'/G_{max})*r_d$

r_d = 1.0 at the ground surface,
= 0.9 at 30 feet below the ground surface
= 0.6 at 70 feet below the ground surface
= 0.5 at 100 feet below the ground surface

$\tau_{av}/\sigma_{0f}' = 0.65*(a_{max}/g)*(\sigma_{0f}/\sigma_{0f}')*r_d$

γ_{eff} for a given $\gamma_{eff}*G_{eff}/G_{max}$ and σ_m' is read from Figure 11 (Tokimatsu and Seed, 19

ε_c for a given γ_{eff} and N_1 is read from Figure 13 (Tokimatsu and Seed, 1987)

CALCULATIONS:

Boring: R-11-008

Water depth (ft bgs): (during drilling) 13.5

Water depth (ft bgs): (design depth) 5.0

Boring Elevation (ft MLLW): 27.5

Groundwater Elevation (ft MLLW): 14.0

Finished Grade Elevn. (ft MLLW): 27.5

Design GW El. (ft MLLW): 22.5

EQ Mag = 7.3

Mag Scale Factor= 1.071

a_{max} = 0.71

Height of Fill (ftl): 0.0

Original Depth (ft bgs)	Final Depth (ft bgs)	Elev (ft msl)	Total Stress at Mid depth (psf)	Original Effective Stress at Mid depth (psf)	Sampler SPT = 1 CDS = 2	Uncorrected Blow Count (N)*	Sampler 1=Unlined 2=Lined	Soil Type (1=fine-grained, 2=coarse-grained)	C_N	C_{ST}	C_s	C_r	$(N_1)_{60}$	Estimated Percentage of Fines (%)	(N1)60-CS (NCEER - used if layer does not liquefy)	(N1)60-CS (Seed - used if layer liquefies)	Design Effective Stress at Mid depth (psf)	σ_m' (psf)	$(K_2)_{max}$	G_{max} (psf)	r_d	γ_{eff} G_{eff}/G_{max}	τ_{av}/σ_{0f}'	Cyclic Shear Strain, γ_{eff} (%)		Volumetric Strain (Dry Sand) ε_c (%)	Volumetric Strain (Saturated Sand) ε_c (%)	$2*\varepsilon_c$ (dry); ε_c (saturtd.)	Settlement of Each Layer (inches)	Sum.	$CRR_{7.5}$
0																															
5.0	5.0	22.5	600	600	1	14	1	1	1.70	1.00	1.20	0.80	-	51.0	-	-	600	400	-	-	0.99	-	0.43	-	--	-	-	-	-	0.0000	1.00
10.0	10.0	17.5	1200	1200	2	59	2	1	1.32	0.67	1.00	0.85	-	51.0	-	-	888	592	-	-	0.98	-	0.57	-	--	-	-	-	-	0.0000	1.00
15.0	15.0	12.5	1800	1706	1	7	1	1	1.11	1.00	1.20	0.85	-	51.0	-	-	1176	784	-	-	0.97	-	0.64	-	--	-	-	-	-	0.0000	1.00
20.0	20.0	7.5	2400	1994	2	13	2	2	1.02	0.67	1.00	0.95	10.5	15.0	13.5	11.5	1464	976	4.52E+01	1.41E+06	0.95	4.26E-04	0.67	-	--	-	2.34E+00	2.34E+00	1.4010	1.4010	0.15
25.0	25.0	2.5	3000	2282	1	6	1	1	0.96	1.00	1.20	0.95	-	81.0	-	-	1752	1168	-	-	0.94	-	0.69	-	--	-	-	-	-	1.4010	1.00
30.0	30.0	-2.5	3600	2570	2	25	2	1	0.90	0.67	1.00	1.00	-	51.0	-	-	2040	1360	-	-	0.93	-	0.71	-	--	-	-	-	-	1.4010	1.00
35.0	35.0	-7.5	4200	2858	1	16	1	1	0.85	1.00	1.20	1.00	-	51.0	-	-	2328	1552	-	-	0.89	-	0.69	-	--	-	-	-	-	1.4010	1.00
40.0	40.0	-12.5	4800	3146	2	20	2	1	0.81	0.67	1.00	1.00	-	51.0	-	-	2616	1744	-	-	0.85	-	0.67	-	--	-	-	-	-	1.4010	1.00
45.0	45.0	-17.5	5400	3434	1	35	1	1	0.78	1.00	1.20	1.00	-	51.0	-	-	2904	1936	-	-	0.81	-	0.65	-	--	-	-	-	-	1.4010	1.00
50.0	50.0	-22.5	6000	3722	2	27	2	1	0.75	0.67	1.00	1.00	-	51.0	-	-	3192	2128	-	-	0.77	-	0.62	0.00E+00	--	0.00E+00	-	-	-	1.4010	1.00
60.0	60.0	-32.5	7200	4298	1	28	1	1	0.70	1.00	1.20	1.00	-	51.0	-	-	3768	2512	-	-	0.69	-	0.56	-	--	-	-	-	-	1.4010	1.00
70.0	70.0	-42.5	8400	4874	2	61	2	2	0.65	0.67	1.00	1.00	33.2	15.0	37.3	37.3	4344	2896	6.68E+01	3.60E+06	0.60	3.14E-04	0.50	-	--	-	0.00E+00	0.00E+00	0.0000	1.4010	1.00

Total (in) 1.4

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-010

Emean (%)	75			Present Ground El.	21.8	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	7.5	=Field Water Table Depth	Acc. max =	0.710	g					Earthq. M=	7.3	
C_E	1.25			Future Ground El.	21.8	C_B	1.00	120	16.8	=Design Water El.	14.3	=Field Water El.								Cm=	1.07	

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	16.8	41	CL	51.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	46	61	1.00	High N	0.00	LARGE	high N
10	11.8	32	SC	15.0	0.60	0.52	1.41	0.85	1.20	1.00	1	1	0.98	0.44	0.61	58	63	1.00	High N	0.00	LARGE	high N
15	6.8	14	CL	51.0	0.90	0.67	1.25	0.85	1.00	0.67	2	2	0.97	0.59	0.68	12	20	1.00	0.21	0.23	0.34	Fines
20	1.8	9	CL	51.0	1.20	0.81	1.14	0.95	1.20	1.00	1	1	0.95	0.73	0.72	15	22	1.00	0.25	0.27	0.37	Fines
25	-3.2	51	SM	15.0	1.50	0.95	1.05	0.95	1.00	0.67	2	2	0.94	0.88	0.74	42	47	1.00	High N	0.00	LARGE	high N
30	-8.2	19	CL	51.0	1.80	1.10	0.98	1.00	1.20	1.00	1	1	0.93	1.02	0.76	28	38	1.00	High N	0.00	LARGE	high N
35	-13.2	28	CL	51.0	2.10	1.24	0.92	1.00	1.00	0.67	2	2	0.89	1.16	0.74	21	31	0.98	High N	0.00	LARGE	high N
40	-18.2	13	CH	51.0	2.40	1.39	0.87	1.00	1.20	1.00	1	1	0.85	1.31	0.72	17	25	0.96	0.30	0.31	0.43	Fines
45	-23.2	26	CL	51.0	2.70	1.53	0.83	1.00	1.00	0.67	2	2	0.81	1.45	0.69	18	26	0.94	0.32	0.33	0.47	Fines
50	-28.2	19	CL	51.0	3.00	1.67	0.79	1.00	1.20	1.00	1	1	0.77	1.60	0.67	23	32	0.92	High N	0.00	LARGE	high N

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-011
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
California

Computed by: SP
Checked by:

Date: 03/30/12
Date:

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework,* Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60},* ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 21.7 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 16.7 ft MSL
Water Level at Investigation = 10 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	0.205
Post-liquefaction Settlement (in)	0.447
Total Settlement (in)	**0.652**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
													σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)	γ_{MOIST}	γ_{SAT}	(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.33	21.4	115.0	115.0	23.8	1.0	4.2	20	5	38	3.58	1.08	45	0.019	0.019	0.019	0.019	2.22	SAND	0.5	1.70	38.3	1.72	66.0	0.11	0.999	0.46	0.430	Above Water	0.12	87827	169.8	0.06	0.02	0.002	NA	NA	0.000
0.49	21.2	115.0	115.0	28.2	0.9	3.3	17	6	36	3.06	1.06	41	0.028	0.028	0.028	0.028	2.15	SAND	0.5	1.70	45.3	1.54	70.0	0.11	0.999	0.46	0.430	Above Water	0.12	69281	202.9	0.06	0.03	0.001	NA	NA	0.000
0.66	21.0	115.0	115.0	9.6	0.1	1.1	19	2	11	3.46	1.07	15	0.038	0.038	0.038	0.038	2.20	SAND	0.5	1.70	15.3	1.68	25.8	0.07	0.998	0.46	0.430	Above Water	0.12	57944	157.4	0.77	1.54	0.063	NA	NA	0.000
0.82	20.9	115.0	115.0	17.7	0.3	1.6	17	4	17	2.94	1.06	21	0.047	0.047	0.047	0.047	2.13	SAND	0.5	1.70	26.4	1.51	42.9	0.09	0.998	0.46	0.430	Above Water	0.13	50868	205.7	0.26	0.29	0.011	NA	NA	0.000
0.98	20.7	115.0	115.0	16.8	0.1	0.3	8	3	13	0.22	1.01	14	0.056	0.056	0.056	0.056	1.78	SAND	0.5	1.70	27.0	1.09	29.4	0.07	0.998	0.46	0.430	Above Water	0.13	45709	205.3	0.46	0.72	0.028	NA	NA	0.000
1.15	20.6	115.0	115.0	17.1	0.2	1.2	16	3	14	2.70	1.05	17	0.066	0.066	0.066	0.066	2.10	SAND	0.5	1.70	27.5	1.45	39.9	0.08	0.997	0.46	0.430	Above Water	0.13	41526	226.8	0.41	0.59	0.024	NA	NA	0.000
1.31	20.4	115.0	115.0	18.3	0.1	0.8	13	4	13	1.80	1.04	16	0.075	0.075	0.075	0.075	1.99	SAND	0.5	1.70	29.4	1.29	37.9	0.08	0.997	0.46	0.430	Above Water	0.13	38404	238.7	0.44	0.67	0.026	NA	NA	0.000
1.48	20.2	115.0	115.0	19.0	0.3	1.6	19	4	14	3.43	1.07	19	0.085	0.085	0.085	0.085	2.20	SAND	0.5	1.70	30.5	1.67	50.8	0.09	0.997	0.46	0.430	Above Water	0.13	35693	258.8	0.39	0.55	0.023	NA	NA	0.000
1.64	20.1	115.0	115.0	25.8	0.4	1.4	15	5	18	2.53	1.05	21	0.094	0.094	0.094	0.094	2.08	SAND	0.5	1.70	41.5	1.41	58.7	0.10	0.996	0.46	0.430	Above Water	0.13	33560	292.0	0.26	0.29	0.011	NA	NA	0.000
1.80	19.9	115.0	115.0	36.0	0.9	2.6	18	8	24	3.30	1.07	29	0.104	0.104	0.104	0.104	2.18	SAND	0.5	1.70	57.9	1.62	93.7	0.16	0.996	0.46	0.430	Above Water	0.13	31737	341.1	0.14	0.11	0.004	NA	NA	0.000
1.97	19.7	115.0	115.0	43.1	1.3	3.0	18	9	26	3.33	1.07	33	0.113	0.113	0.113	0.113	2.18	SAND	0.5	1.70	69.3	1.63	112.9	0.21	0.995	0.46	0.430	Above Water	0.13	30065	373.5	0.12	0.07	0.003	NA	NA	0.000
2.13	19.6	115.0	115.0	25.7	1.2	4.6	30	6	18	4.70	1.15	26	0.122	0.122	0.122	0.122	2.48	SAND	0.5	1.70	41.3	2.69	110.9	0.21	0.995	0.46	0.430	Above Water	0.13	28688	337.1	0.24	0.26	0.010	NA	NA	0.000
2.30	19.4	115.0	115.0	13.3	0.9	6.9	41	4	10	5.00	1.20	17	0.132	0.132	0.132	0.132	2.70	non-LIQ CLAY	1	1.70	NA	4.00	non-LIQ	non-LIQ	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.46	19.2	115.0	115.0	12.3	0.7	5.4	38	3	9	5.00	1.20	16	0.141	0.141	0.141	0.141	2.66	non-LIQ CLAY	1	1.70	NA	3.70	non-LIQ	non-LIQ	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.62	19.1	115.0	115.0	12.9	0.7	5.7	39	3	9	5.00	1.20	16	0.151	0.151	0.151	0.151	2.67	non-LIQ CLAY	1	1.70	NA	3.80	non-LIQ	non-LIQ	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.79	18.9	115.0	115.0	13.9	0.8	6.0	39	4	10	5.00	1.20	16	0.160	0.160	0.160	0.160	2.68	non-LIQ CLAY	1	1.70	NA	3.85	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.95	18.8	115.0	115.0	15.1	0.8	5.4	37	4	10	5.00	1.20	17	0.170	0.170	0.170	0.170	2.64	non-LIQ CLAY	1	1.70	NA	3.56	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.12	18.6	115.0	115.0	17.0	0.9	5.1	35	4	11	4.97	1.20	18	0.179	0.179	0.179	0.179	2.59	non-LIQ CLAY	1	1.70	NA	3.27	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.28	18.4	115.0	115.0	17.9	0.9	5.3	35	5	11	5.00	1.20	18	0.189	0.189	0.189	0.189	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.44	18.3	115.0	115.0	17.4	1.0	5.8	38	5	11	5.00	1.20	18	0.198	0.198	0.198	0.198	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.61	18.1	115.0	115.0	16.5	1.0	5.8	39	4	10	5.00	1.20	17	0.208	0.208	0.208	0.208	2.67	non-LIQ CLAY	1	1.70	NA	3.80	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.77	17.9	115.0	115.0	17.0	0.9	5.5	38	4	10	5.00	1.20	17	0.217	0.217	0.217	0.217	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.94	17.8	115.0	115.0	19.1	1.0	5.5	37	5	11	5.00	1.20	18	0.227	0.227	0.227	0.227	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.10	17.6	115.0	115.0	20.6	1.2	5.8	37	5	11	5.00	1.20	19	0.236	0.236	0.236	0.236	2.64	non-LIQ CLAY	1	1.70	NA	3.56	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.27	17.4	115.0	115.0	22.0	1.3	5.7	36	6	12	5.00	1.20	19	0.246	0.246	0.246	0.246	2.62	non-LIQ CLAY	1	1.70	NA	3.46	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.43	17.3	115.0	115.0	22.3	1.3	5.7	36	6	12	5.00	1.20	19	0.255	0.255	0.255	0.255	2.62	non-LIQ CLAY	1	1.70	NA	3.46	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.59	17.1	115.0	115.0	22.2	1.2	5.4	36	6	11	5.00	1.20	19	0.264	0.264	0.264	0.264	2.61	non-LIQ CLAY	1	1.70	NA	3.41	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.76	16.9	115.0	115.0	21.1	1.2	5.5	37	6	11	5.00	1.20	18	0.274	0.274	0.274	0.274	2.64	non-LIQ CLAY	1	1.70	NA	3.58	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.92	16.8	115.0	115.0	20.6	1.1	5.3	38	5	10	5.00	1.20	17	0.283	0.283	0.283	0.283	2.64	non-LIQ CLAY	1	1.70	NA	3.61	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.09	16.6	115.0	115.0	20.4	1.0	5.0	37	5	10	5.00	1.20	17	0.293	0.293	0.293	0.290	2.63	non-LIQ CLAY	1	1.70	NA	3.55	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.25	16.5	115.0	115.0	19.6	1.0	5.1	38	5	10	5.00	1.20	17	0.302	0.302	0.302	0.297	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.41	16.3	115.0	115.0	19.8	1.0	5.0	38	5	10	5.00	1.20	17	0.311	0.311	0.311	0.306	2.66	non-LIQ CLAY	1	1.70	NA	3.70	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.58	16.1	115.0	115.0	20.3	1.1	5.4	40	5	10	5.00	1.20	17	0.321	0.321	0.321	0.316	2.68	non-LIQ CLAY	1	1.70	NA	3.88	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.74	16.0	115.0	115.0	22.7	1.2	5.1	37	6	11	5.00	1.20	18	0.330	0.330	0.330	0.325	2.64	non-LIQ CLAY	1	1.70	NA	3.57	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.91	15.8	115.0	115.0	21.9	1.1	5.2	38	6	10	5.00	1.20	17	0.340	0.340	0.340	0.335	2.66	non-LIQ CLAY	1	1.70	NA	3.72	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.07	15.6	115.0	115.0	21.9	1.0	4.7	37	6	10	5.00	1.20	17	0.349	0.349	0.349	0.344	2.63	non-LIQ CLAY	1	1.70	NA	3.54	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.23	15.5	115.0	115.0	21.7	1.0	4.6	37	6	10	5.00	1.20	17	0.358	0.358	0.358	0.353	2.64	non-LIQ CLAY	1	1.70	NA	3.56	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.40	15.3	115.0	115.0	22.0	1.0	4.6	37	6	10	5.00	1.20	17	0.368	0.368	0.368	0.363	2.64	non-LIQ CLAY	1	1.70	NA	3.58	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.56	15.1	115.0	115.0	22.3	1.1	4.8	38	6	10	5.00	1.20	17	0.377	0.377	0.377	0.372	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.73	15.0	115.0	115.0	21.0	1.0	5.0	40	6	9	5.00	1.20	16	0.387	0.387	0.387	0.382	2.69	non-LIQ CLAY	1	1.70	NA	3.90	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.89	14.8	115.0	115.0	20.3	1.0	4.7	40	5	9	5.00	1.20	16	0.396	0.396	0.396	0.391	2.69	non-LIQ CLAY	1	1.70	NA	3.90	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	14.7	115.0	115.0	19.6	0.9	4.8	36	5	8	5.00	1.20	15	0.405	0.405	0.405	0.400	2.62	non-LIQ CLAY	1	1.70	NA	3.44	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.22	14.5	115.0	115.0	20.0	1.0	4.8	37	5	8	5.00	1.20	15	0.415	0.415	0.415	0.410	2.62	non-LIQ CLAY	1	1.70	NA	3.47	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.38	14.3	115.0	115.0	18.8	0.9	5.0	38	5	8	5.00	1.20	14	0.424	0.424	0.424	0.419	2.66	non-LIQ CLAY	1	1.70	NA	3.73	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.55	14.2	115.0	115.0	16.0	0.8	5.2	42	4	7	5.00	1.20	13	0.434	0.434	0.434	0.429	2.73	non-LIQ CLAY	1	1.70	NA	4.25	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.71	14.0	115.0	115.0	13.9	0.7	5.1	45	4	6	5.00	1.20	12	0.443	0.443	0.443	0.438	2.78	non-LIQ CLAY	1	1.70	NA	4.58	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	13.8	115.0	115.0	15.1	0.5	3.5	38	4	6	5.00	1.20	12	0.453	0.453	0.453	0.448	2.64	non-LIQ CLAY	1	1.70	NA	3.61	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.04	13.7	115.0	115.0	17.3	0.9	5.0	41	5	7	5.00	1.20	13	0.462	0.462	0.462	0.457	2.71	non-LIQ CLAY	1	1.70	NA	4.09	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	13.5	115.0	115.0	16.5	1.0	6.0	46	5	7	5.00	1.20	13	0.472	0.472	0.472	0.467	2.79	non-LIQ CLAY	1	1.70	NA	4.72	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	13.3	115.0	115.0	23.7	1.0	4.3	38	6	9	5.00	1.20	16	0.481	0.481	0.481	0.476	2.66	non-LIQ CLAY	1	1.70	NA	3.68	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.53	13.2	115.0	115.0	26.1	1.1	4.2	36	7	10	5.00	1.20	17	0.490	0.490	0.490	0.485	2.62	non-LIQ CLAY	1	1.70	NA	3.43	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-17

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
8.69	13.0	115.0	115.0	28.3	1.1	4.0	34	7	10	4.95	1.19	17	0.500	0.500	0.500	0.495	2.58	SILT	0.7	1.69	45.2	3.20	144.6	0.36	0.980	0.46	0.430	0.84	NA	NA	NA	NA	NA	0.000	13	2.150	0.041
8.86	12.8	115.0	115.0	28.3	1.2	4.1	35	7	10	5.00	1.20	18	0.509	0.509	0.509	0.504	2.60	non-LIQ CLAY	1	1.70	NA	3.31	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.02	12.7	115.0	115.0	25.8	1.1	4.3	37	7	10	5.00	1.20	17	0.519	0.519	0.519	0.514	2.64	non-LIQ CLAY	1	1.70	NA	3.59	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	12.5	115.0	115.0	22.9	1.1	4.6	38	6	8	5.00	1.20	15	0.528	0.528	0.528	0.523	2.65	non-LIQ CLAY	1	1.70	NA	3.62	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	12.4	115.0	115.0	21.6	0.9	4.3	38	6	8	5.00	1.20	15	0.538	0.538	0.538	0.533	2.65	non-LIQ CLAY	1	1.70	NA	3.64	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	12.2	115.0	115.0	20.5	0.8	3.9	37	5	7	5.00	1.20	14	0.547	0.547	0.547	0.542	2.64	non-LIQ CLAY	1	1.70	NA	3.55	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	12.0	115.0	115.0	19.4	0.7	3.8	38	5	7	5.00	1.20	13	0.557	0.557	0.557	0.551	2.66	non-LIQ CLAY	1	1.70	NA	3.69	non-LIQ	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	11.9	115.0	115.0	18.4	0.7	3.6	39	5	7	5.00	1.20	13	0.566	0.566	0.566	0.561	2.66	non-LIQ CLAY	1	1.70	NA	3.74	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	11.7	115.0	115.0	16.3	0.6	3.7	42	4	6	5.00	1.20	12	0.576	0.576	0.576	0.570	2.72	non-LIQ CLAY	1	1.70	NA	4.15	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	11.5	115.0	115.0	14.7	0.5	3.5	43	4	5	5.00	1.20	12	0.585	0.585	0.585	0.580	2.75	non-LIQ CLAY	1	1.70	NA	4.36	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	11.4	115.0	115.0	12.8	0.5	3.5	46	4	5	5.00	1.20	11	0.594	0.594	0.594	0.589	2.80	non-LIQ CLAY	1	1.70	NA	4.80	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	11.2	115.0	115.0	14.0	0.4	2.9	42	4	5	5.00	1.20	11	0.604	0.604	0.604	0.598	2.72	non-LIQ CLAY	1	1.70	NA	4.16	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	11.0	115.0	115.0	17.3	0.5	2.8	37	5	6	5.00	1.20	12	0.613	0.613	0.613	0.608	2.64	non-LIQ CLAY	1	1.70	NA	3.60	non-LIQ	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	10.9	115.0	115.0	21.1	0.6	2.9	37	5	7	5.00	1.20	14	0.623	0.623	0.623	0.617	2.64	non-LIQ CLAY	1	1.70	NA	3.55	non-LIQ	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.99	10.7	115.0	115.0	23.4	0.7	3.1	36	6	8	5.00	1.20	14	0.632	0.632	0.632	0.627	2.62	non-LIQ CLAY	1	1.67	NA	3.47	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	10.6	115.0	115.0	25.8	0.9	3.4	36	7	9	5.00	1.20	15	0.641	0.641	0.641	0.636	2.62	non-LIQ CLAY	1	1.65	NA	3.45	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	10.4	115.0	115.0	29.3	0.9	3.0	34	7	9	4.95	1.19	16	0.651	0.651	0.651	0.646	2.58	SAND	0.5	1.27	35.3	3.22	113.6	0.22	0.974	0.45	0.420	0.51	NA	NA	NA	NA	NA	0.000	12	2.310	0.047
11.48	10.2	115.0	115.0	30.9	1.0	3.3	35	8	10	4.97	1.19	17	0.660	0.660	0.660	0.655	2.59	SAND	0.5	1.27	37.0	3.25	120.2	0.24	0.973	0.45	0.420	0.57	NA	NA	NA	NA	NA	0.000	13	2.150	0.041
11.65	10.1	115.0	115.0	36.5	1.1	3.0	31	9	11	4.77	1.16	18	0.670	0.670	0.670	0.665	2.51	SAND	0.5	1.26	43.3	2.80	121.3	0.25	0.973	0.45	0.420	0.59	NA	NA	NA	NA	NA	0.000	13	2.150	0.044
11.81	9.9	115.0	115.0	35.8	1.0	2.9	31	9	11	4.77	1.16	18	0.679	0.676	0.679	0.674	2.51	SAND	0.5	1.25	42.4	2.80	118.8	0.24	0.972	0.45	0.420	0.56	NA	NA	NA	NA	NA	0.000	13	2.150	0.041
11.98	9.7	115.0	115.0	35.5	1.1	3.2	33	9	11	4.86	1.18	18	0.689	0.680	0.689	0.680	2.54	SAND	0.5	1.25	41.9	2.99	125.1	0.26	0.972	0.45	0.420	0.62	NA	NA	NA	NA	NA	0.000	14	2.000	0.041
12.14	9.6	115.0	115.0	34.9	1.2	3.3	33	9	11	4.90	1.18	18	0.698	0.684	0.698	0.684	2.56	SAND	0.5	1.24	41.0	3.09	126.6	0.27	0.972	0.46	0.430	0.63	NA	NA	NA	NA	NA	0.000	14	2.000	0.038
12.30	9.4	115.0	115.0	29.7	1.2	4.1	36	8	9	5.00	1.20	16	0.707	0.689	0.707	0.689	2.61	non-LIQ CLAY	1	1.54	NA	3.38	non-LIQ	non-LIQ	0.971	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	9.2	115.0	115.0	33.8	1.1	3.4	34	9	11	4.94	1.19	18	0.717	0.693	0.717	0.693	2.58	SAND	0.5	1.24	39.4	3.19	125.8	0.27	0.971	0.46	0.430	0.62	NA	NA	NA	NA	NA	0.000	14	2.000	0.041
12.63	9.1	115.0	115.0	37.7	1.4	3.6	34	9	12	4.91	1.18	19	0.726	0.697	0.726	0.697	2.56	SAND	0.5	1.23	43.9	3.11	136.5	0.32	0.971	0.47	0.440	0.72	NA	NA	NA	NA	NA	0.000	15	1.928	0.037
12.80	8.9	115.0	115.0	40.2	1.6	4.1	34	10	12	4.95	1.19	20	0.736	0.702	0.736	0.702	2.58	SAND	0.5	1.23	46.6	3.22	149.9	0.39	0.970	0.47	0.440	0.89	NA	NA	NA	NA	NA	0.000	15	1.928	0.039
12.96	8.7	115.0	115.0	44.0	1.7	3.9	33	11	13	4.86	1.18	21	0.745	0.706	0.745	0.706	2.54	SAND	0.5	1.22	50.9	2.99	152.0	0.41	0.970	0.47	0.440	0.92	NA	NA	NA	NA	NA	0.000	16	1.861	0.036
13.12	8.6	115.0	115.0	39.0	1.8	4.5	35	10	12	5.00	1.20	20	0.754	0.710	0.754	0.710	2.60	SILT	0.7	1.32	48.7	3.31	161.4	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	8.4	115.0	115.0	30.3	1.4	4.5	37	8	10	5.00	1.20	17	0.764	0.715	0.764	0.715	2.64	non-LIQ CLAY	1	1.48	NA	3.59	non-LIQ	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	8.3	115.0	115.0	25.4	1.1	4.1	39	7	8	5.00	1.20	15	0.773	0.719	0.773	0.719	2.68	non-LIQ CLAY	1	1.47	NA	3.84	non-LIQ	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	8.1	115.0	115.0	22.9	0.9	3.8	40	6	7	5.00	1.20	14	0.783	0.723	0.783	0.723	2.69	non-LIQ CLAY	1	1.46	NA	3.93	non-LIQ	non-LIQ	0.968	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	7.9	115.0	115.0	22.2	0.8	3.7	40	6	7	5.00	1.20	14	0.792	0.727	0.792	0.727	2.70	non-LIQ CLAY	1	1.45	NA	3.98	non-LIQ	non-LIQ	0.968	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	7.8	115.0	115.0	21.4	0.8	3.9	42	6	7	5.00	1.20	13	0.802	0.732	0.802	0.732	2.72	non-LIQ CLAY	1	1.45	NA	4.16	non-LIQ	non-LIQ	0.967	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.11	7.6	115.0	115.0	20.6	0.8	3.8	42	6	7	5.00	1.20	13	0.811	0.736	0.811	0.736	2.73	non-LIQ CLAY	1	1.44	NA	4.22	non-LIQ	non-LIQ	0.967	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	7.4	115.0	115.0	19.1	0.8	4.0	45	5	6	5.00	1.20	13	0.821	0.740	0.821	0.740	2.78	non-LIQ CLAY	1	1.43	NA	4.58	non-LIQ	non-LIQ	0.967	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	7.3	115.0	115.0	18.7	0.7	4.0	45	5	6	5.00	1.20	13	0.830	0.745	0.830	0.745	2.79	non-LIQ CLAY	1	1.42	NA	4.66	non-LIQ	non-LIQ	0.966	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	7.1	115.0	115.0	18.2	0.7	4.0	46	5	6	5.00	1.20	12	0.839	0.749	0.839	0.749	2.79	non-LIQ CLAY	1	1.41	NA	4.73	non-LIQ	non-LIQ	0.966	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	6.9	115.0	115.0	18.1	0.7	3.8	45	5	6	5.00	1.20	12	0.849	0.753	0.849	0.753	2.78	non-LIQ CLAY	1	1.40	NA	4.66	non-LIQ	non-LIQ	0.966	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	6.8	115.0	115.0	17.9	0.6	3.6	45	5	6	5.00	1.20	12	0.858	0.758	0.858	0.758	2.78	non-LIQ CLAY	1	1.40	NA	4.59	non-LIQ	non-LIQ	0.965	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.09	6.6	115.0	115.0	18.0	0.6	3.1	43	5	6	5.00	1.20	12	0.868	0.762	0.868	0.762	2.74	non-LIQ CLAY	1	1.39	NA	4.30	non-LIQ	non-LIQ	0.965	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.26	6.4	115.0	115.0	17.3	0.5	3.1	44	5	6	5.00	1.20	12	0.877	0.766	0.877	0.766	2.76	non-LIQ CLAY	1	1.38	NA	4.44	non-LIQ	non-LIQ	0.964	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.42	6.3	115.0	115.0	18.2	0.6	3.1	43	5	6	5.00	1.20	12	0.887	0.771	0.887	0.771	2.74	non-LIQ CLAY	1	1.37	NA	4.30	non-LIQ	non-LIQ	0.964	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	6.1	115.0	115.0	18.8	0.6	3.0	42	5	6	5.00	1.20	12	0.896	0.775	0.896	0.775	2.72	non-LIQ CLAY	1	1.37	NA	4.15	non-LIQ	non-LIQ	0.964	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.75	6.0	115.0	115.0	19.8	0.6	3.0	41	5	6	5.00	1.20	12	0.906	0.779	0.906	0.779	2.70	non-LIQ CLAY	1	1.36	NA	4.02	non-LIQ	non-LIQ	0.963	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	5.8	115.0	115.0	20.8	0.6	2.7	38	5	6	5.00	1.20	13	0.915	0.783	0.915	0.783	2.66	non-LIQ CLAY	1	1.35	NA	3.68	non-LIQ	non-LIQ	0.963	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	5.6	115.0	115.0	20.1	0.5	2.7	39	5	6	5.00	1.20	12	0.925	0.788	0.925	0.788	2.67	non-LIQ CLAY	1	1.34	NA	3.82	non-LIQ	non-LIQ	0.963	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	5.5	115.0	115.0	18.5	0.4	2.4	39	5	6	5.00	1.20	12	0.934	0.792	0.934	0.792	2.68	non-LIQ CLAY	1	1.34	NA	3.82	non-LIQ	non-LIQ	0.962	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	5.3	115.0	115.0	17.6	0.3	2.0	38	5	5	5.00	1.20	11	0.943	0.796	0.943	0.796	2.64	non-LIQ CLAY	1	1.33	NA	3.61	non-LIQ	non-LIQ	0.962	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	5.1	115.0	115.0	17.2	0.3	1.5	36	4	5	5.00	1.20	11	0.953	0.801	0.953	0.801	2.62	non-LIQ CLAY	1	1.32	NA	3.44	non-LIQ	non-LIQ	0.961	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	5.0	115.0	115.0	17.4	0.2	1.4	35	4	5	5.00	1.20	11	0.962	0.805	0.962	0.805	2.60	non-LIQ CLAY	1	1.31	NA	3.31	non-LIQ	non-LIQ	0.961	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	4.8	115.0	115.0	17.8	0.2	1.4	39	5	5	5.00	1.20	11	0.972	0.810	0.972	0.810	2.68	non-LIQ CLAY	1	1.31	NA	3.85	non-LIQ	non-LIQ	0.961	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	4.6	115.0	115.0	17.7	0.3	1.7	36	5	5	5.00	1.20	11	0.981	0.814	0.981	0.814	2.61	non-LIQ CLAY	1	1.30	NA	3.39	non-LIQ	non-LIQ	0.960	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	4.5	115.0	115.0	19.1	0.4	2.2	38	5	6	5.00	1.20	12	0.990	0.818	0.990	0.818	2.65	non-LIQ CLAY	1	1.29	NA	3.67	non-LIQ	non-LIQ	0.960	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	4.3	115.0	115.0	21.5	0.6	3.0	40	6	7	5.00	1.20	13	1.000	0.822	1.000	0.822	2.69	non-LIQ CLAY	1	1.29	NA	3.95	non-LIQ	non-LIQ	0.959	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	4.2	115.0	115.0	24.3	1.1	4.5	44	7	8	5.00	1.20	14	1.009	0.827	1.009	0.827	2.77	non-LIQ CLAY	1	1.28	NA	4.54	non-LIQ	non-LIQ	0.959	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	4.0	115.0	115.0	28.4	1.5	5.4	45	8	9	5.00	1.20	16	1.019	0.831	1.019	0.831	2.78	non-LIQ CLAY	1	1.27	NA	4.58	non-LIQ	non-LIQ	0.959	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	3.8	115.0	115.0	28.7	2.4	8.3	52	9	10	5.00	1.20	17	1.028	0.835	1.028	0.835	2.91	non-LIQ CLAY	1	1.27	NA	5.75	non-LIQ	non-LIQ	0.958	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	3.7	115.0	115.0	38.9	2.7	6.8	43	11	12	5.00	1.20	19	1.037	0.839	1.037	0.839	2.75	non-LIQ CLAY	1	1.26	NA	4.37	non-LIQ	non-LIQ	0.958	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	3.5	115.0	115.0	36.4	2.9	8.0	47	10	12	5.00	1.20	19	1.047	0.844	1.047	0.844	2.82	non-LIQ CLAY	1	1.25	NA	4.98	non-LIQ	non-LIQ	0.958	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	3.3	115.0	115.0	42.9	2.5	5.9	39	11	13	5.00	1.20	20	1.056	0.848	1.056	0.848	2.68	non-LIQ CLAY	1	1.25	NA	3.82	non-LIQ	non-LIQ	0.957	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	3.2	115.0	115.0	31.5	1.9	6.0	45	9	10	5.00	1.20	17	1.066	0.853	1.066	0.853	2.78	non-LIQ CLAY	1	1.24	NA	4.63	non-LIQ	non-LIQ	0.957	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	3.0	115.0	115.0	24.0	1.2	4.8	46	7	8	5.00	1.20	14	1.075	0.857	1.075	0.857	2.80	non-LIQ CLAY	1	1.23	NA	4.83	non-LIQ	non-LIQ	0.956	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	2.8	115.0	115.0	23.2	0.7	3.2	41	6	7	5.00	1.20	13	1.084	0.861	1.084	0.861	2.70	non-LIQ CLAY	1	1.23	NA	4.00	non-LIQ	non-LIQ	0.956	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.03	2.7	115.0	115.0	22.5	0.7	3.1	41	6	7	5.00	1.20	13	1.094	0.866	1.094	0.866	2.71	non-LIQ CLAY	1	1.22	NA	4.06	non-LIQ	non-LIQ	0.956	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	2.5	115.0	115.0	21.7	0.7	3.1	41	6	6	5.00	1.20	13	1.103	0.870	1.103	0.870	2.72	non-LIQ CLAY	1	1.22	NA	4.13	non-LIQ	non-LIQ	0.955	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	2.3	115.0	115.0	19.5	0.6	3.2	44	5	6	5.00	1.20	12	1.113	0.874	1.113	0.874	2.77	non-LIQ CLAY	1	1.21	NA	4.56	non-LIQ	non-LIQ	0.955	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	2.2	115.0	115.0	15.6	0.6	3.8	52	5	5	5.00	1.20	11	1.122	0.878	1.122	0.878	2.90	non-LIQ CLAY	1	1.20	NA	5.69	non-LIQ	non-LIQ	0.954	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	2.0	115.0	115.0	12.7	0.5	3.7	57	4	4	5.00	1.20	10	1.132	0.883	1.132	0.883	2.96	non-LIQ CLAY	1	1.20	NA	6.48	non-LIQ	non-LIQ	0.954	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	1.9	115.0	115.0	11.2	0.3	3.0	57	4	4	5.00	1.20	10	1.141	0.887	1.141	0.887	2.98	non-LIQ CLAY	1	1.19	NA	6.57	non-LIQ	non-LIQ	0.954	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	1.7	115.0	115.0	10.3	0.3	2.5	57	3	4	5.00	1.20	9	1.151	0.891	1.151	0.891	2.98	non-LIQ CLAY	1	1.19	NA	6.50	non-LIQ	non-LIQ	0.953	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	1.5	115.0	115.0	9.6	0.2	2.5	59	3	3	5.00	1.20	9	1.160	0.896	1.160	0.896	3.01	non-LIQ CLAY	1	1.18	NA	6.83	non-LIQ	non-LIQ	0.953	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	1.4	115.0	115.0	9.5	0.2	2.6	60	3	3	5.00	1.20	9	1.170	0.900	1.170	0.900	3.02	non-LIQ CLAY	1	1.18	NA	7.01	non-LIQ	non-LIQ	0.953	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	1.2	115.0	115.0	9.9	0.3	3.1	62	3	4	5.00	1.20	9	1.179	0.904	1.179	0.904	3.05	non-LIQ CLAY	1	1.17	NA	7.35	non-LIQ	non-LIQ	0.952	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	1.0	115.0	115.0	11.2	0.3	3.0	58	4	4	5.00	1.20	10	1.189	0.909	1.189	0.909	2.99	non-LIQ CLAY	1	1.16	NA	6.67	non-LIQ	non-LIQ	0.952	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	0.9	115.0	115.0	11.9	0.5	4.0	61	4	4	5.00	1.20	10	1.198	0.913	1.198	0.913	3.04	non-LIQ CLAY	1	1.16	NA	7.21	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	0.7	115.0	115.0	14.8	1.0	6.8	66	5	5	5.00	1.20	12	1.208	0.917	1.208	0.917	3.11	non-LIQ CLAY	1	1.15	NA	8.00	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	0.5	115.0	115.0	25.7	1.4	5.5	49	8	8	5.00	1.20	15	1.217	0.922	1.217	0.922	2.85	non-LIQ CLAY	1	1.15	NA	5.20	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	0.4	115.0	115.0	46.1	2.2	4.8	36	12	13	5.00	1.20	20	1.226	0.926	1.226	0.926	2.62	non-LIQ CLAY	1	1.14	NA	3.45	non-LIQ	non-LIQ	0.950	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	0.2	115.0	115.0	54.2	2.8	5.1	35	14	15	5.00	1.20	23	1.236	0.930	1.236	0.930	2.60	SILT	0.7	1.09	56.0	3.33	186.6	non-LIQ	0.950	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	0.1	115.0	115.0	52.3	2.4	4.6	34	13	14	4.95	1.19	22	1.245	0.934	1.245	0.934	2.58	SAND	0.5	1.06	52.6	3.22	169.4	non-LIQ	0.950	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	-0.1	115.0	115.0	26.5	1.0	3.7	40	8	8	5.00	1.20	15	1.255	0.939	1.255	0.939	2.70	non-LIQ CLAY	1	1.13	NA	3.98	non-LIQ	non-LIQ	0.949	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	-0.3	115.0	115.0	16.7	0.5	3.3	50	5	5	5.00	1.20	11	1.264	0.943	1.264	0.943	2.87	non-LIQ CLAY	1	1.12	NA	5.38	non-LIQ	non-LIQ	0.949	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	-0.4	115.0	115.0	15.6	0.5	3.3	52	5	5	5.00	1.20	11	1.274	0.948	1.274	0.948	2.90	non-LIQ CLAY	1	1.12	NA	5.65	non-LIQ	non-LIQ	0.948	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	-0.6	115.0	115.0	15.3	0.5	3.3	52	5	5	5.00	1.20	11	1.283	0.952	1.283	0.952	2.91	non-LIQ CLAY	1	1.11	NA	5.77	non-LIQ	non-LIQ	0.948	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	-0.8	115.0	115.0	16.0	0.5	3.1	51	5	5	5.00	1.20	11	1.292	0.956	1.292	0.956	2.88	non-LIQ CLAY	1	1.11	NA	5.47	non-LIQ	non-LIQ	0.948	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.64	-0.9	115.0	115.0	18.5	0.6	3.1	47	5	6	5.00	1.20	12	1.302	0.960	1.302	0.960	2.82	non-LIQ CLAY	1	1.10	NA	4.92	non-LIQ	non-LIQ	0.947	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_{eq}	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							σ_v (tsf)	σ'_v (tsf)	σ_v (tsf)	σ'_v (tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1n})_{cs}$								(tsf)	(%)	(%)	(in)		(%)	(in)
22.80	-1.1	115.0	115.0	20.8	0.7	3.3	46	6	6	5.00	1.20	12	1.311	0.965	1.311	0.965	2.80	non-LIQ CLAY	1	1.10	NA	4.75	non-LIQ	non-LIQ	0.947	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	-1.3	115.0	115.0	23.1	0.8	3.5	44	6	7	5.00	1.20	13	1.321	0.969	1.321	0.969	2.77	non-LIQ CLAY	1	1.09	NA	4.55	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	-1.4	115.0	115.0	23.5	0.8	3.6	45	7	7	5.00	1.20	13	1.330	0.973	1.330	0.973	2.77	non-LIQ CLAY	1	1.09	NA	4.57	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.29	-1.6	115.0	115.0	25.0	0.9	3.7	44	7	7	5.00	1.20	14	1.339	0.978	1.339	0.978	2.76	non-LIQ CLAY	1	1.08	NA	4.48	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	-1.8	115.0	115.0	25.3	1.0	3.8	44	7	7	5.00	1.20	14	1.349	0.982	1.349	0.982	2.77	non-LIQ CLAY	1	1.08	NA	4.51	non-LIQ	non-LIQ	0.945	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	-1.9	115.0	115.0	27.3	0.9	3.2	40	7	8	5.00	1.20	14	1.358	0.986	1.358	0.986	2.69	non-LIQ CLAY	1	1.07	NA	3.95	non-LIQ	non-LIQ	0.945	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	-2.1	115.0	115.0	27.4	0.7	2.7	38	7	7	5.00	1.20	14	1.368	0.991	1.368	0.991	2.65	non-LIQ CLAY	1	1.07	NA	3.62	non-LIQ	non-LIQ	0.945	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	-2.3	115.0	115.0	25.4	0.7	2.9	40	7	7	5.00	1.20	13	1.377	0.995	1.377	0.995	2.69	non-LIQ CLAY	1	1.06	NA	3.95	non-LIQ	non-LIQ	0.944	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	-2.4	115.0	115.0	26.7	0.8	3.0	40	7	7	5.00	1.20	14	1.386	0.999	1.386	0.999	2.69	non-LIQ CLAY	1	1.06	NA	3.89	non-LIQ	non-LIQ	0.944	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	-2.6	115.0	115.0	28.6	0.9	3.1	39	8	8	5.00	1.20	14	1.396	1.004	1.396	1.004	2.67	non-LIQ CLAY	1	1.05	NA	3.80	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	-2.7	115.0	115.0	28.9	1.0	3.4	40	8	8	5.00	1.20	15	1.405	1.008	1.405	1.008	2.69	non-LIQ CLAY	1	1.05	NA	3.96	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.61	-2.9	115.0	115.0	29.4	1.1	3.7	42	8	8	5.00	1.20	15	1.415	1.012	1.415	1.012	2.72	non-LIQ CLAY	1	1.05	NA	4.14	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	-3.1	115.0	115.0	31.6	1.3	4.2	42	9	9	5.00	1.20	16	1.424	1.016	1.424	1.016	2.73	non-LIQ CLAY	1	1.04	NA	4.24	non-LIQ	non-LIQ	0.942	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	-3.2	115.0	115.0	34.6	1.6	4.7	42	10	10	5.00	1.20	17	1.433	1.021	1.433	1.021	2.74	non-LIQ CLAY	1	1.04	NA	4.28	non-LIQ	non-LIQ	0.942	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	-3.4	115.0	115.0	34.8	1.8	5.1	44	10	10	5.00	1.20	17	1.443	1.025	1.443	1.025	2.76	non-LIQ CLAY	1	1.03	NA	4.46	non-LIQ	non-LIQ	0.941	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	-3.6	115.0	115.0	33.0	2.9	8.8	55	10	10	5.00	1.20	17	1.452	1.029	1.452	1.029	2.95	non-LIQ CLAY	1	1.03	NA	6.23	non-LIQ	non-LIQ	0.941	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	-3.7	115.0	115.0	64.6	5.4	8.3	42	18	18	5.00	1.20	26	1.462	1.034	1.462	1.034	2.73	non-LIQ CLAY	1	1.02	NA	4.22	non-LIQ	non-LIQ	0.941	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	-3.9	115.0	115.0	123.8	7.1	5.7	28	29	29	4.53	1.14	38	1.471	1.038	1.471	1.038	2.43	SAND	0.5	1.01	118.1	2.44	288.2	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	-4.1	115.0	115.0	134.3	6.8	5.1	25	31	31	4.29	1.12	39	1.481	1.042	1.481	1.042	2.37	SAND	0.5	1.01	127.9	2.18	278.4	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	-4.2	115.0	115.0	142.0	7.3	5.1	25	32	33	4.26	1.11	40	1.490	1.047	1.490	1.047	2.36	SAND	0.5	1.01	134.9	2.14	289.3	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	-4.4	115.0	115.0	104.7	5.6	5.4	29	25	25	4.60	1.14	33	1.500	1.051	1.500	1.051	2.45	SAND	0.5	1.00	99.3	2.54	251.7	non-LIQ	0.939	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	-4.6	115.0	115.0	60.6	4.3	7.2	41	16	16	5.00	1.20	25	1.509	1.055	1.509	1.055	2.71	non-LIQ CLAY	1	1.00	NA	4.04	non-LIQ	non-LIQ	0.939	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	-4.7	115.0	115.0	80.4	4.6	5.7	33	20	20	4.87	1.18	28	1.519	1.060	1.519	1.060	2.55	SAND	0.5	1.00	76.0	3.01	228.5	non-LIQ	0.938	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	-4.9	115.0	115.0	82.5	4.3	5.2	31	20	20	4.77	1.16	28	1.528	1.064	1.528	1.064	2.51	SAND	0.5	1.00	77.7	2.80	217.9	non-LIQ	0.938	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	-5.0	115.0	115.0	49.9	2.6	5.3	39	13	13	5.00	1.20	21	1.538	1.068	1.538	1.068	2.67	non-LIQ CLAY	1	0.99	NA	3.77	non-LIQ	non-LIQ	0.938	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	-5.2	115.0	115.0	34.9	1.7	4.9	44	10	10	5.00	1.20	17	1.547	1.073	1.547	1.073	2.76	non-LIQ CLAY	1	0.99	NA	4.47	non-LIQ	non-LIQ	0.937	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-5.4	115.0	115.0	31.5	1.2	3.9	42	9	9	5.00	1.20	15	1.557	1.077	1.557	1.077	2.73	non-LIQ CLAY	1	0.98	NA	4.22	non-LIQ	non-LIQ	0.937	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-5.5	115.0	115.0	26.9	1.1	4.2	47	8	8	5.00	1.20	14	1.566	1.081	1.566	1.081	2.81	non-LIQ CLAY	1	0.98	NA	4.88	non-LIQ	non-LIQ	0.937	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-5.7	115.0	115.0	23.6	0.9	4.0	49	7	7	5.00	1.20	13	1.576	1.086	1.576	1.086	2.85	non-LIQ CLAY	1	0.97	NA	5.20	non-LIQ	non-LIQ	0.936	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-5.9	115.0	115.0	22.3	0.7	3.3	47	6	6	5.00	1.20	13	1.585	1.090	1.585	1.090	2.82	non-LIQ CLAY	1	0.97	NA	4.96	non-LIQ	non-LIQ	0.936	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-6.0	115.0	115.0	19.7	0.8	4.2	54	6	6	5.00	1.20	12	1.594	1.094	1.594	1.094	2.94	non-LIQ CLAY	1	0.97	NA	6.06	non-LIQ	non-LIQ	0.935	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-6.2	115.0	115.0	18.4	0.7	3.9	55	6	6	5.00	1.20	12	1.604	1.099	1.604	1.099	2.94	non-LIQ CLAY	1	0.96	NA	6.10	non-LIQ	non-LIQ	0.935	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-6.4	115.0	115.0	17.8	0.7	4.1	56	6	5	5.00	1.20	12	1.613	1.103	1.613	1.103	2.97	non-LIQ CLAY	1	0.96	NA	6.40	non-LIQ	non-LIQ	0.935	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-6.5	115.0	115.0	19.1	0.7	3.9	54	6	6	5.00	1.20	12	1.623	1.107	1.623	1.107	2.93	non-LIQ CLAY	1	0.96	NA	5.96	non-LIQ	non-LIQ	0.934	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-6.7	115.0	115.0	19.4	0.8	4.2	55	6	6	5.00	1.20	12	1.632	1.111	1.632	1.111	2.94	non-LIQ CLAY	1	0.95	NA	6.15	non-LIQ	non-LIQ	0.934	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-6.8	115.0	115.0	19.9	0.9	4.7	56	6	6	5.00	1.20	12	1.641	1.116	1.641	1.116	2.97	non-LIQ CLAY	1	0.95	NA	6.39	non-LIQ	non-LIQ	0.933	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-7.0	115.0	115.0	20.2	1.0	4.8	56	6	6	5.00	1.20	12	1.651	1.120	1.651	1.120	2.97	non-LIQ CLAY	1	0.94	NA	6.41	non-LIQ	non-LIQ	0.933	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-7.2	115.0	115.0	18.0	0.9	5.2	61	6	6	5.00	1.20	12	1.660	1.124	1.660	1.124	3.04	non-LIQ CLAY	1	0.94	NA	7.23	non-LIQ	non-LIQ	0.933	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-7.3	115.0	115.0	17.6	0.9	4.9	61	6	6	5.00	1.20	12	1.670	1.129	1.670	1.129	3.03	non-LIQ CLAY	1	0.94	NA	7.14	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-7.5	115.0	115.0	16.8	0.9	5.1	63	6	5	5.00	1.20	11	1.679	1.133	1.679	1.133	3.06	non-LIQ CLAY	1	0.93	NA	7.46	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-7.7	115.0	115.0	17.1	0.8	4.8	61	6	5	5.00	1.20	12	1.688	1.137	1.688	1.137	3.04	non-LIQ CLAY	1	0.93	NA	7.21	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-7.8	115.0	115.0	15.7	0.8	4.8	64	5	5	5.00	1.20	11	1.698	1.142	1.698	1.142	3.08	non-LIQ CLAY	1	0.93	NA	7.63	non-LIQ	non-LIQ	0.931	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-8.0	115.0	115.0	14.0	0.6	4.6	67	5	5	5.00	1.20	11	1.707	1.146	1.707	1.146	3.11	non-LIQ CLAY	1	0.92	NA	8.11	non-LIQ	non-LIQ	0.931	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-8.2	115.0	115.0	13.8	0.6	4.2	65	5	5	5.00	1.20	10	1.717	1.150	1.717	1.150	3.10	non-LIQ CLAY	1	0.92	NA	7.92	non-LIQ	non-LIQ	0.930	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-8.3	115.0	115.0	13.7	0.5	3.9	64	5	4	5.00	1.20	10	1.726	1.155	1.726	1.155	3.08	non-LIQ CLAY	1	0.92	NA	7.71	non-LIQ	non-LIQ	0.930	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-8.5	115.0	115.0	13.4	0.5	3.6	64	4	4	5.00	1.20	10	1.735	1.159	1.735	1.159	3.08	non-LIQ CLAY	1	0.91	NA	7.67	non-LIQ	non-LIQ	0.928	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-8.7	115.0	115.0	14.0	0.5	3.5	62	5	4	5.00	1.20	10	1.745	1.163	1.745	1.163	3.05	non-LIQ CLAY	1	0.91	NA	7.32	non-LIQ	non-LIQ	0.927	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-8.8	115.0	115.0	13.9	0.6	4.0	65	5	4	5.00	1.20	10	1.754	1.167	1.754	1.167	3.09	non-LIQ CLAY	1	0.91	NA	7.80	non-LIQ	non-LIQ	0.926	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-9.0	115.0	115.0	14.7	0.5	3.3	60	5	5	5.00	1.20	10	1.764	1.172	1.764	1.172	3.02	non-LIQ CLAY	1	0.90	NA	6.94	non-LIQ	non-LIQ	0.924	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-9.1	115.0	115.0	15.3	0.5	3.0	57	5	5	5.00	1.20	10	1.773	1.176	1.773	1.176	2.98	non-LIQ CLAY	1	0.90	NA	6.51	non-LIQ	non-LIQ	0.923	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-9.3	115.0	115.0	15.1	0.5	3.5	60	5	5	5.00	1.20	11	1.783	1.180	1.783	1.180	3.03	non-LIQ CLAY	1	0.90	NA	7.04	non-LIQ	non-LIQ	0.922	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.17	-9.5	115.0	115.0	16.7	0.6	3.9	59.3	5.4	5.1	5.0	1.2	11.0	1.79	1.18	1.79	1.18	3.01	non-LIQ CLAY	1	0.89	NA	6.87	non-LIQ	non-LIQ	0.920	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.33	-9.6	115.0	115.0	20.9	1.7	8.2	68.3	7.3	6.9	5.0	1.2	13.0	1.80	1.19	1.80	1.19	3.14	non-LIQ CLAY	1	0.89	NA	8.41	non-LIQ	non-LIQ	0.919	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.50	-9.8	115.0	115.0	43.7	2.5	5.7	44.4	12.2	11.5	5.0	1.2	19.0	1.81	1.19	1.81	1.19	2.77	non-LIQ CLAY	1	0.89	NA	4.56	non-LIQ	non-LIQ	0.918	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.66	-10.0	115.0	115.0	63.5	2.6	4.2	32.2	15.7	14.8	4.8	1.2	22.0	1.82	1.20	1.82	1.20	2.53	SAND	0.5	0.94	56	2.95	166	non-LIQ	0.916	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.82	-10.1	115.0	115.0	41.7	1.7	4.0	39.6	11.1	10.5	5.0	1.2	18.0	1.83	1.20	1.83	1.20	2.66	non-LIQ CLAY	1	0.88	NA	3.89	non-LIQ	non-LIQ	0.915	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.99	-10.3	115.0	115.0	21.8	1.0	4.6	55.8	6.8	6.4	5.0	1.2	13.0	1.84	1.21	1.84	1.21	2.96	non-LIQ CLAY	1	0.88	NA	6.31	non-LIQ	non-LIQ	0.914	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.15	-10.5	115.0	115.0	21.7	0.8	3.8	52.4	6.6	6.1	5.0	1.2	12.0	1.85	1.21	1.85	1.21	2.91	non-LIQ CLAY	1	0.87	NA	5.76	non-LIQ	non-LIQ	0.912	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.32	-10.6	115.0	115.0	21.9	1.0	4.4	55.3	6.8	6.3	5.0	1.2	13.0	1.86	1.22	1.86	1.22	2.95	non-LIQ CLAY	1	0.87	NA	6.22	non-LIQ	non-LIQ	0.911	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.48	-10.8	115.0	115.0	22.5	1.0	4.6	55.4	7.0	6.5	5.0	1.2	13.0	1.87	1.22	1.87	1.22	2.95	non-LIQ CLAY	1	0.87	NA	6.24	non-LIQ	non-LIQ	0.910	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.64	-10.9	115.0	115.0	22.6	1.1	4.7	55.5	7.0	6.5	5.0	1.2	13.0	1.88	1.22	1.88	1.22	2.96	non-LIQ CLAY	1	0.86	NA	6.26	non-LIQ	non-LIQ	0.908	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.81	-11.1	115.0	115.0	21.4	1.0	4.7	57.2	6.7	6.3	5.0	1.2	13.0	1.89	1.23	1.89	1.23	2.98	non-LIQ CLAY	1	0.86	NA	6.53	non-LIQ	non-LIQ	0.907	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.97	-11.3	115.0	115.0	21.6	1.0	4.5	56.3	6.8	6.3	5.0	1.2	13.0	1.90	1.23	1.90	1.23	2.97	non-LIQ CLAY	1	0.86	NA	6.39	non-LIQ	non-LIQ	0.906	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-11.4	115.0	115.0	21.1	1.0	4.5	57.1	6.6	6.1	5.0	1.2	12.0	1.91	1.24	1.91	1.24	2.98	non-LIQ CLAY	1	0.86	NA	6.52	non-LIQ	non-LIQ	0.904	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-11.6	115.0	115.0	20.0	0.9	4.5	58.5	6.4	5.9	5.0	1.2	12.0	1.91	1.24	1.91	1.24	3.00	non-LIQ CLAY	1	0.85	NA	6.75	non-LIQ	non-LIQ	0.903	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-11.8	115.0	115.0	19.7	0.9	4.6	59.2	6.4	5.9	5.0	1.2	12.0	1.92	1.25	1.92	1.25	3.01	non-LIQ CLAY	1	0.85	NA	6.87	non-LIQ	non-LIQ	0.902	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-11.9	115.0	115.0	20.6	1.0	4.9	59.5	6.7	6.1	5.0	1.2	12.0	1.93	1.25	1.93	1.25	3.01	non-LIQ CLAY	1	0.85	NA	6.90	non-LIQ	non-LIQ	0.900	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-12.1	115.0	115.0	20.4	1.1	5.5	62.1	6.8	6.2	5.0	1.2	12.0	1.94	1.25	1.94	1.25	3.05	non-LIQ CLAY	1	0.84	NA	7.35	non-LIQ	non-LIQ	0.899	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-12.3	115.0	115.0	19.9	1.0	5.0	60.8	6.5	6.0	5.0	1.2	12.0	1.95	1.26	1.95	1.26	3.03	non-LIQ CLAY	1	0.84	NA	7.13	non-LIQ	non-LIQ	0.898	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-12.4	115.0	115.0	19.8	1.0	4.9	60.8	6.5	5.9	5.0	1.2	12.0	1.96	1.26	1.96	1.26	3.03	non-LIQ CLAY	1	0.84	NA	7.13	non-LIQ	non-LIQ	0.896	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-12.6	115.0	115.0	20.3	0.9	4.7	59.2	6.5	6.0	5.0	1.2	12.0	1.97	1.27	1.97	1.27	3.01	non-LIQ CLAY	1	0.84	NA	6.87	non-LIQ	non-LIQ	0.895	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-12.8	115.0	115.0	19.4	1.0	5.3	63.0	6.5	5.9	5.0	1.2	12.0	1.98	1.27	1.98	1.27	3.07	non-LIQ CLAY	1	0.83	NA	7.50	non-LIQ	non-LIQ	0.894	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-12.9	115.0	115.0	20.2	1.1	5.4	62.5	6.7	6.1	5.0	1.2	12.0	1.99	1.28	1.99	1.28	3.06	non-LIQ CLAY	1	0.83	NA	7.42	non-LIQ	non-LIQ	0.892	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-13.1	115.0	115.0	20.5	1.2	5.6	63.0	6.8	6.2	5.0	1.2	12.0	2.00	1.28	2.00	1.28	3.07	non-LIQ CLAY	1	0.83	NA	7.51	non-LIQ	non-LIQ	0.891	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-13.2	115.0	115.0	21.2	1.1	5.3	61.2	6.9	6.3	5.0	1.2	13.0	2.01	1.28	2.01	1.28	3.04	non-LIQ CLAY	1	0.82	NA	7.19	non-LIQ	non-LIQ	0.890	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-13.4	115.0	115.0	21.2	1.1	5.2	60.7	6.9	6.3	5.0	1.2	13.0	2.02	1.29	2.02	1.29	3.03	non-LIQ CLAY	1	0.82	NA	7.11	non-LIQ	non-LIQ	0.888	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-13.6	115.0	115.0	21.0	1.1	5.1	60.7	6.9	6.2	5.0	1.2	12.0	2.03	1.29	2.03	1.29	3.03	non-LIQ CLAY	1	0.82	NA	7.12	non-LIQ	non-LIQ	0.887	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-13.7	115.0	115.0	21.2	1.1	5.1	60.5	6.9	6.2	5.0	1.2	12.0	2.04	1.30	2.04	1.30	3.03	non-LIQ CLAY	1	0.82	NA	7.07	non-LIQ	non-LIQ	0.886	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-13.9	115.0	115.0	20.4	1.0	4.9	60.7	6.6	6.0	5.0	1.2	12.0	2.05	1.30	2.05	1.30	3.03	non-LIQ CLAY	1	0.81	NA	7.12	non-LIQ	non-LIQ	0.884	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-14.1	115.0	115.0	21.0	1.0	4.6	59.2	6.7	6.1	5.0	1.2	12.0	2.06	1.31	2.06	1.31	3.01	non-LIQ CLAY	1	0.81	NA	6.85	non-LIQ	non-LIQ	0.883	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-14.2	115.0	115.0	21.8	1.1	4.9	59.2	7.0	6.3	5.0	1.2	13.0	2.07	1.31	2.07	1.31	3.01	non-LIQ CLAY	1	0.81	NA	6.86	non-LIQ	non-LIQ	0.882	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-14.4	115.0	115.0	21.7	1.1	5.0	59.7	7.0	6.3	5.0	1.2	13.0	2.08	1.31	2.08	1.31	3.02	non-LIQ CLAY	1	0.81	NA	6.95	non-LIQ	non-LIQ	0.880	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-14.6	115.0	115.0	21.3	1.0	4.8	59.8	6.9	6.2	5.0	1.2	12.0	2.08	1.32	2.08	1.32	3.02	non-LIQ CLAY	1	0.80	NA	6.96	non-LIQ	non-LIQ	0.879	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-14.7	115.0	115.0	20.9	1.0	4.7	59.8	6.8	6.0	5.0	1.2	12.0	2.09	1.32	2.09	1.32	3.02	non-LIQ CLAY	1	0.80	NA	6.96	non-LIQ	non-LIQ	0.878	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-14.9	115.0	115.0	19.7	0.9	4.6	61.1	6.4	5.8	5.0	1.2	12.0	2.10	1.33	2.10	1.33	3.04	non-LIQ CLAY	1	0.80	NA	7.19	non-LIQ	non-LIQ	0.876	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-15.1	115.0	115.0	18.9	0.8	4.5	62.0	6.2	5.6	5.0	1.2	12.0	2.11	1.33	2.11	1.33	3.05	non-LIQ CLAY	1	0.79	NA	7.33	non-LIQ	non-LIQ	0.875	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-15.2	115.0	115.0	20.3	1.0	4.8	61.4	6.7	5.9	5.0	1.2	12.0	2.12	1.34	2.12	1.34	3.04	non-LIQ CLAY	1	0.79	NA	7.22	non-LIQ	non-LIQ	0.874	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-15.4	115.0	115.0	23.9	0.7	3.1	49.5	7.0	6.2	5.0	1.2	12.0	2.13	1.34	2.13	1.34	2.86	non-LIQ CLAY	1	0.79	NA	5.31	non-LIQ	non-LIQ	0.872	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.24	-15.5	115.0	115.0	19.9	0.6	3.2	54.6	6.1	5.5	5.0	1.2	12.0	2.14	1.34	2.14	1.34	2.94	non-LIQ CLAY	1	0.79	NA	6.12	non-LIQ	non-LIQ	0.871	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
37.40	-15.7	115.0	115.0	18.7	0.7	3.8	59.4	6.0	5.3	5.0	1.2	11.0	2.15	1.35	2.15	1.35	3.01	non-LIQ CLAY	1	0.78	NA	6.90	non-LIQ	non-LIQ	0.870	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.57	-15.9	115.0	115.0	18.2	0.7	4.1	62.1	6.0	5.3	5.0	1.2	11.0	2.16	1.35	2.16	1.35	3.05	non-LIQ CLAY	1	0.78	NA	7.36	non-LIQ	non-LIQ	0.868	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.73	-16.0	115.0	115.0	17.8	0.7	4.2	63.2	5.9	5.2	5.0	1.2	11.0	2.17	1.36	2.17	1.36	3.07	non-LIQ CLAY	1	0.78	NA	7.54	non-LIQ	non-LIQ	0.867	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.89	-16.2	115.0	115.0	17.9	0.7	4.1	62.9	5.9	5.2	5.0	1.2	11.0	2.18	1.36	2.18	1.36	3.06	non-LIQ CLAY	1	0.78	NA	7.49	non-LIQ	non-LIQ	0.866	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-16.4	115.0	115.0	17.2	0.8	4.4	65.4	5.9	5.2	5.0	1.2	11.0	2.19	1.37	2.19	1.37	3.10	non-LIQ CLAY	1	0.77	NA	7.91	non-LIQ	non-LIQ	0.864	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-16.5	115.0	115.0	17.5	0.7	3.9	62.8	5.8	5.1	5.0	1.2	11.0	2.20	1.37	2.20	1.37	3.06	non-LIQ CLAY	1	0.77	NA	7.46	non-LIQ	non-LIQ	0.863	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-16.7	115.0	115.0	17.8	0.7	3.9	62.3	5.9	5.2	5.0	1.2	11.0	2.21	1.37	2.21	1.37	3.06	non-LIQ CLAY	1	0.77	NA	7.38	non-LIQ	non-LIQ	0.862	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-16.9	115.0	115.0	18.0	0.7	4.0	62.5	6.0	5.2	5.0	1.2	11.0	2.22	1.38	2.22	1.38	3.06	non-LIQ CLAY	1	0.77	NA	7.41	non-LIQ	non-LIQ	0.860	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-17.0	115.0	115.0	18.1	0.7	4.1	62.7	6.0	5.3	5.0	1.2	11.0	2.23	1.38	2.23	1.38	3.06	non-LIQ CLAY	1	0.77	NA	7.44	non-LIQ	non-LIQ	0.859	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-17.2	115.0	115.0	19.3	0.8	4.0	60.4	6.3	5.5	5.0	1.2	12.0	2.24	1.39	2.24	1.39	3.03	non-LIQ CLAY	1	0.76	NA	7.06	non-LIQ	non-LIQ	0.858	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-17.3	115.0	115.0	20.5	0.8	4.1	59.5	6.6	5.8	5.0	1.2	12.0	2.24	1.39	2.24	1.39	3.02	non-LIQ CLAY	1	0.76	NA	6.91	non-LIQ	non-LIQ	0.856	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.21	-17.5	115.0	115.0	21.0	0.9	4.3	59.6	6.8	5.9	5.0	1.2	12.0	2.25	1.40	2.25	1.40	3.02	non-LIQ CLAY	1	0.76	NA	6.93	non-LIQ	non-LIQ	0.855	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-17.7	115.0	115.0	22.1	0.9	4.1	57.3	7.0	6.1	5.0	1.2	12.0	2.26	1.40	2.26	1.40	2.98	non-LIQ CLAY	1	0.76	NA	6.54	non-LIQ	non-LIQ	0.854	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.53	-17.8	115.0	115.0	22.1	0.9	3.9	56.5	6.9	6.0	5.0	1.2	12.0	2.27	1.40	2.27	1.40	2.97	non-LIQ CLAY	1	0.75	NA	6.42	non-LIQ	non-LIQ	0.852	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-18.0	115.0	115.0	21.5	0.8	3.7	56.4	6.7	5.8	5.0	1.2	12.0	2.28	1.41	2.28	1.41	2.97	non-LIQ CLAY	1	0.75	NA	6.40	non-LIQ	non-LIQ	0.851	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-18.2	115.0	115.0	21.2	0.7	3.5	56.1	6.6	5.7	5.0	1.2	12.0	2.29	1.41	2.29	1.41	2.96	non-LIQ CLAY	1	0.75	NA	6.35	non-LIQ	non-LIQ	0.850	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-18.3	115.0	115.0	21.1	0.8	3.6	57.0	6.7	5.7	5.0	1.2	12.0	2.30	1.42	2.30	1.42	2.98	non-LIQ CLAY	1	0.75	NA	6.50	non-LIQ	non-LIQ	0.848	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-18.5	115.0	115.0	21.3	0.7	3.4	55.8	6.6	5.7	5.0	1.2	12.0	2.31	1.42	2.31	1.42	2.96	non-LIQ CLAY	1	0.74	NA	6.30	non-LIQ	non-LIQ	0.847	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-18.7	115.0	115.0	21.8	0.8	3.6	55.8	6.8	5.9	5.0	1.2	12.0	2.32	1.43	2.32	1.43	2.96	non-LIQ CLAY	1	0.74	NA	6.31	non-LIQ	non-LIQ	0.846	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-18.8	115.0	115.0	22.6	0.7	3.3	53.7	6.9	5.9	5.0	1.2	12.0	2.33	1.43	2.33	1.43	2.93	non-LIQ CLAY	1	0.74	NA	5.96	non-LIQ	non-LIQ	0.844	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.68	-19.0	115.0	115.0	23.5	0.8	3.5	53.7	7.2	6.2	5.0	1.2	12.0	2.34	1.43	2.34	1.43	2.93	non-LIQ CLAY	1	0.74	NA	5.96	non-LIQ	non-LIQ	0.843	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.85	-19.2	115.0	115.0	26.9	1.0	3.6	50.9	8.0	6.9	5.0	1.2	13.0	2.35	1.44	2.35	1.44	2.88	non-LIQ CLAY	1	0.74	NA	5.53	non-LIQ	non-LIQ	0.842	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-19.3	115.0	115.0	17.7	1.1	6.1	73.0	6.5	5.5	5.0	1.2	12.0	2.36	1.44	2.36	1.44	3.20	non-LIQ CLAY	1	0.73	NA	9.25	non-LIQ	non-LIQ	0.840	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-19.5	115.0	115.0	24.3	0.9	3.7	54.0	7.5	6.4	5.0	1.2	13.0	2.37	1.45	2.37	1.45	2.93	non-LIQ CLAY	1	0.73	NA	6.01	non-LIQ	non-LIQ	0.839	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.34	-19.6	115.0	115.0	21.6	0.9	4.3	60.3	7.0	6.0	5.0	1.2	12.0	2.38	1.45	2.38	1.45	3.03	non-LIQ CLAY	1	0.73	NA	7.04	non-LIQ	non-LIQ	0.838	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-19.8	115.0	115.0	23.8	1.0	4.1	56.5	7.5	6.4	5.0	1.2	13.0	2.39	1.46	2.39	1.46	2.97	non-LIQ CLAY	1	0.73	NA	6.42	non-LIQ	non-LIQ	0.836	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-20.0	115.0	115.0	25.5	1.1	4.3	55.8	7.9	6.8	5.0	1.2	13.0	2.40	1.46	2.40	1.46	2.96	non-LIQ CLAY	1	0.72	NA	6.30	non-LIQ	non-LIQ	0.835	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-20.1	115.0	115.0	28.1	1.2	4.2	53.0	8.5	7.2	5.0	1.2	14.0	2.41	1.47	2.41	1.47	2.92	non-LIQ CLAY	1	0.72	NA	5.85	non-LIQ	non-LIQ	0.834	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-20.3	115.0	115.0	29.0	1.2	4.1	52.0	8.7	7.4	5.0	1.2	14.0	2.41	1.47	2.41	1.47	2.90	non-LIQ CLAY	1	0.72	NA	5.70	non-LIQ	non-LIQ	0.832	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-20.5	115.0	115.0	28.3	1.3	4.5	54.3	8.7	7.4	5.0	1.2	14.0	2.42	1.47	2.42	1.47	2.94	non-LIQ CLAY	1	0.72	NA	6.07	non-LIQ	non-LIQ	0.831	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.32	-20.6	115.0	115.0	28.6	1.3	4.6	54.5	8.6	7.5	5.0	1.2	14.0	2.43	1.48	2.43	1.48	2.94	non-LIQ CLAY	1	0.72	NA	6.09	non-LIQ	non-LIQ	0.830	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.49	-20.8	115.0	115.0	27.9	1.4	4.8	56.0	8.7	7.4	5.0	1.2	14.0	2.44	1.48	2.44	1.48	2.96	non-LIQ CLAY	1	0.71	NA	6.34	non-LIQ	non-LIQ	0.828	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-21.0	115.0	115.0	26.8	1.3	4.9	57.6	8.5	7.2	5.0	1.2	14.0	2.45	1.49	2.45	1.49	2.99	non-LIQ CLAY	1	0.71	NA	6.59	non-LIQ	non-LIQ	0.827	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-21.1	115.0	115.0	25.6	1.2	4.7	57.8	8.1	6.8	5.0	1.2	13.0	2.46	1.49	2.46	1.49	2.99	non-LIQ CLAY	1	0.71	NA	6.63	non-LIQ	non-LIQ	0.826	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-21.3	115.0	115.0	23.6	1.1	4.9	60.7	7.7	6.5	5.0	1.2	13.0	2.47	1.50	2.47	1.50	3.03	non-LIQ CLAY	1	0.71	NA	7.11	non-LIQ	non-LIQ	0.824	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.14	-21.4	115.0	115.0	23.2	1.1	4.8	61.2	7.6	6.4	5.0	1.2	13.0	2.48	1.50	2.48	1.50	3.04	non-LIQ CLAY	1	0.71	NA	7.19	non-LIQ	non-LIQ	0.823	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-21.6	115.0	115.0	22.9	1.1	4.8	61.6	7.5	6.3	5.0	1.2	13.0	2.49	1.50	2.49	1.50	3.05	non-LIQ CLAY	1	0.70	NA	7.26	non-LIQ	non-LIQ	0.822	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-21.8	115.0	115.0	23.3	1.1	4.6	60.4	7.6	6.3	5.0	1.2	13.0	2.50	1.51	2.50	1.51	3.03	non-LIQ CLAY	1	0.70	NA	7.06	non-LIQ	non-LIQ	0.820	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-21.9	115.0	115.0	23.9	1.1	4.4	58.9	7.7	6.4	5.0	1.2	13.0	2.51	1.51	2.51	1.51	3.01	non-LIQ CLAY	1	0.70	NA	6.81	non-LIQ	non-LIQ	0.819	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-22.1	115.0	115.0	24.2	1.1	4.5	59.1	7.8	6.5	5.0	1.2	13.0	2.52	1.52	2.52	1.52	3.01	non-LIQ CLAY	1	0.70	NA	6.85	non-LIQ	non-LIQ	0.818	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-22.3	115.0	115.0	24.9	1.2	5.0	60.2	8.1	6.7	5.0	1.2	13.0	2.53	1.52	2.53	1.52	3.03	non-LIQ CLAY	1	0.70	NA	7.03	non-LIQ	non-LIQ	0.816	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.13	-22.4	115.0	115.0	25.9	1.2	4.5	57.3	8.2	6.8	5.0	1.2	13.0	2.54	1.53	2.54	1.53	2.98	non-LIQ CLAY	1	0.69	NA	6.55	non-LIQ	non-LIQ	0.815	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.29	-22.6	115.0	115.0	23.9	1.1	4.5	59.4	7.7	6.4	5.0	1.2	13.0	2.55	1.53	2.55	1.53	3.01	non-LIQ CLAY	1	0.69	NA	6.90	non-LIQ	non-LIQ	0.814	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.46	-22.8	115.0	115.0	23.5	1.0	4.4	59.9	7.6	6.3	5.0	1.2	13.0	2.56	1.53	2.56	1.53	3.02	non-LIQ CLAY	1	0.69	NA	6.98	non-LIQ	non-LIQ	0.812	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.62	-22.9	115.0	115.0	22.2	1.0	4.5	62.1	7.3	6.1	5.0	1.2	12.0	2.57	1.54	2.57	1.54	3.05	non-LIQ CLAY	1	0.69	NA	7.35	non-LIQ	non-LIQ	0.811	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.78	-23.1	115.0	115.0	20.9	0.9	4.3	62.9	6.9	5.8	5.0	1.2	12.0	2.57	1.54	2.57	1.54	3.06	non-LIQ CLAY	1	0.69	NA	7.49	non-LIQ	non-LIQ	0.810	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.95	-23.3	115.0	115.0	21.3	0.9	4.1	61.5	7.0	5.8	5.0	1.2	12.0	2.58	1.55	2.58	1.55	3.04	non-LIQ CLAY	1	0.68	NA	7.24	non-LIQ	non-LIQ	0.808	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-23.4	115.0	115.0	24.2	0.9	3.7	56.1	7.6	6.3	5.0	1.2	13.0	2.59	1.55	2.59	1.55	2.96	non-LIQ CLAY	1	0.68	NA	6.35	non-LIQ	non-LIQ	0.807	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-23.6	115.0	115.0	26.6	1.0	3.6	53.2	8.1	6.7	5.0	1.2	13.0	2.60	1.56	2.60	1.56	2.92	non-LIQ CLAY	1	0.68	NA	5.89	non-LIQ	non-LIQ	0.806	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-23.7	115.0	115.0	27.1	0.9	3.3	51.6	8.1	6.7	5.0	1.2	13.0	2.61	1.56	2.61	1.56	2.89	non-LIQ CLAY	1	0.68	NA	5.63	non-LIQ	non-LIQ	0.804	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-23.9	115.0	115.0	27.7	0.9	3.3	50.8	8.2	6.8	5.0	1.2	13.0	2.62	1.56	2.62	1.56	2.88	non-LIQ CLAY	1	0.68	NA	5.51	non-LIQ	non-LIQ	0.803	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-24.1	115.0	115.0	30.1	0.9	3.1	47.9	8.7	7.2	5.0	1.2	14.0	2.63	1.57	2.63	1.57	2.83	non-LIQ CLAY	1	0.67	NA	5.06	non-LIQ	non-LIQ	0.802	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-24.2	115.0	115.0	33.5	1.0	3.0	44.9	9.4	7.7	5.0	1.2	14.0	2.64	1.57	2.64	1.57	2.78	non-LIQ CLAY	1	0.67	NA	4.63	non-LIQ	non-LIQ	0.800	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-24.4	115.0	115.0	31.9	1.1	3.3	47.7	9.2	7.5	5.0	1.2	14.0	2.65	1.58	2.65	1.58	2.83	non-LIQ CLAY	1	0.67	NA	5.04	non-LIQ	non-LIQ	0.799	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-24.6	115.0	115.0	29.9	1.1	3.5	50.5	8.9	7.2	5.0	1.2	14.0	2.66	1.58	2.66	1.58	2.88	non-LIQ CLAY	1	0.67	NA	5.46	non-LIQ	non-LIQ	0.798	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-24.7	115.0	115.0	29.9	1.2	3.9	52.0	9.0	7.4	5.0	1.2	14.0	2.67	1.59	2.67	1.59	2.90	non-LIQ CLAY	1	0.67	NA	5.71	non-LIQ	non-LIQ	0.796	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-24.9	115.0	115.0	32.8	1.4	4.3	51.6	9.8	8.0	5.0	1.2	15.0	2.68	1.59	2.68	1.59	2.89	non-LIQ CLAY	1	0.67	NA	5.64	non-LIQ	non-LIQ	0.795	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-25.1	115.0	115.0	33.9	1.6	4.6	52.1	10.2	8.3	5.0	1.2	15.0	2.69	1.59	2.69	1.59	2.90	non-LIQ CLAY	1	0.66	NA	5.71	non-LIQ	non-LIQ	0.794	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-25.2	115.0	115.0	31.0	1.5	4.7	54.8	9.6	7.8	5.0	1.2	14.0	2.70	1.60	2.70	1.60	2.94	non-LIQ CLAY	1	0.66	NA	6.14	non-LIQ	non-LIQ	0.792	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-25.4	115.0	115.0	32.1	1.5	4.8	54.3	9.9	8.0	5.0	1.2	15.0	2.71	1.60	2.71	1.60	2.94	non-LIQ CLAY	1	0.66	NA	6.07	non-LIQ	non-LIQ	0.791	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-25.5	115.0	115.0	32.0	1.4	4.3	52.6	9.7	7.8	5.0	1.2	14.0	2.72	1.61	2.72	1.61	2.91	non-LIQ CLAY	1	0.66	NA	5.79	non-LIQ	non-LIQ	0.790	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.41	-25.7	115.0	115.0	28.3	1.2	4.3	55.9	8.8	7.2	5.0	1.2	14.0	2.73	1.61	2.73	1.61	2.96	non-LIQ CLAY	1	0.66	NA	6.32	non-LIQ	non-LIQ	0.788	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-25.9	115.0	115.0	25.1	1.0	3.8	56.8	7.9	6.4	5.0	1.2	13.0	2.74	1.62	2.74	1.62	2.97	non-LIQ CLAY	1	0.65	NA	6.47	non-LIQ	non-LIQ	0.787	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-26.0	115.0	115.0	23.9	0.9	3.8	58.1	7.6	6.1	5.0	1.2	12.0	2.75	1.62	2.75	1.62	2.99	non-LIQ CLAY	1	0.65	NA	6.69	non-LIQ	non-LIQ	0.785	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-26.2	115.0	115.0	23.0	0.9	3.9	59.9	7.5	6.0	5.0	1.2	12.0	2.75	1.62	2.75	1.62	3.02	non-LIQ CLAY	1	0.65	NA	6.96	non-LIQ	non-LIQ	0.784	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-26.4	115.0	115.0	23.8	0.9	3.9	58.9	7.6	6.1	5.0	1.2	12.0	2.76	1.63	2.76	1.63	3.01	non-LIQ CLAY	1	0.65	NA	6.82	non-LIQ	non-LIQ	0.783	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-26.5	115.0	115.0	24.3	1.0	3.9	58.6	7.8	6.3	5.0	1.2	13.0	2.77	1.63	2.77	1.63	3.00	non-LIQ CLAY	1	0.65	NA	6.77	non-LIQ	non-LIQ	0.781	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-26.7	115.0	115.0	25.5	1.0	3.9	57.2	8.1	6.5	5.0	1.2	13.0	2.78	1.64	2.78	1.64	2.98	non-LIQ CLAY	1	0.65	NA	6.54	non-LIQ	non-LIQ	0.780	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-26.9	115.0	115.0	28.3	1.2	4.3	56.2	8.9	7.1	5.0	1.2	14.0	2.79	1.64	2.79	1.64	2.97	non-LIQ CLAY	1	0.64	NA	6.37	non-LIQ	non-LIQ	0.779	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.72	-27.0	115.0	115.0	32.6	1.4	4.4	53.0	9.9	7.9	5.0	1.2	15.0	2.80	1.65	2.80	1.65	2.92	non-LIQ CLAY	1	0.64	NA	5.66	non-LIQ	non-LIQ	0.778	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-27.2	115.0	115.0	32.9	1.2	3.7	50.1	9.7	7.8	5.0	1.2	14.0	2.81	1.65	2.81	1.65	2.87	non-LIQ CLAY	1	0.64	NA	5.41	non-LIQ	non-LIQ	0.776	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-27.4	115.0	115.0	27.9	1.0	3.6	53.4	8.5	6.8	5.0	1.2	13.0	2.82	1.66	2.82	1.66	2.92	non-LIQ CLAY	1	0.64	NA	5.92	non-LIQ	non-LIQ	0.775	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-27.5	115.0	115.0	24.6	0.8	3.4	55.9	7.7	6.1	5.0	1.2	12.0	2.83	1.66	2.83	1.66	2.96	non-LIQ CLAY	1	0.64	NA	6.31	non-LIQ	non-LIQ	0.774	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-27.7	115.0	115.0	24.2	0.8	3.5	57.0	7.6	6.1	5.0	1.2	12.0	2.84	1.66	2.84	1.66	2.98	non-LIQ CLAY	1	0.64	NA	6.50	non-LIQ	non-LIQ	0.772	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-27.8	115.0	115.0	26.5	1.0	3.8	56.1	8.3	6.6	5.0	1.2	13.0	2.85	1.67	2.85	1.67	2.96	non-LIQ CLAY	1	0.63	NA	6.35	non-LIQ	non-LIQ	0.771	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.70	-28.0	115.0	115.0	34.7	1.2	3.4	47.7	10.0	8.0	5.0	1.2	15.0	2.86	1.67	2.86	1.67	2.83	non-LIQ CLAY	1	0.63	NA	5.04	non-LIQ	non-LIQ	0.770	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.87	-28.2	115.0	115.0	29.3	0.8	2.9	49.1	8.6	6.8	5.0	1.2	13.0	2.87	1.68	2.87	1.68	2.85	non-LIQ CLAY	1	0.63	NA	5.26	non-LIQ	non-LIQ	0.768	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.03	-28.3	115.0	115.0	24.6	0.9	3.9	56.8	7.9	6.3	5.0	1.2	13.0	2.88	1.68	2.88	1.68	3.00	non-LIQ CLAY	1	0.63	NA	6.79	non-LIQ	non-LIQ	0.767	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.20	-28.5	115.0	115.0	27.9	1.7	6.1	64.0	9.4	7.4	5.0	1.2	14.0	2.89	1.69	2.89	1.69	3.08	non-LIQ CLAY	1	0.63	NA	7.68	non-LIQ	non-LIQ	0.765	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-013
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
California

Computed by: SP
Checked by:

Date: 03/30/12
Date:

Figure No.:

Reference:

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2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60} ,* ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data* , Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 19.8 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 14.8 ft MSL
Water Level at Investigation = 10 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	0.107
Post-liquefaction Settlement (in)	0.460
Total Settlement (in)	**0.567**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ_{MOIST}	γ_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.16	19.6	115.0	115.0	5.9	0.0	0.0	8	1	11	0.31	1.01	12	0.009	0.009	0.009	0.009	1.80	SAND	0.5	1.70	9.4	1.10	10.4	0.06	1.000	0.46	0.430	Above Water	0.12	135601	79.1	0.84	1.55	0.059	NA	NA	0.000
0.33	19.5	115.0	115.0	14.5	0.3	2.4	18	3	23	3.21	1.07	27	0.019	0.019	0.019	0.019	2.17	SAND	0.5	1.70	23.3	1.59	37.0	0.08	0.999	0.46	0.430	Above Water	0.12	87827	142.8	0.15	0.12	0.005	NA	NA	0.000
0.49	19.3	115.0	115.0	21.9	0.8	3.4	20	5	29	3.60	1.08	35	0.028	0.028	0.028	0.028	2.23	SAND	0.5	1.70	35.1	1.73	60.9	0.10	0.999	0.46	0.430	Above Water	0.12	69281	188.4	0.10	0.06	0.002	NA	NA	0.000
0.66	19.1	115.0	115.0	22.6	1.2	5.4	27	5	28	4.49	1.13	36	0.038	0.038	0.038	0.038	2.42	SAND	0.5	1.70	36.3	2.38	86.4	0.14	0.998	0.46	0.430	Above Water	0.12	57944	216.3	0.10	0.07	0.003	NA	NA	0.000
0.82	19.0	115.0	115.0	20.7	1.3	6.4	32	5	24	4.82	1.17	33	0.047	0.047	0.047	0.047	2.53	SAND	0.5	1.70	33.3	2.90	96.6	0.16	0.998	0.46	0.430	Above Water	0.13	50868	229.7	0.14	0.10	0.004	NA	NA	0.000
0.98	18.8	115.0	115.0	19.8	1.1	5.7	32	5	21	4.81	1.17	29	0.056	0.056	0.056	0.056	2.52	SAND	0.5	1.70	31.7	2.88	91.5	0.15	0.998	0.46	0.430	Above Water	0.13	45709	239.9	0.18	0.16	0.006	NA	NA	0.000
1.15	18.7	115.0	115.0	17.8	0.9	5.1	32	4	18	4.84	1.17	26	0.066	0.066	0.066	0.066	2.53	SAND	0.5	1.70	28.6	2.94	84.1	0.14	0.997	0.46	0.430	Above Water	0.13	41526	244.9	0.25	0.28	0.011	NA	NA	0.000
1.31	18.5	115.0	115.0	16.7	0.7	4.4	32	4	15	4.82	1.17	23	0.075	0.075	0.075	0.075	2.53	SAND	0.5	1.70	26.8	2.91	78.0	0.12	0.997	0.46	0.430	Above Water	0.13	38404	250.0	0.33	0.43	0.016	NA	NA	0.000
1.48	18.3	115.0	115.0	14.7	0.9	6.0	33	4	13	4.86	1.18	20	0.085	0.085	0.085	0.085	2.54	SILT	0.7	1.70	23.6	2.99	70.4	0.11	0.997	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.64	18.2	115.0	115.0	13.8	1.1	7.7	38	4	12	5.00	1.20	20	0.094	0.094	0.094	0.094	2.66	SILT	0.7	1.70	22.1	3.72	82.1	0.13	0.996	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.80	18.0	115.0	115.0	13.8	1.2	8.7	42	4	12	5.00	1.20	19	0.104	0.104	0.104	0.104	2.72	SILT	0.7	1.70	22.1	4.16	92.1	0.15	0.996	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.97	17.8	115.0	115.0	14.3	1.2	8.4	41	4	12	5.00	1.20	19	0.113	0.113	0.113	0.113	2.72	SILT	0.7	1.70	23.0	4.11	94.7	0.16	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.13	17.7	115.0	115.0	14.9	1.2	8.3	41	4	12	5.00	1.20	19	0.122	0.122	0.122	0.122	2.72	SILT	0.7	1.70	24.0	4.12	98.8	0.17	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.30	17.5	115.0	115.0	15.4	1.3	8.3	42	4	12	5.00	1.20	19	0.132	0.132	0.132	0.132	2.72	SILT	0.7	1.70	24.7	4.16	102.9	0.18	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.46	17.3	115.0	115.0	15.6	1.3	8.1	42	4	12	5.00	1.20	19	0.141	0.141	0.141	0.141	2.72	SILT	0.7	1.70	25.0	4.17	104.3	0.19	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.62	17.2	115.0	115.0	16.6	1.3	7.6	40	4	12	5.00	1.20	19	0.151	0.151	0.151	0.151	2.70	SILT	0.7	1.70	26.6	3.98	106.0	0.19	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.79	17.0	115.0	115.0	17.2	1.2	7.1	39	5	12	5.00	1.20	19	0.160	0.160	0.160	0.160	2.68	SILT	0.7	1.70	27.7	3.83	106.0	0.19	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.95	16.9	115.0	115.0	17.6	1.2	7.0	39	5	12	5.00	1.20	19	0.170	0.170	0.170	0.170	2.68	SILT	0.7	1.70	28.2	3.84	108.3	0.20	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.12	16.7	115.0	115.0	17.8	1.3	7.1	40	5	12	5.00	1.20	19	0.179	0.179	0.179	0.179	2.69	SILT	0.7	1.70	28.6	3.91	111.6	0.21	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.28	16.5	115.0	115.0	18.1	1.2	6.7	39	5	11	5.00	1.20	19	0.189	0.189	0.189	0.189	2.68	SILT	0.7	1.70	29.1	3.82	111.3	0.21	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.44	16.4	115.0	115.0	19.3	1.2	6.1	37	5	12	5.00	1.20	19	0.198	0.198	0.198	0.198	2.64	SILT	0.7	1.70	30.9	3.55	109.9	0.20	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.61	16.2	115.0	115.0	20.8	1.2	5.9	36	5	12	5.00	1.20	20	0.208	0.208	0.208	0.208	2.61	SILT	0.7	1.70	33.5	3.39	113.5	0.22	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.77	16.0	115.0	115.0	21.7	1.3	5.8	36	6	12	5.00	1.20	20	0.217	0.217	0.217	0.217	2.60	SILT	0.7	1.70	34.9	3.35	117.2	0.23	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.94	15.9	115.0	115.0	22.4	1.5	6.7	38	6	13	5.00	1.20	20	0.227	0.227	0.227	0.227	2.65	SILT	0.7	1.70	36.0	3.66	131.5	0.29	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.10	15.7	115.0	115.0	23.5	1.7	7.3	39	6	13	5.00	1.20	21	0.236	0.236	0.236	0.236	2.67	SILT	0.7	1.70	37.7	3.81	143.5	0.35	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.27	15.5	115.0	115.0	23.8	1.8	7.5	40	6	13	5.00	1.20	21	0.246	0.246	0.246	0.246	2.69	SILT	0.7	1.70	38.3	3.92	149.9	0.39	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.43	15.4	115.0	115.0	23.4	1.7	7.1	39	6	13	5.00	1.20	20	0.255	0.255	0.255	0.255	2.68	SILT	0.7	1.70	37.6	3.85	145.0	0.36	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.59	15.2	115.0	115.0	22.7	1.5	6.8	40	6	12	5.00	1.20	20	0.264	0.264	0.264	0.264	2.68	SILT	0.7	1.70	36.5	3.87	141.3	0.34	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.76	15.0	115.0	115.0	24.5	1.5	6.3	37	6	13	5.00	1.20	20	0.274	0.274	0.274	0.274	2.64	SILT	0.7	1.70	39.4	3.59	141.6	0.34	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.92	14.9	115.0	115.0	26.5	1.6	6.2	36	7	13	5.00	1.20	21	0.283	0.283	0.283	0.283	2.62	SILT	0.7	1.70	42.6	3.45	146.9	0.37	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.09	14.7	115.0	115.0	28.3	1.7	5.9	35	7	14	4.97	1.20	21	0.293	0.293	0.293	0.290	2.59	SILT	0.7	1.70	45.5	3.27	149.0	0.39	0.988	0.46	0.430	0.90	NA	NA	NA	NA	NA	0.000	17	1.765	0.036
5.25	14.6	115.0	115.0	29.1	1.6	5.6	34	7	14	4.93	1.19	21	0.302	0.302	0.302	0.297	2.57	SILT	0.7	1.70	46.8	3.16	148.0	0.38	0.988	0.46	0.430	0.89	NA	NA	NA	NA	NA	0.000	17	1.765	0.034
5.41	14.4	115.0	115.0	29.9	1.6	5.2	33	7	14	4.88	1.18	21	0.311	0.311	0.311	0.306	2.55	SILT	0.7	1.70	48.0	3.03	145.2	0.36	0.987	0.46	0.430	0.85	NA	NA	NA	NA	NA	0.000	17	1.765	0.034
5.58	14.2	115.0	115.0	29.1	1.4	5.0	33	7	13	4.87	1.18	20	0.321	0.321	0.321	0.316	2.55	SILT	0.7	1.70	46.7	3.02	141.0	0.34	0.987	0.46	0.430	0.79	NA	NA	NA	NA	NA	0.000	16	1.859	0.038
5.74	14.1	115.0	115.0	27.0	1.3	5.0	34	7	12	4.94	1.19	19	0.330	0.330	0.330	0.325	2.58	SILT	0.7	1.70	43.4	3.18	137.8	0.32	0.987	0.46	0.430	0.75	NA	NA	NA	NA	NA	0.000	15	1.926	0.037
5.91	13.9	115.0	115.0	24.9	1.2	5.0	36	6	11	5.00	1.20	19	0.340	0.340	0.340	0.335	2.61	non-LIQ CLAY	1	1.70	NA	3.37	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.07	13.7	115.0	115.0	24.7	1.2	5.0	36	6	11	5.00	1.20	18	0.349	0.349	0.349	0.344	2.62	non-LIQ CLAY	1	1.70	NA	3.43	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.23	13.6	115.0	115.0	24.0	1.3	5.3	38	6	11	5.00	1.20	18	0.358	0.358	0.358	0.353	2.65	non-LIQ CLAY	1	1.70	NA	3.63	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.40	13.4	115.0	115.0	22.4	1.1	5.1	38	6	10	5.00	1.20	17	0.368	0.368	0.368	0.363	2.66	non-LIQ CLAY	1	1.70	NA	3.73	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.56	13.2	115.0	115.0	21.0	1.0	4.7	39	6	9	5.00	1.20	16	0.377	0.377	0.377	0.372	2.67	non-LIQ CLAY	1	1.70	NA	3.75	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.73	13.1	115.0	115.0	21.1	0.9	4.5	38	6	9	5.00	1.20	16	0.387	0.387	0.387	0.382	2.65	non-LIQ CLAY	1	1.70	NA	3.66	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.89	12.9	115.0	115.0	21.3	0.9	4.3	38	6	9	5.00	1.20	16	0.396	0.396	0.396	0.391	2.64	non-LIQ CLAY	1	1.70	NA	3.60	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	12.8	115.0	115.0	21.3	0.8	3.8	36	5	9	5.00	1.20	16	0.405	0.405	0.405	0.400	2.61	non-LIQ CLAY	1	1.70	NA	3.41	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.22	12.6	115.0	115.0	20.2	0.7	3.6	36	5	8	5.00	1.20	15	0.415	0.415	0.415	0.410	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.38	12.4	115.0	115.0	20.5	0.7	3.2	40	5	9	5.00	1.20	15	0.424	0.424	0.424	0.419	2.69	non-LIQ CLAY	1	1.70	NA	3.92	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.55	12.3	115.0	115.0	21.5	0.6	2.7	39	6	9	5.00	1.20	16	0.434	0.434	0.434	0.429	2.68	non-LIQ CLAY	1	1.70	NA	3.85	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.71	12.1	115.0	115.0	20.5	0.6	2.9	38	5	8	5.00	1.20	15	0.443	0.443	0.443	0.438	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	11.9	115.0	115.0	18.6	0.6	3.0	36	5	7	5.00	1.20	14	0.453	0.453	0.453	0.448	2.61	non-LIQ CLAY	1	1.70	NA	3.41	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.04	11.8	115.0	115.0	15.7	0.6	3.6	38	4	6	5.00	1.20	12	0.462	0.462	0.462	0.457	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	11.6	115.0	115.0	13.7	0.4	3.2	39	4	5	5.00	1.20	12	0.472	0.472	0.472	0.467	2.67	non-LIQ CLAY	1	1.70	NA	3.76	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	11.4	115.0	115.0	12.8	0.6	4.7	47	4	5	5.00	1.20	12	0.481	0.481	0.481	0.476	2.81	non-LIQ CLAY	1	1.70	NA	4.86	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-21

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							σ_v (tsf)	σ_v' (tsf)	σ_v (tsf)	σ_v' (tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1n})_{cs}$								(tsf)	(%)	(%)	(in)		(%)	(in)
8.53	11.3	115.0	115.0	26.9	1.1	4.1	35	7	10	5.00	1.20	17	0.490	0.490	0.490	0.485	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.69	11.1	115.0	115.0	45.4	1.2	2.7	25	10	15	4.28	1.11	21	0.500	0.500	0.500	0.495	2.36	SAND	0.5	1.46	62.4	2.16	135.1	0.31	0.980	0.46	0.430	0.72	NA	NA	NA	NA	NA	0.000	17	1.765	0.034
8.86	10.9	115.0	115.0	59.9	1.3	2.2	19	13	19	3.51	1.08	23	0.509	0.509	0.509	0.504	2.21	SAND	0.5	1.44	81.6	1.70	138.7	0.33	0.979	0.46	0.430	0.76	NA	NA	NA	NA	NA	0.000	21	1.467	0.030
9.02	10.8	115.0	115.0	62.1	1.3	2.1	19	13	19	3.37	1.07	24	0.519	0.519	0.519	0.514	2.19	SAND	0.5	1.43	83.8	1.64	137.8	0.32	0.979	0.46	0.430	0.75	NA	NA	NA	NA	NA	0.000	21	1.467	0.029
9.19	10.6	115.0	115.0	37.4	1.5	4.0	33	9	13	4.87	1.18	20	0.528	0.528	0.528	0.523	2.55	SAND	0.5	1.42	50.0	3.02	151.1	0.40	0.979	0.46	0.430	0.93	NA	NA	NA	NA	NA	0.000	16	1.859	0.038
9.35	10.5	115.0	115.0	62.7	3.2	5.1	30	15	21	4.69	1.15	29	0.538	0.538	0.538	0.533	2.48	SAND	0.5	1.40	83.1	2.66	220.9	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	10.3	115.0	115.0	102.3	4.8	4.7	23	23	32	4.10	1.10	39	0.547	0.547	0.547	0.542	2.32	SAND	0.5	1.39	134.5	2.02	272.1	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	10.1	115.0	115.0	185.2	5.1	2.8	13	36	50	1.75	1.03	53	0.557	0.557	0.557	0.551	1.99	SAND	0.5	1.38	241.4	1.28	309.5	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	10.0	115.0	115.0	168.6	4.4	2.6	13	33	45	1.77	1.03	49	0.566	0.565	0.566	0.561	1.99	SAND	0.5	1.37	218.1	1.29	280.4	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	9.8	115.0	115.0	147.0	4.4	3.0	15	30	41	2.49	1.05	45	0.576	0.569	0.576	0.569	2.07	SAND	0.5	1.36	189.5	1.41	266.4	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	9.6	115.0	115.0	138.8	4.7	3.4	17	29	39	3.00	1.06	45	0.585	0.573	0.585	0.573	2.14	SAND	0.5	1.36	178.2	1.53	272.0	non-LIQ	0.976	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	9.5	115.0	115.0	122.9	3.4	2.8	16	25	34	2.70	1.05	38	0.594	0.577	0.594	0.577	2.10	SAND	0.5	1.35	157.2	1.45	228.0	non-LIQ	0.976	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	9.3	115.0	115.0	155.8	1.9	1.2	7	28	38	0.14	1.01	38	0.604	0.582	0.604	0.582	1.75	SAND	0.5	1.35	198.5	1.07	212.9	non-LIQ	0.976	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	9.1	115.0	115.0	114.8	1.7	1.4	10	22	29	1.03	1.02	31	0.613	0.586	0.613	0.586	1.90	SAND	0.5	1.34	145.8	1.19	173.8	non-LIQ	0.975	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	9.0	115.0	115.0	44.6	1.2	2.6	26	10	14	4.35	1.12	20	0.623	0.591	0.623	0.591	2.38	SAND	0.5	1.34	56.4	2.23	125.9	0.27	0.975	0.47	0.440	0.60	NA	NA	NA	NA	NA	0.000	16	1.861	0.038
10.99	8.8	115.0	115.0	22.9	0.9	3.9	37	6	8	5.00	1.20	15	0.632	0.595	0.632	0.595	2.63	non-LIQ CLAY	1	1.70	NA	3.49	non-LIQ	non-LIQ	0.974	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	8.7	115.0	115.0	15.1	0.5	3.4	42	4	6	5.00	1.20	12	0.641	0.599	0.641	0.599	2.73	non-LIQ CLAY	1	1.70	NA	4.25	non-LIQ	non-LIQ	0.974	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	8.5	115.0	115.0	15.2	0.5	3.5	43	4	6	5.00	1.20	12	0.651	0.603	0.651	0.603	2.74	non-LIQ CLAY	1	1.70	NA	4.32	non-LIQ	non-LIQ	0.974	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.48	8.3	115.0	115.0	15.4	0.6	3.6	43	4	6	5.00	1.20	12	0.660	0.608	0.660	0.608	2.75	non-LIQ CLAY	1	1.70	NA	4.37	non-LIQ	non-LIQ	0.973	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	8.2	115.0	115.0	14.3	0.5	3.7	45	4	5	5.00	1.20	11	0.670	0.612	0.670	0.612	2.79	non-LIQ CLAY	1	1.70	NA	4.68	non-LIQ	non-LIQ	0.973	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	8.0	115.0	115.0	13.5	0.5	3.7	47	4	5	5.00	1.20	11	0.679	0.616	0.679	0.616	2.81	non-LIQ CLAY	1	1.70	NA	4.88	non-LIQ	non-LIQ	0.972	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	7.8	115.0	115.0	14.1	0.5	3.7	46	4	5	5.00	1.20	11	0.689	0.621	0.689	0.621	2.80	non-LIQ CLAY	1	1.70	NA	4.75	non-LIQ	non-LIQ	0.972	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	7.7	115.0	115.0	14.3	0.5	3.8	46	4	5	5.00	1.20	11	0.698	0.625	0.698	0.625	2.80	non-LIQ CLAY	1	1.69	NA	4.81	non-LIQ	non-LIQ	0.972	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	7.5	115.0	115.0	14.3	0.6	4.2	48	4	5	5.00	1.20	11	0.707	0.629	0.707	0.629	2.83	non-LIQ CLAY	1	1.68	NA	5.07	non-LIQ	non-LIQ	0.971	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	7.3	115.0	115.0	14.7	0.6	3.8	46	4	5	5.00	1.20	11	0.717	0.634	0.717	0.634	2.80	non-LIQ CLAY	1	1.67	NA	4.77	non-LIQ	non-LIQ	0.971	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	7.2	115.0	115.0	15.0	0.5	3.7	45	4	5	5.00	1.20	12	0.726	0.638	0.726	0.638	2.79	non-LIQ CLAY	1	1.66	NA	4.66	non-LIQ	non-LIQ	0.971	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.80	7.0	115.0	115.0	15.1	0.6	3.7	45	4	5	5.00	1.20	12	0.736	0.642	0.736	0.642	2.79	non-LIQ CLAY	1	1.65	NA	4.69	non-LIQ	non-LIQ	0.970	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	6.8	115.0	115.0	15.4	0.6	3.7	45	4	6	5.00	1.20	12	0.745	0.647	0.745	0.647	2.78	non-LIQ CLAY	1	1.64	NA	4.63	non-LIQ	non-LIQ	0.970	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.12	6.7	115.0	115.0	14.7	0.5	3.7	46	4	5	5.00	1.20	11	0.754	0.651	0.754	0.651	2.80	non-LIQ CLAY	1	1.63	NA	4.81	non-LIQ	non-LIQ	0.969	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	6.5	115.0	115.0	14.8	0.5	3.5	45	4	5	5.00	1.20	11	0.764	0.655	0.764	0.655	2.79	non-LIQ CLAY	1	1.61	NA	4.69	non-LIQ	non-LIQ	0.969	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	6.4	115.0	115.0	14.9	0.5	3.5	45	4	5	5.00	1.20	11	0.773	0.659	0.773	0.659	2.79	non-LIQ CLAY	1	1.60	NA	4.66	non-LIQ	non-LIQ	0.969	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	6.2	115.0	115.0	15.5	0.6	3.6	45	4	6	5.00	1.20	12	0.783	0.664	0.783	0.664	2.78	non-LIQ CLAY	1	1.59	NA	4.65	non-LIQ	non-LIQ	0.968	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	6.0	115.0	115.0	15.9	0.6	3.7	45	4	6	5.00	1.20	12	0.792	0.668	0.792	0.668	2.78	non-LIQ CLAY	1	1.58	NA	4.65	non-LIQ	non-LIQ	0.968	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	5.9	115.0	115.0	15.3	0.6	4.1	48	4	6	5.00	1.20	12	0.802	0.672	0.802	0.672	2.83	non-LIQ CLAY	1	1.57	NA	5.02	non-LIQ	non-LIQ	0.967	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.11	5.7	115.0	115.0	14.4	0.6	4.1	49	4	5	5.00	1.20	11	0.811	0.677	0.811	0.677	2.86	non-LIQ CLAY	1	1.56	NA	5.29	non-LIQ	non-LIQ	0.967	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	5.5	115.0	115.0	14.5	0.6	4.1	49	4	5	5.00	1.20	11	0.821	0.681	0.821	0.681	2.66	non-LIQ CLAY	1	1.55	NA	5.29	non-LIQ	non-LIQ	0.967	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	5.4	115.0	115.0	14.7	0.6	4.3	50	4	5	5.00	1.20	11	0.830	0.686	0.830	0.686	2.87	non-LIQ CLAY	1	1.54	NA	5.38	non-LIQ	non-LIQ	0.966	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	5.2	115.0	115.0	14.9	0.7	4.6	51	4	5	5.00	1.20	12	0.839	0.690	0.839	0.690	2.88	non-LIQ CLAY	1	1.53	NA	5.52	non-LIQ	non-LIQ	0.966	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	5.0	115.0	115.0	15.2	0.7	4.4	50	4	6	5.00	1.20	12	0.849	0.694	0.849	0.694	2.86	non-LIQ CLAY	1	1.52	NA	5.33	non-LIQ	non-LIQ	0.966	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	4.9	115.0	115.0	14.7	0.6	4.0	49	4	5	5.00	1.20	11	0.858	0.698	0.858	0.698	2.86	non-LIQ CLAY	1	1.51	NA	5.27	non-LIQ	non-LIQ	0.965	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.09	4.7	115.0	115.0	14.2	0.5	3.8	49	4	5	5.00	1.20	11	0.868	0.703	0.868	0.703	2.85	non-LIQ CLAY	1	1.51	NA	5.27	non-LIQ	non-LIQ	0.965	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.26	4.5	115.0	115.0	14.1	0.5	3.4	48	4	5	5.00	1.20	11	0.877	0.707	0.877	0.707	2.83	non-LIQ CLAY	1	1.50	NA	5.04	non-LIQ	non-LIQ	0.964	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.42	4.4	115.0	115.0	13.8	0.5	3.4	48	4	5	5.00	1.20	11	0.887	0.711	0.887	0.711	2.84	non-LIQ CLAY	1	1.49	NA	5.13	non-LIQ	non-LIQ	0.964	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	4.2	115.0	115.0	13.4	0.4	3.2	48	4	5	5.00	1.20	11	0.896	0.716	0.896	0.716	2.84	non-LIQ CLAY	1	1.48	NA	5.12	non-LIQ	non-LIQ	0.964	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.75	4.1	115.0	115.0	14.7	0.5	3.1	45	4	5	5.00	1.20	11	0.906	0.720	0.906	0.720	2.79	non-LIQ CLAY	1	1.47	NA	4.70	non-LIQ	non-LIQ	0.963	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	3.9	115.0	115.0	16.1	0.5	3.2	44	4	5	5.00	1.20	12	0.915	0.724	0.915	0.724	2.77	non-LIQ CLAY	1	1.46	NA	4.54	non-LIQ	non-LIQ	0.963	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	3.7	115.0	115.0	17.5	0.5	2.9	41	5	6	5.00	1.20	12	0.925	0.729	0.925	0.729	2.72	non-LIQ CLAY	1	1.45	NA	4.12	non-LIQ	non-LIQ	0.963	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	3.6	115.0	115.0	16.9	0.5	3.1	43	5	6	5.00	1.20	12	0.934	0.733	0.934	0.733	2.75	non-LIQ CLAY	1	1.44	NA	4.35	non-LIQ	non-LIQ	0.962	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	3.4	115.0	115.0	18.1	0.5	2.7	40	5	6	5.00	1.20	12	0.943	0.737	0.943	0.737	2.69	non-LIQ CLAY	1	1.44	NA	3.91	non-LIQ	non-LIQ	0.962	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	3.2	115.0	115.0	20.0	0.5	2.7	38	5	6	5.00	1.20	13	0.953	0.742	0.953	0.742	2.65	non-LIQ CLAY	1	1.43	NA	3.68	non-LIQ	non-LIQ	0.961	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	3.1	115.0	115.0	21.9	0.6	2.6	36	6	7	5.00	1.20	13	0.962	0.746	0.962	0.746	2.61	non-LIQ CLAY	1	1.42	NA	3.42	non-LIQ	non-LIQ	0.961	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	2.9	115.0	115.0	22.7	0.6	2.8	36	6	7	5.00	1.20	13	0.972	0.750	0.972	0.750	2.62	non-LIQ CLAY	1	1.41	NA	3.45	non-LIQ	non-LIQ	0.961	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	2.7	115.0	115.0	21.7	0.6	2.8	37	6	7	5.00	1.20	13	0.981	0.754	0.981	0.754	2.64	non-LIQ CLAY	1	1.40	NA	3.57	non-LIQ	non-LIQ	0.960	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	2.6	115.0	115.0	20.0	0.6	2.8	39	5	6	5.00	1.20	13	0.990	0.759	0.990	0.759	2.67	non-LIQ CLAY	1	1.39	NA	3.78	non-LIQ	non-LIQ	0.960	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	2.4	115.0	115.0	17.6	0.5	2.9	42	5	6	5.00	1.20	12	1.000	0.763	1.000	0.763	2.73	non-LIQ CLAY	1	1.39	NA	4.21	non-LIQ	non-LIQ	0.959	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	2.3	115.0	115.0	15.4	0.5	3.3	47	4	5	5.00	1.20	11	1.009	0.767	1.009	0.767	2.82	non-LIQ CLAY	1	1.38	NA	4.94	non-LIQ	non-LIQ	0.959	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	2.1	115.0	115.0	13.5	0.5	3.7	52	4	5	5.00	1.20	11	1.019	0.772	1.019	0.772	2.91	non-LIQ CLAY	1	1.37	NA	5.75	non-LIQ	non-LIQ	0.959	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	1.9	115.0	115.0	13.7	0.6	4.3	55	4	5	5.00	1.20	11	1.028	0.776	1.028	0.776	2.94	non-LIQ CLAY	1	1.36	NA	6.13	non-LIQ	non-LIQ	0.958	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	1.8	115.0	115.0	17.1	0.7	3.9	48	5	6	5.00	1.20	12	1.037	0.780	1.037	0.780	2.83	non-LIQ CLAY	1	1.36	NA	5.08	non-LIQ	non-LIQ	0.958	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	1.6	115.0	115.0	15.8	0.6	4.1	51	5	5	5.00	1.20	12	1.047	0.785	1.047	0.785	2.88	non-LIQ CLAY	1	1.35	NA	5.49	non-LIQ	non-LIQ	0.958	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	1.4	115.0	115.0	12.2	0.6	4.7	60	4	5	5.00	1.20	10	1.056	0.789	1.056	0.789	3.02	non-LIQ CLAY	1	1.34	NA	6.95	non-LIQ	non-LIQ	0.957	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	1.3	115.0	115.0	10.4	0.5	4.6	64	3	4	5.00	1.20	10	1.066	0.793	1.066	0.793	3.08	non-LIQ CLAY	1	1.33	NA	7.64	non-LIQ	non-LIQ	0.957	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	1.1	115.0	115.0	9.9	0.4	3.9	63	3	4	5.00	1.20	10	1.075	0.798	1.075	0.798	3.06	non-LIQ CLAY	1	1.33	NA	7.42	non-LIQ	non-LIQ	0.956	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	0.9	115.0	115.0	9.6	0.4	4.0	64	3	4	5.00	1.20	9	1.084	0.802	1.084	0.802	3.08	non-LIQ CLAY	1	1.32	NA	7.66	non-LIQ	non-LIQ	0.956	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.03	0.8	115.0	115.0	8.8	0.3	3.7	65	3	3	5.00	1.20	9	1.094	0.806	1.094	0.806	3.10	non-LIQ CLAY	1	1.31	NA	7.90	non-LIQ	non-LIQ	0.956	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	0.6	115.0	115.0	8.5	0.3	3.5	66	3	3	5.00	1.20	9	1.103	0.810	1.103	0.810	3.10	non-LIQ CLAY	1	1.31	NA	7.94	non-LIQ	non-LIQ	0.955	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	0.4	115.0	115.0	8.5	0.3	3.3	65	3	3	5.00	1.20	9	1.113	0.815	1.113	0.815	3.09	non-LIQ CLAY	1	1.30	NA	7.82	non-LIQ	non-LIQ	0.955	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	0.3	115.0	115.0	8.4	0.3	3.3	65	3	3	5.00	1.20	9	1.122	0.819	1.122	0.819	3.10	non-LIQ CLAY	1	1.29	NA	7.90	non-LIQ	non-LIQ	0.954	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	0.1	115.0	115.0	8.2	0.3	3.4	67	3	3	5.00	1.20	9	1.132	0.824	1.132	0.824	3.12	non-LIQ CLAY	1	1.28	NA	8.21	non-LIQ	non-LIQ	0.954	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	-0.1	115.0	115.0	8.2	0.3	3.4	67	3	3	5.00	1.20	9	1.141	0.828	1.141	0.828	3.12	non-LIQ CLAY	1	1.28	NA	8.20	non-LIQ	non-LIQ	0.954	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	-0.2	115.0	115.0	7.9	0.3	3.5	69	3	3	5.00	1.20	9	1.151	0.832	1.151	0.832	3.15	non-LIQ CLAY	1	1.27	NA	8.52	non-LIQ	non-LIQ	0.953	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	-0.4	115.0	115.0	7.6	0.3	3.5	71	3	3	5.00	1.20	9	1.160	0.836	1.160	0.836	3.17	non-LIQ CLAY	1	1.26	NA	8.88	non-LIQ	non-LIQ	0.953	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	-0.5	115.0	115.0	7.5	0.3	3.7	73	3	3	5.00	1.20	9	1.170	0.841	1.170	0.841	3.20	non-LIQ CLAY	1	1.26	NA	9.20	non-LIQ	non-LIQ	0.953	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	-0.7	115.0	115.0	8.0	0.3	3.6	70	3	3	5.00	1.20	9	1.179	0.845	1.179	0.845	3.16	non-LIQ CLAY	1	1.25	NA	8.71	non-LIQ	non-LIQ	0.952	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	-0.9	115.0	115.0	8.6	0.3	4.0	70	3	3	5.00	1.20	9	1.189	0.849	1.189	0.849	3.16	non-LIQ CLAY	1	1.25	NA	8.66	non-LIQ	non-LIQ	0.952	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	-1.0	115.0	115.0	9.9	0.5	5.3	71	4	4	5.00	1.20	10	1.198	0.854	1.198	0.854	3.17	non-LIQ CLAY	1	1.24	NA	8.86	non-LIQ	non-LIQ	0.951	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	-1.2	115.0	115.0	15.8	0.9	6.0	60	5	6	5.00	1.20	12	1.208	0.858	1.208	0.858	3.02	non-LIQ CLAY	1	1.23	NA	7.00	non-LIQ	non-LIQ	0.951	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	-1.4	115.0	115.0	19.4	1.6	8.2	62	6	7	5.00	1.20	13	1.217	0.862	1.217	0.862	3.05	non-LIQ CLAY	1	1.23	NA	7.29	non-LIQ	non-LIQ	0.951	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	-1.5	115.0	115.0	28.5	2.0	6.8	50	8	9	5.00	1.20	16	1.226	0.867	1.226	0.867	2.86	non-LIQ CLAY	1	1.22	NA	5.34	non-LIQ	non-LIQ	0.950	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	-1.7	115.0	115.0	27.9	1.6	5.6	47	8	9	5.00	1.20	16	1.236	0.871	1.236	0.871	2.81	non-LIQ CLAY	1	1.21	NA	4.86	non-LIQ	non-LIQ	0.950	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	-1.9	115.0	115.0	19.4	1.1	5.6	54	6	7	5.00	1.20	13	1.245	0.875	1.245	0.875	2.93	non-LIQ CLAY	1	1.21	NA	6.04	non-LIQ	non-LIQ	0.950	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	-2.0	115.0	115.0	15.5	0.7	4.7	57	5	5	5.00	1.20	11	1.255	0.880	1.255	0.880	2.97	non-LIQ CLAY	1	1.20	NA	6.43	non-LIQ	non-LIQ	0.949	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	-2.2	115.0	115.0	14.8	0.6	4.2	56	5	5	5.00	1.20	11	1.264	0.884	1.264	0.884	2.96	non-LIQ CLAY	1	1.20	NA	6.31	non-LIQ	non-LIQ	0.949	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	-2.4	115.0	115.0	15.5	0.6	3.8	53	5	5	5.00	1.20	11	1.274	0.888	1.274	0.888	2.92	non-LIQ CLAY	1	1.19	NA	5.89	non-LIQ	non-LIQ	0.948	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	-2.5	115.0	115.0	17.9	0.7	3.7	49	5	6	5.00	1.20	12	1.283	0.893	1.283	0.893	2.86	non-LIQ CLAY	1	1.19	NA	5.31	non-LIQ	non-LIQ	0.948	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	-2.7	115.0	115.0	20.4	0.8	3.7	47	6	6	5.00	1.20	13	1.292	0.897	1.292	0.897	2.81	non-LIQ CLAY	1	1.18	NA	4.89	non-LIQ	non-LIQ	0.948	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-22

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
22.64	-2.8	115.0	115.0	23.4	0.9	3.7	44	7	7	5.00	1.20	13	1.302	0.901	1.302	0.901	2.76	non-LIQ CLAY	1	1.17	NA	4.46	non-LIQ	non-LIQ	0.947	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	-3.0	115.0	115.0	24.8	1.0	3.9	43	7	7	5.00	1.20	14	1.311	0.905	1.311	0.905	2.75	non-LIQ CLAY	1	1.17	NA	4.41	non-LIQ	non-LIQ	0.947	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	-3.2	115.0	115.0	26.4	1.2	4.5	45	7	8	5.00	1.20	15	1.321	0.910	1.321	0.910	2.78	non-LIQ CLAY	1	1.16	NA	4.60	non-LIQ	non-LIQ	0.946	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	-3.3	115.0	115.0	29.4	1.5	5.0	44	8	9	5.00	1.20	16	1.330	0.914	1.330	0.914	2.77	non-LIQ CLAY	1	1.16	NA	4.56	non-LIQ	non-LIQ	0.946	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.29	-3.5	115.0	115.0	33.4	1.6	4.7	41	9	10	5.00	1.20	17	1.339	0.918	1.339	0.918	2.71	non-LIQ CLAY	1	1.15	NA	4.09	non-LIQ	non-LIQ	0.946	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	-3.7	115.0	115.0	32.0	1.8	5.5	45	9	10	5.00	1.20	17	1.349	0.923	1.349	0.923	2.78	non-LIQ CLAY	1	1.15	NA	4.59	non-LIQ	non-LIQ	0.945	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	-3.8	115.0	115.0	36.5	2.0	5.6	43	10	11	5.00	1.20	18	1.358	0.927	1.358	0.927	2.74	non-LIQ CLAY	1	1.14	NA	4.30	non-LIQ	non-LIQ	0.945	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	-4.0	115.0	115.0	42.9	2.2	5.1	38	11	12	5.00	1.20	19	1.368	0.931	1.368	0.931	2.66	non-LIQ CLAY	1	1.14	NA	3.72	non-LIQ	non-LIQ	0.945	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	-4.2	115.0	115.0	36.3	2.3	6.3	45	10	11	5.00	1.20	18	1.377	0.936	1.377	0.936	2.78	non-LIQ CLAY	1	1.13	NA	4.66	non-LIQ	non-LIQ	0.944	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	-4.3	115.0	115.0	39.2	2.4	6.1	43	11	12	5.00	1.20	19	1.386	0.940	1.386	0.940	2.75	non-LIQ CLAY	1	1.13	NA	4.38	non-LIQ	non-LIQ	0.944	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	-4.5	115.0	115.0	37.9	2.6	6.9	46	11	11	5.00	1.20	19	1.396	0.944	1.396	0.944	2.80	non-LIQ CLAY	1	1.12	NA	4.80	non-LIQ	non-LIQ	0.943	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	-4.6	115.0	115.0	38.1	2.5	6.6	45	11	11	5.00	1.20	19	1.405	0.949	1.405	0.949	2.79	non-LIQ CLAY	1	1.12	NA	4.66	non-LIQ	non-LIQ	0.943	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.61	-4.8	115.0	115.0	38.2	2.3	5.9	43	11	11	5.00	1.20	18	1.415	0.953	1.415	0.953	2.75	non-LIQ CLAY	1	1.11	NA	4.41	non-LIQ	non-LIQ	0.943	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	-5.0	115.0	115.0	38.1	2.4	6.2	44	11	11	5.00	1.20	18	1.424	0.957	1.424	0.957	2.77	non-LIQ CLAY	1	1.11	NA	4.55	non-LIQ	non-LIQ	0.942	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	-5.1	115.0	115.0	40.8	2.4	5.9	42	11	12	5.00	1.20	19	1.433	0.961	1.433	0.961	2.73	non-LIQ CLAY	1	1.10	NA	4.24	non-LIQ	non-LIQ	0.942	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	-5.3	115.0	115.0	35.3	2.4	6.9	48	10	11	5.00	1.20	18	1.443	0.966	1.443	0.966	2.83	non-LIQ CLAY	1	1.10	NA	5.04	non-LIQ	non-LIQ	0.941	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	-5.5	115.0	115.0	55.1	3.4	6.3	39	15	15	5.00	1.20	23	1.452	0.970	1.452	0.970	2.66	non-LIQ CLAY	1	1.09	NA	3.74	non-LIQ	non-LIQ	0.941	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	-5.6	115.0	115.0	75.1	3.9	5.2	32	19	19	4.82	1.17	27	1.462	0.975	1.462	0.975	2.53	SAND	0.5	1.04	73.9	2.91	215.1	non-LIQ	0.941	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	-5.8	115.0	115.0	84.2	5.1	6.0	33	21	22	4.86	1.18	30	1.471	0.979	1.471	0.979	2.54	SAND	0.5	1.04	82.7	2.99	247.7	non-LIQ	0.940	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	-6.0	115.0	115.0	104.1	5.1	4.9	27	24	25	4.48	1.13	33	1.481	0.983	1.481	0.983	2.42	SAND	0.5	1.04	102.1	2.38	242.6	non-LIQ	0.940	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	-6.1	115.0	115.0	66.7	4.7	7.0	38	18	18	5.00	1.20	27	1.490	0.987	1.490	0.987	2.65	non-LIQ CLAY	1	1.07	NA	3.67	non-LIQ	non-LIQ	0.940	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	-6.3	115.0	115.0	68.5	4.4	6.4	36	18	18	5.00	1.20	27	1.500	0.992	1.500	0.992	2.61	non-LIQ CLAY	1	1.07	NA	3.41	non-LIQ	non-LIQ	0.939	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	-6.5	115.0	115.0	66.2	4.3	6.5	37	17	18	5.00	1.20	26	1.509	0.996	1.509	0.996	2.63	non-LIQ CLAY	1	1.06	NA	3.51	non-LIQ	non-LIQ	0.939	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	-6.6	115.0	115.0	56.2	3.7	6.6	40	15	15	5.00	1.20	24	1.519	1.000	1.519	1.000	2.69	non-LIQ CLAY	1	1.06	NA	3.90	non-LIQ	non-LIQ	0.938	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	-6.8	115.0	115.0	40.1	2.2	5.6	42	11	11	5.00	1.20	19	1.528	1.005	1.528	1.005	2.74	non-LIQ CLAY	1	1.05	NA	4.26	non-LIQ	non-LIQ	0.938	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	-6.9	115.0	115.0	27.6	1.2	4.2	45	8	8	5.00	1.20	15	1.538	1.009	1.538	1.009	2.78	non-LIQ CLAY	1	1.05	NA	4.61	non-LIQ	non-LIQ	0.938	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	-7.1	115.0	115.0	23.3	0.8	3.5	46	7	7	5.00	1.20	13	1.547	1.013	1.547	1.013	2.79	non-LIQ CLAY	1	1.04	NA	4.71	non-LIQ	non-LIQ	0.937	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-7.3	115.0	115.0	23.0	0.8	3.3	45	6	7	5.00	1.20	13	1.557	1.018	1.557	1.018	2.78	non-LIQ CLAY	1	1.04	NA	4.66	non-LIQ	non-LIQ	0.937	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-7.4	115.0	115.0	23.0	0.8	3.3	45	6	7	5.00	1.20	13	1.566	1.022	1.566	1.022	2.79	non-LIQ CLAY	1	1.04	NA	4.67	non-LIQ	non-LIQ	0.937	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-7.6	115.0	115.0	23.9	0.9	3.6	46	7	7	5.00	1.20	13	1.576	1.026	1.576	1.026	2.79	non-LIQ CLAY	1	1.03	NA	4.72	non-LIQ	non-LIQ	0.936	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-7.8	115.0	115.0	25.5	1.0	3.7	45	7	7	5.00	1.20	14	1.585	1.031	1.585	1.031	2.78	non-LIQ CLAY	1	1.03	NA	4.63	non-LIQ	non-LIQ	0.936	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-7.9	115.0	115.0	26.2	1.1	4.2	47	7	8	5.00	1.20	14	1.594	1.035	1.594	1.035	2.81	non-LIQ CLAY	1	1.02	NA	4.88	non-LIQ	non-LIQ	0.935	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-8.1	115.0	115.0	26.2	1.2	4.6	48	8	8	5.00	1.20	14	1.604	1.039	1.604	1.039	2.83	non-LIQ CLAY	1	1.02	NA	5.09	non-LIQ	non-LIQ	0.935	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-8.3	115.0	115.0	26.1	1.2	4.6	48	8	8	5.00	1.20	14	1.613	1.043	1.613	1.043	2.84	non-LIQ CLAY	1	1.01	NA	5.14	non-LIQ	non-LIQ	0.935	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-8.4	115.0	115.0	26.3	1.2	4.4	47	8	8	5.00	1.20	14	1.623	1.048	1.623	1.048	2.82	non-LIQ CLAY	1	1.01	NA	4.98	non-LIQ	non-LIQ	0.934	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-8.6	115.0	115.0	25.9	1.1	4.2	47	7	7	5.00	1.20	14	1.632	1.052	1.632	1.052	2.82	non-LIQ CLAY	1	1.01	NA	4.94	non-LIQ	non-LIQ	0.934	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-8.7	115.0	115.0	25.4	1.1	4.2	47	7	7	5.00	1.20	14	1.641	1.056	1.641	1.056	2.82	non-LIQ CLAY	1	1.00	NA	5.00	non-LIQ	non-LIQ	0.933	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-8.9	115.0	115.0	24.8	1.0	4.2	48	7	7	5.00	1.20	14	1.651	1.061	1.651	1.061	2.84	non-LIQ CLAY	1	1.00	NA	5.13	non-LIQ	non-LIQ	0.933	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-9.1	115.0	115.0	24.7	1.0	4.0	48	7	7	5.00	1.20	14	1.660	1.065	1.660	1.065	2.83	non-LIQ CLAY	1	0.99	NA	5.01	non-LIQ	non-LIQ	0.933	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-9.2	115.0	115.0	24.3	1.0	4.1	48	7	7	5.00	1.20	13	1.670	1.070	1.670	1.070	2.84	non-LIQ CLAY	1	0.99	NA	5.12	non-LIQ	non-LIQ	0.932	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-9.4	115.0	115.0	25.4	1.0	4.0	47	7	7	5.00	1.20	14	1.679	1.074	1.679	1.074	2.82	non-LIQ CLAY	1	0.99	NA	4.96	non-LIQ	non-LIQ	0.932	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-9.6	115.0	115.0	26.3	1.2	4.6	49	8	8	5.00	1.20	14	1.688	1.078	1.688	1.078	2.84	non-LIQ CLAY	1	0.98	NA	5.18	non-LIQ	non-LIQ	0.932	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-9.7	115.0	115.0	28.3	1.6	5.6	51	8	8	5.00	1.20	15	1.698	1.082	1.698	1.082	2.88	non-LIQ CLAY	1	0.98	NA	5.50	non-LIQ	non-LIQ	0.931	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-9.9	115.0	115.0	34.4	2.7	7.9	53	11	10	5.00	1.20	17	1.707	1.087	1.707	1.087	2.92	non-LIQ CLAY	1	0.97	NA	5.93	non-LIQ	non-LIQ	0.931	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-10.1	115.0	115.0	60.0	3.3	5.5	37	16	15	5.00	1.20	23	1.717	1.091	1.717	1.091	2.63	non-LIQ CLAY	1	0.97	NA	3.52	non-LIQ	non-LIQ	0.930	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-10.2	115.0	115.0	49.1	2.7	5.6	40	13	13	5.00	1.20	21	1.726	1.095	1.726	1.095	2.70	non-LIQ CLAY	1	0.97	NA	3.99	non-LIQ	non-LIQ	0.930	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-10.4	115.0	115.0	33.3	1.6	4.9	45	9	9	5.00	1.20	16	1.735	1.099	1.735	1.099	2.79	non-LIQ CLAY	1	0.96	NA	4.68	non-LIQ	non-LIQ	0.928	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-10.6	115.0	115.0	26.3	1.1	4.3	48	8	7	5.00	1.20	14	1.745	1.104	1.745	1.104	2.84	non-LIQ CLAY	1	0.96	NA	5.09	non-LIQ	non-LIQ	0.927	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-10.7	115.0	115.0	22.9	1.0	4.2	51	7	7	5.00	1.20	13	1.754	1.108	1.754	1.108	2.88	non-LIQ CLAY	1	0.95	NA	5.54	non-LIQ	non-LIQ	0.926	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-10.9	115.0	115.0	23.7	0.9	3.8	49	7	7	5.00	1.20	13	1.764	1.113	1.764	1.113	2.85	non-LIQ CLAY	1	0.95	NA	5.20	non-LIQ	non-LIQ	0.924	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-11.0	115.0	115.0	23.1	0.9	4.1	50	7	7	5.00	1.20	13	1.773	1.117	1.773	1.117	2.88	non-LIQ CLAY	1	0.95	NA	5.46	non-LIQ	non-LIQ	0.923	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-11.2	115.0	115.0	23.1	1.0	4.5	52.4	7.0	6.8	5.0	1.2	13.0	1.78	1.12	1.78	1.12	2.91	non-LIQ CLAY	1	0.94	NA	5.76	non-LIQ	non-LIQ	0.922	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.17	-11.4	115.0	115.0	23.6	1.1	4.8	53.2	7.2	7.0	5.0	1.2	13.0	1.79	1.13	1.79	1.13	2.92	non-LIQ CLAY	1	0.94	NA	5.89	non-LIQ	non-LIQ	0.920	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.33	-11.5	115.0	115.0	24.2	1.2	5.0	53.2	7.4	7.1	5.0	1.2	14.0	1.80	1.13	1.80	1.13	2.92	non-LIQ CLAY	1	0.94	NA	5.89	non-LIQ	non-LIQ	0.919	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.50	-11.7	115.0	115.0	24.7	1.2	5.0	52.9	7.5	7.2	5.0	1.2	14.0	1.81	1.13	1.81	1.13	2.91	non-LIQ CLAY	1	0.93	NA	5.84	non-LIQ	non-LIQ	0.918	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.66	-11.9	115.0	115.0	26.4	1.4	5.3	52.4	8.0	7.7	5.0	1.2	14.0	1.82	1.14	1.82	1.14	2.91	non-LIQ CLAY	1	0.93	NA	5.77	non-LIQ	non-LIQ	0.916	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.82	-12.0	115.0	115.0	27.9	1.4	5.1	50.8	8.3	8.0	5.0	1.2	15.0	1.83	1.14	1.83	1.14	2.88	non-LIQ CLAY	1	0.93	NA	5.51	non-LIQ	non-LIQ	0.915	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.99	-12.2	115.0	115.0	30.0	1.6	5.2	49.5	8.8	8.5	5.0	1.2	15.0	1.84	1.15	1.84	1.15	2.86	non-LIQ CLAY	1	0.92	NA	5.31	non-LIQ	non-LIQ	0.914	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.15	-12.4	115.0	115.0	30.4	1.2	4.0	44.7	8.5	8.2	5.0	1.2	15.0	1.85	1.15	1.85	1.15	2.78	non-LIQ CLAY	1	0.92	NA	4.60	non-LIQ	non-LIQ	0.912	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.32	-12.5	115.0	115.0	25.3	1.0	3.9	48.5	7.4	7.0	5.0	1.2	13.0	1.86	1.16	1.86	1.16	2.84	non-LIQ CLAY	1	0.92	NA	5.16	non-LIQ	non-LIQ	0.911	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.48	-12.7	115.0	115.0	23.7	0.9	3.8	49.8	7.0	6.7	5.0	1.2	13.0	1.87	1.16	1.87	1.16	2.86	non-LIQ CLAY	1	0.91	NA	5.36	non-LIQ	non-LIQ	0.910	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.64	-12.8	115.0	115.0	26.0	1.0	4.0	48.6	7.6	7.2	5.0	1.2	14.0	1.88	1.16	1.88	1.16	2.85	non-LIQ CLAY	1	0.91	NA	5.18	non-LIQ	non-LIQ	0.908	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.81	-13.0	115.0	115.0	25.8	1.3	4.9	52.1	7.8	7.4	5.0	1.2	14.0	1.89	1.17	1.89	1.17	2.90	non-LIQ CLAY	1	0.91	NA	5.72	non-LIQ	non-LIQ	0.907	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.97	-13.2	115.0	115.0	24.4	1.4	5.9	57.4	7.7	7.3	5.0	1.2	14.0	1.90	1.17	1.90	1.17	2.98	non-LIQ CLAY	1	0.90	NA	6.56	non-LIQ	non-LIQ	0.906	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-13.3	115.0	115.0	22.0	1.3	5.9	59.8	7.1	6.8	5.0	1.2	13.0	1.91	1.18	1.91	1.18	3.02	non-LIQ CLAY	1	0.90	NA	6.97	non-LIQ	non-LIQ	0.904	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-13.5	115.0	115.0	20.2	1.1	5.7	61.5	6.6	6.3	5.0	1.2	13.0	1.91	1.18	1.91	1.18	3.04	non-LIQ CLAY	1	0.90	NA	7.25	non-LIQ	non-LIQ	0.903	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-13.7	115.0	115.0	20.3	1.1	5.7	61.5	6.7	6.3	5.0	1.2	13.0	1.92	1.19	1.92	1.19	3.04	non-LIQ CLAY	1	0.89	NA	7.25	non-LIQ	non-LIQ	0.902	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-13.8	115.0	115.0	21.4	1.1	5.3	59.0	6.9	6.5	5.0	1.2	13.0	1.93	1.19	1.93	1.19	3.01	non-LIQ CLAY	1	0.89	NA	6.83	non-LIQ	non-LIQ	0.900	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-14.0	115.0	115.0	19.9	1.1	5.8	62.7	6.6	6.2	5.0	1.2	12.0	1.94	1.19	1.94	1.19	3.06	non-LIQ CLAY	1	0.89	NA	7.45	non-LIQ	non-LIQ	0.899	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-14.2	115.0	115.0	18.9	1.2	6.1	65.5	6.4	6.0	5.0	1.2	12.0	1.95	1.20	1.95	1.20	3.10	non-LIQ CLAY	1	0.88	NA	7.93	non-LIQ	non-LIQ	0.898	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-14.3	115.0	115.0	19.3	1.1	5.5	62.8	6.4	6.0	5.0	1.2	12.0	1.96	1.20	1.96	1.20	3.06	non-LIQ CLAY	1	0.88	NA	7.47	non-LIQ	non-LIQ	0.896	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-14.5	115.0	115.0	18.3	0.8	4.2	59.3	5.9	5.5	5.0	1.2	12.0	1.97	1.21	1.97	1.21	3.01	non-LIQ CLAY	1	0.88	NA	6.87	non-LIQ	non-LIQ	0.895	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-14.7	115.0	115.0	18.3	1.0	5.6	64.9	6.2	5.8	5.0	1.2	12.0	1.98	1.21	1.98	1.21	3.09	non-LIQ CLAY	1	0.87	NA	7.82	non-LIQ	non-LIQ	0.894	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-14.8	115.0	115.0	15.2	1.1	7.1	75.9	5.7	5.3	5.0	1.2	11.0	1.99	1.22	1.99	1.22	3.24	non-LIQ CLAY	1	0.87	NA	9.77	non-LIQ	non-LIQ	0.892	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-15.0	115.0	115.0	18.5	1.1	5.7	65.1	6.3	5.9	5.0	1.2	12.0	2.00	1.22	2.00	1.22	3.10	non-LIQ CLAY	1	0.87	NA	7.87	non-LIQ	non-LIQ	0.891	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-15.1	115.0	115.0	18.5	1.1	5.8	65.6	6.3	5.9	5.0	1.2	12.0	2.01	1.22	2.01	1.22	3.10	non-LIQ CLAY	1	0.86	NA	7.94	non-LIQ	non-LIQ	0.890	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-15.3	115.0	115.0	20.5	1.1	5.4	61.3	6.7	6.2	5.0	1.2	12.0	2.02	1.23	2.02	1.23	3.04	non-LIQ CLAY	1	0.86	NA	7.22	non-LIQ	non-LIQ	0.888	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-15.5	115.0	115.0	21.8	1.2	5.3	59.4	7.0	6.5	5.0	1.2	13.0	2.03	1.23	2.03	1.23	3.01	non-LIQ CLAY	1	0.86	NA	6.89	non-LIQ	non-LIQ	0.887	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-15.6	115.0	115.0	21.7	1.2	5.4	59.8	7.0	6.5	5.0	1.2	13.0	2.04	1.24	2.04	1.24	3.02	non-LIQ CLAY	1	0.85	NA	6.96	non-LIQ	non-LIQ	0.886	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-15.8	115.0	115.0	22.6	1.2	5.2	58.3	7.2	6.7	5.0	1.2	13.0	2.05	1.24	2.05	1.24	3.00	non-LIQ CLAY	1	0.85	NA	6.71	non-LIQ	non-LIQ	0.884	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-16.0	115.0	115.0	23.1	1.2	5.2	57.9	7.3	6.8	5.0	1.2	13.0	2.06	1.25	2.06	1.25	2.99	non-LIQ CLAY	1	0.85	NA	6.65	non-LIQ	non-LIQ	0.883	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-16.1	115.0	115.0	21.4	1.1	5.3	60.1	6.9	6.4	5.0	1.2	13.0	2.07	1.25	2.07	1.25	3.02	non-LIQ CLAY	1	0.85	NA	7.01	non-LIQ	non-LIQ	0.882	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-16.3	115.0	115.0	21.0	1.1	5.4	61.3	6.9	6.3	5.0	1.2	13.0	2.08	1.25	2.08	1.25	3.04	non-LIQ CLAY	1	0.84	NA	7.22	non-LIQ	non-LIQ	0.880	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-16.5	115.0	115.0	20.9	1.1	5.2	60.8	6.8	6.3	5.0	1.2	13.0	2.08	1.26	2.08	1.26	3.03	non-LIQ CLAY	1	0.84	NA	7.12	non-LIQ	non-LIQ	0.879	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-16.6	115.0	115.0	19.5	1.0	5.4	63.4	6.5	6.0	5.0	1.2	12.0	2.09	1.26	2.09	1.26	3.07	non-LIQ CLAY	1	0.84	NA	7.57	non-LIQ	non-LIQ	0.878	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-16.8	115.0	115.0	19.2	1.1	5.6	64.8	6.5	6.0	5.0	1.2	12.0	2.10	1.27	2.10	1.27	3.09	non-LIQ CLAY	1	0.83	NA	7.80	non-LIQ	non-LIQ	0.876	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-17.0	115.0	115.0	18.7	1.0	5.4	65.2	6.3	5.8	5.0	1.2	12.0	2.11	1.27	2.11	1.27	3.10	non-LIQ CLAY	1	0.83	NA	7.87	non-LIQ	non-LIQ	0.875	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-17.1	115.0	115.0	16.7	0.9	5.7	69.5	5.9	5.4	5.0	1.2	11.0	2.12	1.28	2.12	1.28	3.15	non-LIQ CLAY	1	0.83	NA	8.62	non-LIQ	non-LIQ	0.874	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-17.3	115.0	115.0	16.8	0.9	5.5	68.9	5.9	5.4	5.0	1.2	11.0	2.13	1.28	2.13	1.28	3.15	non-LIQ CLAY	1	0.83	NA	8.52	non-LIQ	non-LIQ	0.872	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_{eq}	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
37.24	-17.4	115.0	115.0	16.3	0.9	5.3	69.4	5.7	5.2	5.0	1.2	11.0	2.14	1.29	2.14	1.29	3.15	non-LIQ CLAY	1	0.82	NA	8.61	non-LIQ	non-LIQ	0.871	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.40	-17.6	115.0	115.0	15.9	0.9	5.6	71.2	5.7	5.2	5.0	1.2	11.0	2.15	1.29	2.15	1.29	3.18	non-LIQ CLAY	1	0.82	NA	8.94	non-LIQ	non-LIQ	0.870	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.57	-17.8	115.0	115.0	16.6	0.9	5.6	70.1	5.9	5.3	5.0	1.2	11.0	2.16	1.29	2.16	1.29	3.16	non-LIQ CLAY	1	0.82	NA	8.73	non-LIQ	non-LIQ	0.868	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.73	-17.9	115.0	115.0	15.6	0.9	5.6	71.8	5.6	5.1	5.0	1.2	11.0	2.17	1.30	2.17	1.30	3.18	non-LIQ CLAY	1	0.82	NA	9.04	non-LIQ	non-LIQ	0.867	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.89	-18.1	115.0	115.0	15.6	0.9	5.5	71.7	5.6	5.1	5.0	1.2	11.0	2.18	1.30	2.18	1.30	3.18	non-LIQ CLAY	1	0.81	NA	9.01	non-LIQ	non-LIQ	0.866	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-18.3	115.0	115.0	15.5	0.8	5.4	71.7	5.6	5.0	5.0	1.2	11.0	2.19	1.31	2.19	1.31	3.18	non-LIQ CLAY	1	0.81	NA	9.02	non-LIQ	non-LIQ	0.864	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-18.4	115.0	115.0	15.8	0.8	5.3	71.0	5.7	5.1	5.0	1.2	11.0	2.20	1.31	2.20	1.31	3.17	non-LIQ CLAY	1	0.81	NA	8.89	non-LIQ	non-LIQ	0.863	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-18.6	115.0	115.0	17.4	0.9	5.3	67.8	6.1	5.4	5.0	1.2	12.0	2.21	1.32	2.21	1.32	3.13	non-LIQ CLAY	1	0.80	NA	8.32	non-LIQ	non-LIQ	0.862	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-18.8	115.0	115.0	18.5	1.0	5.5	66.7	6.4	5.7	5.0	1.2	12.0	2.22	1.32	2.22	1.32	3.12	non-LIQ CLAY	1	0.80	NA	8.14	non-LIQ	non-LIQ	0.860	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-18.9	115.0	115.0	17.7	1.1	5.9	70.0	6.3	5.6	5.0	1.2	12.0	2.23	1.32	2.23	1.32	3.16	non-LIQ CLAY	1	0.80	NA	8.71	non-LIQ	non-LIQ	0.859	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-19.1	115.0	115.0	17.1	1.0	6.1	71.6	6.2	5.5	5.0	1.2	12.0	2.24	1.33	2.24	1.33	3.18	non-LIQ CLAY	1	0.80	NA	9.00	non-LIQ	non-LIQ	0.858	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-19.2	115.0	115.0	18.1	1.0	5.4	67.2	6.3	5.6	5.0	1.2	12.0	2.24	1.33	2.24	1.33	3.12	non-LIQ CLAY	1	0.79	NA	8.23	non-LIQ	non-LIQ	0.856	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.21	-19.4	115.0	115.0	19.5	0.9	4.8	62.7	6.5	5.8	5.0	1.2	12.0	2.25	1.34	2.25	1.34	3.06	non-LIQ CLAY	1	0.79	NA	7.46	non-LIQ	non-LIQ	0.855	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-19.6	115.0	115.0	20.5	0.9	4.4	60.1	6.6	5.9	5.0	1.2	12.0	2.26	1.34	2.26	1.34	3.02	non-LIQ CLAY	1	0.79	NA	7.01	non-LIQ	non-LIQ	0.854	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.53	-19.7	115.0	115.0	19.2	0.9	4.6	62.5	6.4	5.7	5.0	1.2	12.0	2.27	1.35	2.27	1.35	3.06	non-LIQ CLAY	1	0.79	NA	7.42	non-LIQ	non-LIQ	0.852	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-19.9	115.0	115.0	17.1	0.8	4.5	66.0	5.9	5.2	5.0	1.2	11.0	2.28	1.35	2.28	1.35	3.11	non-LIQ CLAY	1	0.78	NA	8.01	non-LIQ	non-LIQ	0.851	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-20.1	115.0	115.0	18.1	1.0	5.6	68.7	6.4	5.6	5.0	1.2	12.0	2.29	1.35	2.29	1.35	3.14	non-LIQ CLAY	1	0.78	NA	8.49	non-LIQ	non-LIQ	0.850	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-20.2	115.0	115.0	26.6	2.2	8.4	66.3	9.1	8.1	5.0	1.2	15.0	2.30	1.36	2.30	1.36	3.11	non-LIQ CLAY	1	0.78	NA	8.07	non-LIQ	non-LIQ	0.848	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-20.4	115.0	115.0	38.1	2.8	7.2	54.5	11.7	10.3	5.0	1.2	17.0	2.31	1.36	2.31	1.36	2.94	non-LIQ CLAY	1	0.78	NA	6.10	non-LIQ	non-LIQ	0.847	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-20.6	115.0	115.0	46.2	3.1	6.8	49.2	13.6	11.9	5.0	1.2	19.0	2.32	1.37	2.32	1.37	2.85	non-LIQ CLAY	1	0.77	NA	5.27	non-LIQ	non-LIQ	0.846	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-20.7	115.0	115.0	61.1	3.1	5.1	39.0	16.2	14.2	5.0	1.2	22.0	2.33	1.37	2.33	1.37	2.67	non-LIQ CLAY	1	0.77	NA	3.80	non-LIQ	non-LIQ	0.844	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.68	-20.9	115.0	115.0	56.4	2.7	4.9	39.8	15.1	13.2	5.0	1.2	21.0	2.34	1.38	2.34	1.38	2.69	non-LIQ CLAY	1	0.77	NA	3.91	non-LIQ	non-LIQ	0.843	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.85	-21.1	115.0	115.0	118.7	3.8	3.2	22.0	26.2	23.0	3.9	1.1	29.0	2.35	1.38	2.35	1.38	2.29	SAND	0.5	0.88	98	1.90	187	non-LIQ	0.842	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-21.2	115.0	115.0	81.6	3.6	4.5	30.9	19.9	17.4	4.8	1.2	25.0	2.36	1.38	2.36	1.38	2.51	SAND	0.5	0.87	67	2.80	189	non-LIQ	0.840	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-21.4	115.0	115.0	40.3	2.3	5.7	49.2	11.8	10.3	5.0	1.2	17.0	2.37	1.39	2.37	1.39	2.85	non-LIQ CLAY	1	0.76	NA	5.26	non-LIQ	non-LIQ	0.839	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.34	-21.5	115.0	115.0	24.2	1.5	6.2	63.3	8.1	7.1	5.0	1.2	13.0	2.38	1.39	2.38	1.39	3.07	non-LIQ CLAY	1	0.76	NA	7.55	non-LIQ	non-LIQ	0.838	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-21.7	115.0	115.0	31.0	1.3	4.0	49.0	9.1	7.9	5.0	1.2	14.0	2.39	1.40	2.39	1.40	2.85	non-LIQ CLAY	1	0.76	NA	5.23	non-LIQ	non-LIQ	0.836	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-21.9	115.0	115.0	22.6	1.2	5.2	61.8	7.4	6.5	5.0	1.2	13.0	2.40	1.40	2.40	1.40	3.05	non-LIQ CLAY	1	0.75	NA	7.29	non-LIQ	non-LIQ	0.835	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-22.0	115.0	115.0	22.2	1.1	4.9	60.9	7.3	6.3	5.0	1.2	13.0	2.41	1.41	2.41	1.41	3.03	non-LIQ CLAY	1	0.75	NA	7.14	non-LIQ	non-LIQ	0.834	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-22.2	115.0	115.0	22.1	1.2	5.3	62.7	7.3	6.4	5.0	1.2	13.0	2.41	1.41	2.41	1.41	3.06	non-LIQ CLAY	1	0.75	NA	7.45	non-LIQ	non-LIQ	0.832	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-22.4	115.0	115.0	22.3	1.2	5.4	63.0	7.4	6.4	5.0	1.2	13.0	2.42	1.41	2.42	1.41	3.07	non-LIQ CLAY	1	0.75	NA	7.50	non-LIQ	non-LIQ	0.831	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.32	-22.5	115.0	115.0	22.5	1.2	5.4	62.9	7.5	6.5	5.0	1.2	13.0	2.43	1.42	2.43	1.42	3.06	non-LIQ CLAY	1	0.75	NA	7.49	non-LIQ	non-LIQ	0.830	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.49	-22.7	115.0	115.0	23.0	1.2	5.4	62.2	7.6	6.6	5.0	1.2	13.0	2.44	1.42	2.44	1.42	3.05	non-LIQ CLAY	1	0.74	NA	7.37	non-LIQ	non-LIQ	0.828	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-22.9	115.0	115.0	24.0	1.3	5.4	61.2	7.9	6.8	5.0	1.2	13.0	2.45	1.43	2.45	1.43	3.04	non-LIQ CLAY	1	0.74	NA	7.20	non-LIQ	non-LIQ	0.827	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-23.0	115.0	115.0	23.1	1.2	5.3	62.1	7.6	6.6	5.0	1.2	13.0	2.46	1.43	2.46	1.43	3.05	non-LIQ CLAY	1	0.74	NA	7.34	non-LIQ	non-LIQ	0.826	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-23.2	115.0	115.0	21.3	1.1	5.0	63.5	7.1	6.1	5.0	1.2	12.0	2.47	1.44	2.47	1.44	3.07	non-LIQ CLAY	1	0.74	NA	7.58	non-LIQ	non-LIQ	0.824	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.14	-23.3	115.0	115.0	21.3	1.0	4.6	61.9	7.0	6.0	5.0	1.2	12.0	2.48	1.44	2.48	1.44	3.05	non-LIQ CLAY	1	0.73	NA	7.32	non-LIQ	non-LIQ	0.823	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-23.5	115.0	115.0	21.7	1.0	4.7	61.9	7.2	6.1	5.0	1.2	12.0	2.49	1.44	2.49	1.44	3.05	non-LIQ CLAY	1	0.73	NA	7.32	non-LIQ	non-LIQ	0.822	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-23.7	115.0	115.0	21.8	1.1	4.8	62.2	7.2	6.2	5.0	1.2	12.0	2.50	1.45	2.50	1.45	3.05	non-LIQ CLAY	1	0.73	NA	7.37	non-LIQ	non-LIQ	0.820	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-23.8	115.0	115.0	21.5	1.5	7.0	70.4	7.7	6.6	5.0	1.2	13.0	2.51	1.45	2.51	1.45	3.17	non-LIQ CLAY	1	0.73	NA	8.79	non-LIQ	non-LIQ	0.819	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-24.0	115.0	115.0	33.0	2.0	6.2	56.4	10.3	8.8	5.0	1.2	16.0	2.52	1.46	2.52	1.46	2.97	non-LIQ CLAY	1	0.73	NA	6.40	non-LIQ	non-LIQ	0.818	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-24.2	115.0	115.0	63.2	1.9	3.0	29.6	15.2	12.9	4.7	1.2	20.0	2.53	1.46	2.53	1.46	2.48	SAND	0.5	0.65	51	2.65	135	0.308	0.816	0.650	0.610	0.50	NA	NA	NA	NA	NA	0.00	15.00	1.94	0.04
44.13	-24.3	115.0	115.0	62.3	2.3	3.7	32.8	15.5	13.2	4.9	1.2	20.0	2.54	1.47	2.54	1.47	2.55	SAND	0.5	0.65	50	3.01	151	0.399	0.815	0.650	0.610	0.65	NA	NA	NA	NA	NA	0.00	16.00	1.87	0.04
44.29	-24.5	115.0	115.0	55.2	1.7	3.1	32.1	13.6	11.6	4.8	1.2	18.0	2.55	1.47	2.55	1.47	2.53	SAND	0.5	0.65	44	2.93	129	0.282	0.814	0.650	0.610	0.46	NA	NA	NA	NA	NA	0.00	15.00	1.94	0.04
44.46	-24.7	115.0	115.0	25.1	1.0	4.0	55.2	7.8	6.6	5.0	1.2	13.0	2.56	1.48	2.56	1.48	2.95	non-LIQ CLAY	1	0.72	NA	6.21	non-LIQ	non-LIQ	0.812	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.62	-24.8	115.0	115.0	21.9	0.9	4.1	59.7	7.1	6.0	5.0	1.2	12.0	2.57	1.48	2.57	1.48	3.02	non-LIQ CLAY	1	0.72	NA	6.95	non-LIQ	non-LIQ	0.811	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.78	-25.0	115.0	115.0	22.5	0.9	3.9	58.1	7.2	6.0	5.0	1.2	12.0	2.57	1.48	2.57	1.48	2.99	non-LIQ CLAY	1	0.71	NA	6.68	non-LIQ	non-LIQ	0.810	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.95	-25.2	115.0	115.0	23.5	0.9	3.8	56.7	7.4	6.2	5.0	1.2	12.0	2.58	1.49	2.58	1.49	2.97	non-LIQ CLAY	1	0.71	NA	6.44	non-LIQ	non-LIQ	0.808	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-25.3	115.0	115.0	24.3	0.9	3.5	54.2	7.5	6.3	5.0	1.2	13.0	2.59	1.49	2.59	1.49	2.93	non-LIQ CLAY	1	0.71	NA	6.05	non-LIQ	non-LIQ	0.807	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-25.5	115.0	115.0	22.8	0.8	3.6	56.5	7.2	6.0	5.0	1.2	12.0	2.60	1.50	2.60	1.50	2.97	non-LIQ CLAY	1	0.71	NA	6.41	non-LIQ	non-LIQ	0.806	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-25.6	115.0	115.0	21.7	0.8	3.7	58.5	6.9	5.8	5.0	1.2	12.0	2.61	1.50	2.61	1.50	3.00	non-LIQ CLAY	1	0.71	NA	6.75	non-LIQ	non-LIQ	0.804	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-25.8	115.0	115.0	22.0	0.8	3.7	57.9	7.0	5.9	5.0	1.2	12.0	2.62	1.51	2.62	1.51	2.99	non-LIQ CLAY	1	0.70	NA	6.65	non-LIQ	non-LIQ	0.803	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-26.0	115.0	115.0	22.4	0.9	3.9	58.5	7.2	6.0	5.0	1.2	12.0	2.63	1.51	2.63	1.51	3.00	non-LIQ CLAY	1	0.70	NA	6.75	non-LIQ	non-LIQ	0.802	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-26.1	115.0	115.0	23.6	0.8	3.5	55.5	7.3	6.1	5.0	1.2	12.0	2.64	1.51	2.64	1.51	2.96	non-LIQ CLAY	1	0.70	NA	6.26	non-LIQ	non-LIQ	0.800	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-26.3	115.0	115.0	23.2	0.9	4.0	58.5	7.4	6.2	5.0	1.2	12.0	2.65	1.52	2.65	1.52	3.00	non-LIQ CLAY	1	0.70	NA	6.74	non-LIQ	non-LIQ	0.799	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-26.5	115.0	115.0	23.5	0.9	3.9	57.6	7.4	6.2	5.0	1.2	12.0	2.66	1.52	2.66	1.52	2.99	non-LIQ CLAY	1	0.70	NA	6.60	non-LIQ	non-LIQ	0.798	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-26.6	115.0	115.0	24.4	1.0	4.1	57.4	7.7	6.4	5.0	1.2	13.0	2.67	1.53	2.67	1.53	2.98	non-LIQ CLAY	1	0.69	NA	6.57	non-LIQ	non-LIQ	0.796	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-26.8	115.0	115.0	26.4	1.0	3.9	54.7	8.2	6.8	5.0	1.2	13.0	2.68	1.53	2.68	1.53	2.94	non-LIQ CLAY	1	0.69	NA	6.12	non-LIQ	non-LIQ	0.795	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-27.0	115.0	115.0	24.9	1.0	3.9	56.1	7.8	6.5	5.0	1.2	13.0	2.69	1.54	2.69	1.54	2.96	non-LIQ CLAY	1	0.69	NA	6.35	non-LIQ	non-LIQ	0.794	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-27.1	115.0	115.0	20.5	0.8	3.9	62.0	6.8	5.6	5.0	1.2	12.0	2.70	1.54	2.70	1.54	3.05	non-LIQ CLAY	1	0.69	NA	7.34	non-LIQ	non-LIQ	0.792	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-27.3	115.0	115.0	18.1	0.8	4.2	67.4	6.3	5.2	5.0	1.2	11.0	2.71	1.54	2.71	1.54	3.13	non-LIQ CLAY	1	0.69	NA	8.26	non-LIQ	non-LIQ	0.791	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-27.4	115.0	115.0	19.0	0.3	1.8	51.2	5.7	4.7	5.0	1.2	11.0	2.72	1.55	2.72	1.55	2.89	non-LIQ CLAY	1	0.68	NA	5.57	non-LIQ	non-LIQ	0.790	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.41	-27.6	115.0	115.0	18.8	0.7	3.8	64.3	6.3	5.2	5.0	1.2	11.0	2.73	1.55	2.73	1.55	3.08	non-LIQ CLAY	1	0.68	NA	7.73	non-LIQ	non-LIQ	0.788	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-27.8	115.0	115.0	9.4	0.7	7.2	109.5	4.9	4.0	5.0	1.2	10.0	2.74	1.56	2.74	1.56	3.61	non-LIQ CLAY	1	0.68	NA	16.13	non-LIQ	non-LIQ	0.787	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-27.9	115.0	115.0	19.1	0.7	3.5	62.6	6.3	5.2	5.0	1.2	11.0	2.75	1.56	2.75	1.56	3.06	non-LIQ CLAY	1	0.68	NA	7.44	non-LIQ	non-LIQ	0.785	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-28.1	115.0	115.0	20.5	0.8	3.8	62.0	6.8	5.6	5.0	1.2	12.0	2.75	1.57	2.75	1.57	3.05	non-LIQ CLAY	1	0.68	NA	7.33	non-LIQ	non-LIQ	0.784	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-28.3	115.0	115.0	21.9	0.8	3.9	60.3	7.1	5.8	5.0	1.2	12.0	2.76	1.57	2.76	1.57	3.03	non-LIQ CLAY	1	0.67	NA	7.05	non-LIQ	non-LIQ	0.783	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-28.4	115.0	115.0	20.3	0.7	3.5	60.7	6.6	5.4	5.0	1.2	12.0	2.77	1.57	2.77	1.57	3.03	non-LIQ CLAY	1	0.67	NA	7.12	non-LIQ	non-LIQ	0.781	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-28.6	115.0	115.0	18.0	0.7	3.9	67.1	6.2	5.1	5.0	1.2	11.0	2.78	1.58	2.78	1.58	3.12	non-LIQ CLAY	1	0.67	NA	8.20	non-LIQ	non-LIQ	0.780	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-28.8	115.0	115.0	19.4	0.7	3.6	62.8	6.5	5.3	5.0	1.2	11.0	2.79	1.58	2.79	1.58	3.06	non-LIQ CLAY	1	0.67	NA	7.47	non-LIQ	non-LIQ	0.779	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.72	-28.9	115.0	115.0	19.2	0.7	3.7	64.0	6.5	5.3	5.0	1.2	11.0	2.80	1.59	2.80	1.59	3.08	non-LIQ CLAY	1	0.67	NA	7.66	non-LIQ	non-LIQ	0.778	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-29.1	115.0	115.0	19.0	0.8	4.2	66.7	6.5	5.3	5.0	1.2	11.0	2.81	1.59	2.81	1.59	3.12	non-LIQ CLAY	1	0.66	NA	8.14	non-LIQ	non-LIQ	0.776	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-29.3	115.0	115.0	19.2	0.7	3.5	63.1	6.4	5.2	5.0	1.2	11.0	2.82	1.60	2.82	1.60	3.07	non-LIQ CLAY	1	0.66	NA	7.51	non-LIQ	non-LIQ	0.775	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-29.4	115.0	115.0	21.4	0.8	3.5	59.9	6.9	5.6	5.0	1.2	12.0	2.83	1.60	2.83	1.60	3.02	non-LIQ CLAY	1	0.66	NA	6.98	non-LIQ	non-LIQ	0.774	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-29.6	115.0	115.0	24.2	0.7	2.8	52.4	7.3	5.9	5.0	1.2	12.0	2.84	1.60	2.84	1.60	2.91	non-LIQ CLAY	1	0.66	NA	5.76	non-LIQ	non-LIQ	0.772	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-29.7	115.0	115.0	22.3	0.8	3.7	59.7	7.2	5.9	5.0	1.2	12.0	2.85	1.61	2.85	1.61	3.02	non-LIQ CLAY	1	0.66	NA	6.94	non-LIQ	non-LIQ	0.771	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.70	-29.9	115.0	115.0	22.8	0.9	4.1	61.3	7.5	6.0	5.0	1.2	12.0	2.86	1.61	2.86	1.61	3.04	non-LIQ CLAY	1	0.66	NA	7.21	non-LIQ	non-LIQ	0.770	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.87	-30.1	115.0	115.0	31.8	1.4	4.3	53.2	9.7	7.8	5.0	1.2	14.0	2.87	1.62	2.87	1.62	2.92	non-LIQ CLAY	1	0.65	NA	5.69	non-LIQ	non-LIQ	0.768	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.03	-30.2	115.0	115.0	40.7	1.6	4.0	46.1	11.6	9.4	5.0	1.2	16.0	2.88	1.62	2.88	1.62	2.80	non-LIQ CLAY	1	0.65	NA	4.80	non-LIQ	non-LIQ	0.767	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-014

Emean (%)	75			Present Ground El.	19.5	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	9.5	=Field Water Table Depth	Acc. max =	0.710	g			Earthq. M=	7.3			
C_E	1.25			Future Ground El.	19.5	C_B	1.00	120	14.5	=Design Water El.	10	=Field Water El.						Cm=	1.07			

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	14.5	16	CH	51.0	0.30	0.30	1.70	0.80	1.20	1.00	1	1	0.99	0.30	0.46	33	44	1.00	High N	0.00	LARGE	high N
10	9.5	49	SC	15.0	0.60	0.58	1.34	0.85	1.00	0.67	2	2	0.98	0.44	0.61	46	51	1.00	High N	0.00	LARGE	high N
15	4.5	9	CH	51.0	0.90	0.73	1.20	0.85	1.20	1.00	1	1	0.97	0.59	0.68	14	21	1.00	0.23	0.25	0.37	Fines
20	-0.5	26	CL	51.0	1.20	0.87	1.09	0.95	1.00	0.67	2	2	0.95	0.73	0.72	22	32	1.00	High N	0.00	LARGE	high N
25	-5.5	8	CL	51.0	1.50	1.02	1.01	0.95	1.20	1.00	1	1	0.94	0.88	0.74	12	19	1.00	0.20	0.22	0.29	Fines
30	-10.5	25	CH	51.0	1.80	1.16	0.95	1.00	1.00	0.67	2	2	0.93	1.02	0.76	20	29	1.00	0.40	0.42	0.56	Fines
35	-15.5	14	CH	51.0	2.10	1.30	0.89	1.00	1.20	1.00	1	1	0.89	1.16	0.74	19	28	0.98	0.35	0.37	0.50	Fines
40	-20.5	17	CL	51.0	2.40	1.45	0.85	1.00	1.00	0.67	2	2	0.85	1.31	0.72	12	19	0.96	0.21	0.21	0.30	Fines
45	-25.5	17	CL	51.0	2.70	1.59	0.81	1.00	1.20	1.00	1	1	0.81	1.45	0.69	21	30	0.94	0.45	0.45	0.66	Fines
50	-30.5	18	CH	51.0	3.00	1.74	0.78	1.00	1.00	0.67	2	2	0.77	1.60	0.67	12	19	0.92	0.20	0.20	0.30	Fines
55	-35.5	20	CH	51.0	3.30	1.88	0.75	1.00	1.20	1.00	1	1	0.73	1.74	0.64	22	32	0.90	High N	0.00	LARGE	high N
60	-40.5	42	CL	51.0	3.60	2.02	0.72	1.00	1.00	0.67	2	2	0.69	1.88	0.60	25	35	0.88	High N	0.00	LARGE	high N
65	-45.5	32	CL	51.0	3.90	2.17	0.69	1.00	1.20	1.00	1	1	0.64	2.03	0.57	33	45	0.88	High N	0.00	LARGE	high N
70	-50.5	73	SC	15.0	4.20	2.31	0.67	1.00	1.00	0.67	2	2	0.60	2.17	0.54	41	45	0.87	High N	0.00	LARGE	high N

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-017
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
California

Computed by: SP
Checked by:

Date: 03/30/12
Date:

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework,* Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60},* ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering. Blacksburg. Pp. 1263-1280, 1986.

Surface Elevation = 17 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 12 ft MSL
Water Level at Investigation = 6.8 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	0.003
Post-liquefaction Settlement (in)	0.460
Total Settlement (in)	**0.463**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ_{MOIST}	γ_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.16	16.8	115.0	115.0	23.0	0.7	2.9	13	5	49	2.01	1.04	53	0.009	0.009	0.009	0.009	2.02	SAND	0.5	1.70	37.0	1.32	48.9	0.09	1.000	0.46	0.430	Above Water	0.12	135601	128.3	0.03	0.01	0.000	NA	NA	0.000
0.33	16.7	115.0	115.0	36.9	1.0	2.7	12	7	53	1.54	1.03	57	0.019	0.019	0.019	0.019	1.96	SAND	0.5	1.70	59.3	1.25	74.4	0.12	0.999	0.46	0.430	Above Water	0.12	87827	189.9	0.03	0.01	0.000	NA	NA	0.000
0.49	16.5	115.0	115.0	40.7	1.3	3.1	14	8	50	2.20	1.04	54	0.028	0.028	0.028	0.028	2.04	SAND	0.5	1.70	65.3	1.35	88.3	0.14	0.999	0.46	0.430	Above Water	0.12	69281	225.8	0.04	0.01	0.000	NA	NA	0.000
0.66	16.3	115.0	115.0	38.4	1.8	4.6	20	8	44	3.58	1.08	51	0.038	0.038	0.038	0.038	2.22	SAND	0.5	1.70	61.7	1.73	106.5	0.19	0.998	0.46	0.430	Above Water	0.12	57944	251.0	0.05	0.02	0.001	NA	NA	0.000
0.82	16.2	115.0	115.0	38.6	2.1	5.5	23	9	41	4.06	1.10	49	0.047	0.047	0.047	0.047	2.31	SAND	0.5	1.70	62.0	1.99	123.4	0.25	0.998	0.46	0.430	Above Water	0.13	50868	273.7	0.06	0.02	0.001	NA	NA	0.000
0.98	16.0	115.0	115.0	23.9	2.3	9.7	32	6	25	4.82	1.17	35	0.056	0.056	0.056	0.056	2.52	SILT	0.7	1.70	38.3	2.90	111.0	0.21	0.998	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.15	15.9	115.0	115.0	22.2	1.9	8.3	31	5	22	4.77	1.16	30	0.066	0.066	0.066	0.066	2.51	SILT	0.7	1.70	35.7	2.81	100.4	0.17	0.997	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.31	15.7	115.0	115.0	18.3	1.5	8.1	34	5	17	4.92	1.19	25	0.075	0.075	0.075	0.075	2.56	SILT	0.7	1.70	29.4	3.12	91.6	0.15	0.997	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.48	15.5	115.0	115.0	15.1	1.2	8.2	37	4	14	5.00	1.20	22	0.085	0.085	0.085	0.085	2.64	SILT	0.7	1.70	24.2	3.57	86.6	0.14	0.997	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.64	15.4	115.0	115.0	14.5	1.2	8.4	39	4	13	5.00	1.20	21	0.094	0.094	0.094	0.094	2.68	SILT	0.7	1.70	23.4	3.82	89.3	0.15	0.996	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.80	15.2	115.0	115.0	14.2	1.2	8.4	41	4	12	5.00	1.20	20	0.104	0.104	0.104	0.104	2.70	SILT	0.7	1.70	22.8	4.02	91.5	0.15	0.996	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
1.97	15.0	115.0	115.0	13.8	1.1	8.2	41	4	11	5.00	1.20	19	0.113	0.113	0.113	0.113	2.72	SILT	0.7	1.70	22.2	4.12	91.5	0.15	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.13	14.9	115.0	115.0	16.3	1.2	7.2	38	4	13	5.00	1.20	20	0.122	0.122	0.122	0.122	2.64	SILT	0.7	1.70	26.1	3.61	94.4	0.16	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.30	14.7	115.0	115.0	19.1	1.2	6.5	34	5	14	4.95	1.19	21	0.132	0.132	0.132	0.132	2.58	SILT	0.7	1.70	30.7	3.20	98.2	0.17	0.995	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.46	14.5	115.0	115.0	19.1	1.2	6.4	35	5	13	4.96	1.19	21	0.141	0.141	0.141	0.141	2.59	SILT	0.7	1.70	30.7	3.24	99.6	0.17	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.62	14.4	115.0	115.0	15.6	1.1	7.0	40	4	11	5.00	1.20	18	0.151	0.151	0.151	0.151	2.69	SILT	0.7	1.70	25.0	3.91	98.0	0.17	0.994	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.79	14.2	115.0	115.0	13.8	0.9	6.6	41	4	10	5.00	1.20	17	0.160	0.160	0.160	0.160	2.72	SILT	0.7	1.70	22.2	4.12	91.3	0.15	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
2.95	14.1	115.0	115.0	13.1	0.8	6.2	41	4	9	5.00	1.20	16	0.170	0.170	0.170	0.170	2.72	SILT	0.7	1.70	21.1	4.14	87.3	0.14	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.12	13.9	115.0	115.0	11.9	0.7	6.1	36	3	7	5.00	1.20	14	0.179	0.179	0.179	0.179	2.61	non-LIQ CLAY	1	1.70	NA	3.37	non-LIQ	non-LIQ	0.993	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.28	13.7	115.0	115.0	11.8	0.7	5.9	36	3	7	5.00	1.20	14	0.189	0.189	0.189	0.189	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.44	13.6	115.0	115.0	11.2	0.7	5.9	37	3	7	5.00	1.20	13	0.198	0.198	0.198	0.198	2.64	non-LIQ CLAY	1	1.70	NA	3.58	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.61	13.4	115.0	115.0	10.3	0.6	5.9	39	3	6	5.00	1.20	12	0.208	0.208	0.208	0.208	2.68	non-LIQ CLAY	1	1.70	NA	3.86	non-LIQ	non-LIQ	0.992	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.77	13.2	115.0	115.0	11.5	0.7	6.1	39	3	7	5.00	1.20	13	0.217	0.217	0.217	0.217	2.67	non-LIQ CLAY	1	1.70	NA	3.79	non-LIQ	non-LIQ	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
3.94	13.1	115.0	115.0	13.8	0.9	6.4	38	4	8	5.00	1.20	14	0.227	0.227	0.227	0.227	2.65	non-LIQ CLAY	1	1.70	NA	3.64	non-LIQ	non-LIQ	0.991	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.10	12.9	115.0	115.0	13.6	1.0	7.7	42	4	8	5.00	1.20	14	0.236	0.236	0.236	0.236	2.72	non-LIQ CLAY	1	1.70	NA	4.18	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.27	12.7	115.0	115.0	14.3	1.0	7.3	41	4	8	5.00	1.20	15	0.246	0.246	0.246	0.246	2.70	non-LIQ CLAY	1	1.70	NA	4.03	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.43	12.6	115.0	115.0	14.5	1.0	6.9	40	4	8	5.00	1.20	14	0.255	0.255	0.255	0.255	2.69	non-LIQ CLAY	1	1.70	NA	3.92	non-LIQ	non-LIQ	0.990	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.59	12.4	115.0	115.0	15.2	1.0	6.6	39	4	8	5.00	1.20	15	0.264	0.264	0.264	0.264	2.67	non-LIQ CLAY	1	1.70	NA	3.82	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.76	12.2	115.0	115.0	15.0	1.0	6.9	41	4	8	5.00	1.20	15	0.274	0.274	0.274	0.274	2.70	non-LIQ CLAY	1	1.70	NA	4.00	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
4.92	12.1	115.0	115.0	16.3	1.1	6.6	39	4	8	5.00	1.20	15	0.283	0.283	0.283	0.283	2.67	non-LIQ CLAY	1	1.70	NA	3.79	non-LIQ	non-LIQ	0.989	0.46	0.430	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.09	11.9	115.0	115.0	18.9	1.1	5.7	40	5	10	5.00	1.20	17	0.293	0.293	0.293	0.290	2.70	non-LIQ CLAY	1	1.70	NA	3.99	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.25	11.8	115.0	115.0	18.3	1.0	5.7	36	5	9	5.00	1.20	16	0.302	0.302	0.302	0.297	2.61	non-LIQ CLAY	1	1.70	NA	3.38	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.41	11.6	115.0	115.0	17.3	1.0	5.9	38	5	8	5.00	1.20	15	0.311	0.311	0.311	0.306	2.65	non-LIQ CLAY	1	1.70	NA	3.62	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.58	11.4	115.0	115.0	16.4	1.0	5.9	39	4	8	5.00	1.20	14	0.321	0.321	0.321	0.316	2.67	non-LIQ CLAY	1	1.70	NA	3.78	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.74	11.3	115.0	115.0	16.1	0.9	5.6	39	4	8	5.00	1.20	14	0.330	0.330	0.330	0.325	2.67	non-LIQ CLAY	1	1.70	NA	3.77	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.91	11.1	115.0	115.0	14.4	0.9	6.0	42	4	7	5.00	1.20	13	0.340	0.340	0.340	0.335	2.73	non-LIQ CLAY	1	1.70	NA	4.24	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.07	10.9	115.0	115.0	14.2	1.0	7.2	46	4	7	5.00	1.20	13	0.349	0.349	0.349	0.344	2.81	non-LIQ CLAY	1	1.70	NA	4.83	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.23	10.8	115.0	115.0	18.0	1.2	6.7	41	5	8	5.00	1.20	15	0.358	0.358	0.358	0.353	2.72	non-LIQ CLAY	1	1.70	NA	4.13	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.40	10.6	115.0	115.0	22.3	1.2	5.4	39	6	10	5.00	1.20	17	0.368	0.368	0.368	0.363	2.68	non-LIQ CLAY	1	1.70	NA	3.86	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.56	10.4	115.0	115.0	23.6	1.1	4.8	37	6	10	5.00	1.20	17	0.377	0.377	0.377	0.372	2.63	non-LIQ CLAY	1	1.70	NA	3.53	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.73	10.3	115.0	115.0	25.5	1.0	4.0	33	6	11	4.90	1.18	17	0.387	0.387	0.387	0.382	2.56	SILT	0.7	1.70	40.9	3.08	126.1	0.27	0.984	0.46	0.430	0.62	NA	NA	NA	NA	NA	0.000	14	2.000	0.041
6.89	10.1	115.0	115.0	24.0	1.1	4.5	36	6	10	5.00	1.20	17	0.396	0.396	0.396	0.391	2.62	non-LIQ CLAY	1	1.70	NA	3.43	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	10.0	115.0	115.0	25.8	1.1	4.3	35	7	11	4.97	1.20	18	0.405	0.405	0.405	0.400	2.59	SILT	0.7	1.70	41.4	3.27	135.3	0.31	0.984	0.46	0.430	0.72	NA	NA	NA	NA	NA	0.000	14	2.000	0.038
7.22	9.8	115.0	115.0	25.5	1.4	5.6	39	7	11	5.00	1.20	18	0.415	0.415	0.415	0.410	2.68	non-LIQ CLAY	1	1.70	NA	3.84	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.38	9.6	115.0	115.0	22.9	1.5	6.4	39	6	10	5.00	1.20	17	0.424	0.424	0.424	0.419	2.68	non-LIQ CLAY	1	1.70	NA	3.86	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.55	9.5	115.0	115.0	21.4	1.4	6.5	41	6	9	5.00	1.20	16	0.434	0.434	0.434	0.429	2.71	non-LIQ CLAY	1	1.70	NA	4.08	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.71	9.3	115.0	115.0	19.2	1.2	6.1	42	5	8	5.00	1.20	15	0.443	0.443	0.443	0.438	2.73	non-LIQ CLAY	1	1.70	NA	4.21	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	9.1	115.0	115.0	20.8	1.1	5.1	38	5	8	5.00	1.20	15	0.453	0.453	0.453	0.448	2.65	non-LIQ CLAY	1	1.70	NA	3.67	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.04	9.0	115.0	115.0	21.4	1.0	4.5	36	6	8	5.00	1.20	15	0.462	0.462	0.462	0.457	2.61	non-LIQ CLAY	1	1.70	NA	3.42	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	8.8	115.0	115.0	24.5	1.3	5.1	36	6	9	5.00	1.20	16	0.472	0.472	0.472	0.467	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	8.6	115.0	115.0	30.3	1.4	4.6	35	8	11	5.00	1.20	19	0.481	0.481	0.481	0.476	2.60	non-LIQ CLAY	1	1.70	NA	3.30	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
8.53	8.5	115.0	115.0	31.4	1.6	5.1	36	8	12	5.00	1.20	19	0.490	0.490	0.490	0.485	2.62	non-LIQ CLAY	1	1.70	NA	3.47	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.69	8.3	115.0	115.0	30.8	1.5	4.9	36	8	12	5.00	1.20	19	0.500	0.500	0.500	0.495	2.62	non-LIQ CLAY	1	1.70	NA	3.46	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.86	8.1	115.0	115.0	29.7	1.6	5.5	36	8	11	5.00	1.20	18	0.509	0.509	0.509	0.504	2.61	non-LIQ CLAY	1	1.70	NA	3.38	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.02	8.0	115.0	115.0	30.6	1.7	5.6	36	8	11	5.00	1.20	18	0.519	0.519	0.519	0.514	2.61	non-LIQ CLAY	1	1.70	NA	3.38	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	7.8	115.0	115.0	29.0	1.8	6.3	39	8	11	5.00	1.20	18	0.528	0.528	0.528	0.523	2.67	non-LIQ CLAY	1	1.70	NA	3.77	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	7.7	115.0	115.0	28.7	1.8	6.3	39	8	11	5.00	1.20	18	0.538	0.538	0.538	0.533	2.68	non-LIQ CLAY	1	1.70	NA	3.86	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	7.5	115.0	115.0	27.0	1.7	6.3	41	7	10	5.00	1.20	17	0.547	0.547	0.547	0.542	2.70	non-LIQ CLAY	1	1.70	NA	4.00	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	7.3	115.0	115.0	21.9	1.2	5.3	41	6	8	5.00	1.20	15	0.557	0.557	0.557	0.551	2.72	non-LIQ CLAY	1	1.70	NA	4.14	non-LIQ	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	7.2	115.0	115.0	17.7	0.9	4.9	44	5	7	5.00	1.20	13	0.566	0.566	0.566	0.561	2.77	non-LIQ CLAY	1	1.70	NA	4.53	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	7.0	115.0	115.0	17.0	0.6	3.7	41	5	6	5.00	1.20	12	0.576	0.576	0.576	0.570	2.71	non-LIQ CLAY	1	1.70	NA	4.05	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	6.8	115.0	115.0	17.2	0.6	3.5	40	5	6	5.00	1.20	12	0.585	0.585	0.585	0.580	2.69	non-LIQ CLAY	1	1.70	NA	3.92	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	6.7	115.0	115.0	17.0	0.6	3.4	40	5	6	5.00	1.20	12	0.594	0.590	0.594	0.589	2.69	non-LIQ CLAY	1	1.70	NA	3.89	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	6.5	115.0	115.0	18.0	0.6	3.3	38	5	6	5.00	1.20	13	0.604	0.594	0.604	0.594	2.66	non-LIQ CLAY	1	1.70	NA	3.72	non-LIQ	non-LIQ	0.976	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	6.3	115.0	115.0	21.2	0.7	3.3	36	5	7	5.00	1.20	14	0.613	0.599	0.613	0.599	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.975	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	6.2	115.0	115.0	25.6	0.9	3.6	37	7	9	5.00	1.20	16	0.623	0.603	0.623	0.603	2.63	non-LIQ CLAY	1	1.70	NA	3.51	non-LIQ	non-LIQ	0.975	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.99	6.0	115.0	115.0	27.0	1.2	4.5	37	7	9	5.00	1.20	16	0.632	0.607	0.632	0.607	2.63	non-LIQ CLAY	1	1.70	NA	3.49	non-LIQ	non-LIQ	0.974	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	5.9	115.0	115.0	26.9	1.2	4.6	37	7	9	5.00	1.20	16	0.641	0.611	0.641	0.611	2.64	non-LIQ CLAY	1	1.70	NA	3.57	non-LIQ	non-LIQ	0.974	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	5.7	115.0	115.0	26.0	1.1	4.3	37	7	9	5.00	1.20	16	0.651	0.616	0.651	0.616	2.63	non-LIQ CLAY	1	1.70	NA	3.50	non-LIQ	non-LIQ	0.974	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.48	5.5	115.0	115.0	25.8	1.1	4.2	37	7	9	5.00	1.20	15	0.660	0.620	0.660	0.620	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.973	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	5.4	115.0	115.0	26.6	1.0	3.9	38	7	9	5.00	1.20	16	0.670	0.625	0.670	0.625	2.65	non-LIQ CLAY	1	1.69	NA	3.62	non-LIQ	non-LIQ	0.973	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	5.2	115.0	115.0	26.9	1.0	3.5	36	7	9	5.00	1.20	16	0.679	0.629	0.679	0.629	2.62	non-LIQ CLAY	1	1.68	NA	3.43	non-LIQ	non-LIQ	0.972	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	5.0	115.0	115.0	27.0	0.9	3.4	36	7	9	5.00	1.20	16	0.689	0.633	0.689	0.633	2.60	non-LIQ CLAY	1	1.67	NA	3.35	non-LIQ	non-LIQ	0.972	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	4.9	115.0	115.0	26.7	1.0	3.7	37	7	9	5.00	1.20	16	0.698	0.638	0.698	0.636	2.64	non-LIQ CLAY	1	1.66	NA	3.57	non-LIQ	non-LIQ	0.972	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	4.7	115.0	115.0	27.8	1.0	3.7	36	7	9	5.00	1.20	16	0.707	0.642	0.707	0.642	2.62	non-LIQ CLAY	1	1.65	NA	3.45	non-LIQ	non-LIQ	0.971	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	4.5	115.0	115.0	27.0	1.0	3.8	38	7	9	5.00	1.20	16	0.717	0.646	0.717	0.646	2.65	non-LIQ CLAY	1	1.64	NA	3.62	non-LIQ	non-LIQ	0.971	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	4.4	115.0	115.0	26.5	1.0	3.7	35	7	9	5.00	1.20	15	0.726	0.650	0.726	0.650	2.60	non-LIQ CLAY	1	1.63	NA	3.33	non-LIQ	non-LIQ	0.971	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.80	4.2	115.0	115.0	23.7	0.9	3.9	38	6	8	5.00	1.20	15	0.736	0.655	0.736	0.655	2.66	non-LIQ CLAY	1	1.62	NA	3.68	non-LIQ	non-LIQ	0.970	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	4.0	115.0	115.0	21.9	0.9	3.9	40	6	7	5.00	1.20	14	0.745	0.659	0.745	0.659	2.68	non-LIQ CLAY	1	1.61	NA	3.87	non-LIQ	non-LIQ	0.970	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.12	3.9	115.0	115.0	20.9	0.8	3.7	39	6	7	5.00	1.20	13	0.754	0.663	0.754	0.663	2.68	non-LIQ CLAY	1	1.60	NA	3.85	non-LIQ	non-LIQ	0.969	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	3.7	115.0	115.0	21.2	0.7	3.5	39	6	7	5.00	1.20	13	0.764	0.668	0.764	0.668	2.67	non-LIQ CLAY	1	1.58	NA	3.78	non-LIQ	non-LIQ	0.969	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	3.6	115.0	115.0	21.7	0.7	3.1	36	6	7	5.00	1.20	13	0.773	0.672	0.773	0.672	2.62	non-LIQ CLAY	1	1.57	NA	3.46	non-LIQ	non-LIQ	0.969	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	3.4	115.0	115.0	21.2	0.6	2.8	36	5	7	5.00	1.20	13	0.783	0.676	0.783	0.676	2.61	non-LIQ CLAY	1	1.56	NA	3.40	non-LIQ	non-LIQ	0.968	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	3.2	115.0	115.0	22.5	0.5	2.2	35	6	7	5.00	1.20	14	0.792	0.681	0.792	0.681	2.60	non-LIQ CLAY	1	1.55	NA	3.31	non-LIQ	non-LIQ	0.968	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	3.1	115.0	115.0	24.4	0.6	2.5	34	6	8	4.93	1.19	14	0.802	0.685	0.802	0.685	2.57	SILT	0.7	1.36	31.3	3.16	99.0	0.17	0.967	0.52	0.490	0.35	NA	NA	NA	NA	NA	0.000	11	2.460	0.047
14.11	2.9	115.0	115.0	28.1	0.9	3.1	35	7	9	4.96	1.19	15	0.811	0.689	0.811	0.689	2.59	SILT	0.7	1.35	35.8	3.24	115.9	0.22	0.967	0.53	0.490	0.46	NA	NA	NA	NA	NA	0.000	12	2.310	0.047
14.27	2.7	115.0	115.0	29.1	1.3	4.6	38	8	9	5.00	1.20	16	0.821	0.694	0.821	0.694	2.66	non-LIQ CLAY	1	1.53	NA	3.70	non-LIQ	non-LIQ	0.967	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	2.6	115.0	115.0	32.4	1.6	4.8	37	8	10	5.00	1.20	17	0.830	0.698	0.830	0.698	2.64	non-LIQ CLAY	1	1.52	NA	3.56	non-LIQ	non-LIQ	0.966	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	2.4	115.0	115.0	39.8	2.0	5.1	37	10	13	5.00	1.20	20	0.839	0.702	0.839	0.702	2.63	non-LIQ CLAY	1	1.51	NA	3.53	non-LIQ	non-LIQ	0.966	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	2.2	115.0	115.0	41.5	2.4	5.8	37	11	13	5.00	1.20	21	0.849	0.706	0.849	0.706	2.63	non-LIQ CLAY	1	1.50	NA	3.49	non-LIQ	non-LIQ	0.966	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	2.1	115.0	115.0	49.8	2.5	5.0	34	13	15	4.95	1.19	23	0.858	0.711	0.858	0.711	2.58	SAND	0.5	1.22	57.4	3.22	184.8	non-LIQ	0.965	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.09	1.9	115.0	115.0	61.9	3.5	5.7	34	16	19	4.91	1.18	27	0.868	0.715	0.868	0.715	2.56	SAND	0.5	1.22	71.2	3.11	221.5	non-LIQ	0.965	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.26	1.7	115.0	115.0	70.3	3.6	5.1	30	17	21	4.73	1.16	29	0.877	0.720	0.877	0.720	2.49	SAND	0.5	1.21	80.6	2.73	220.2	non-LIQ	0.964	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.42	1.6	115.0	115.0	83.8	4.1	4.9	28	20	24	4.53	1.14	32	0.887	0.724	0.887	0.724	2.43	SAND	0.5	1.21	95.8	2.44	233.7	non-LIQ	0.964	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	1.4	115.0	115.0	125.9	4.9	3.9	20	27	33	3.66	1.08	39	0.896	0.728	0.896	0.728	2.24	SAND	0.5	1.21	143.4	1.76	252.9	non-LIQ	0.964	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.75	1.3	115.0	115.0	97.5	5.3	5.4	27	23	28	4.52	1.13	36	0.906	0.732	0.906	0.732	2.43	SAND	0.5	1.20	110.7	2.42	268.0	non-LIQ	0.963	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	1.1	115.0	115.0	78.7	5.2	6.6	33	20	24	4.88	1.18	33	0.915	0.737	0.915	0.737	2.55	SAND	0.5	1.20	89.2	3.04	271.3	non-LIQ	0.963	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	0.9	115.0	115.0	72.7	4.9	6.7	34	18	22	4.94	1.19	31	0.925	0.741	0.925	0.741	2.58	SAND	0.5	1.19	82.1	3.19	262.0	non-LIQ	0.963	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	0.8	115.0	115.0	75.3	4.7	6.3	33	19	22	4.87	1.18	31	0.934	0.745	0.934	0.745	2.55	SAND	0.5	1.19	84.7	3.02	255.7	non-LIQ	0.962	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	0.6	115.0	115.0	66.4	4.2	6.4	35	17	20	4.97	1.20	29	0.943	0.750	0.943	0.750	2.59	SAND	0.5	1.19	74.5	3.26	243.0	non-LIQ	0.962	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	0.4	115.0	115.0	77.2	4.1	5.4	30	19	22	4.71	1.16	30	0.953	0.754	0.953	0.754	2.49	SAND	0.5	1.18	86.4	2.70	233.6	non-LIQ	0.961	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	0.3	115.0	115.0	113.1	5.3	4.7	24	26	30	4.18	1.11	38	0.962	0.758	0.962	0.758	2.34	SAND	0.5	1.18	126.2	2.08	263.1	non-LIQ	0.961	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	0.1	115.0	115.0	128.0	5.9	4.6	23	28	34	4.00	1.10	41	0.972	0.763	0.972	0.763	2.30	SAND	0.5	1.18	142.5	1.95	277.9	non-LIQ	0.961	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	-0.1	115.0	115.0	95.7	5.1	5.4	28	23	27	4.54	1.14	35	0.981	0.767	0.981	0.767	2.43	SAND	0.5	1.17	106.2	2.45	260.2	non-LIQ	0.960	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	-0.2	115.0	115.0	73.4	5.0	6.8	35	19	22	4.96	1.19	31	0.990	0.771	0.990	0.771	2.58	SAND	0.5	1.17	81.3	3.23	262.9	non-LIQ	0.960	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	-0.4	115.0	115.0	67.6	4.2	6.1	34	17	20	4.94	1.19	29	1.000	0.776	1.000	0.776	2.57	SAND	0.5	1.17	74.7	3.18	237.1	non-LIQ	0.959	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	-0.6	115.0	115.0	69.0	4.3	6.2	34	17	20	4.94	1.19	29	1.009	0.780	1.009	0.780	2.57	SAND	0.5	1.16	76.0	3.18	241.4	non-LIQ	0.959	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	-0.7	115.0	115.0	88.2	4.3	4.8	27	21	24	4.50	1.13	32	1.019	0.784	1.019	0.784	2.42	SAND	0.5	1.16	96.9	2.40	232.2	non-LIQ	0.959	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	-0.9	115.0	115.0	91.5	5.0	5.4	29	22	25	4.61	1.14	33	1.028	0.788	1.028	0.788	2.45	SAND	0.5	1.16	100.2	2.54	254.6	non-LIQ	0.958	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	-1.0	115.0	115.0	88.4	5.4	6.1	31	22	25	4.76	1.16	34	1.037	0.793	1.037	0.793	2.50	SAND	0.5	1.16	96.6	2.78	268.3	non-LIQ	0.958	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	-1.2	115.0	115.0	80.4	4.0	4.9	29	19	22	4.62	1.14	30	1.047	0.797	1.047	0.797	2.46	SAND	0.5	1.15	87.5	2.56	223.6	non-LIQ	0.958	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	-1.4	115.0	115.0	56.1	4.0	7.1	38	15	17	5.00	1.20	25	1.056	0.801	1.056	0.801	2.65	non-LIQ CLAY	1	1.32	NA	3.62	non-LIQ	non-LIQ	0.957	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	-1.5	115.0	115.0	70.4	4.7	6.7	35	18	21	5.00	1.20	30	1.066	0.806	1.066	0.806	2.60	SAND	0.5	1.15	76.3	3.33	253.6	non-LIQ	0.957	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	-1.7	115.0	115.0	73.2	4.7	6.4	34	18	21	4.94	1.19	30	1.075	0.810	1.075	0.810	2.58	SAND	0.5	1.14	79.1	3.18	251.5	non-LIQ	0.956	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	-1.9	115.0	115.0	80.2	4.4	5.4	30	19	22	4.73	1.16	30	1.084	0.814	1.084	0.814	2.49	SAND	0.5	1.14	86.4	2.73	235.9	non-LIQ	0.956	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.03	-2.0	115.0	115.0	78.0	4.1	5.3	30	19	22	4.73	1.16	30	1.094	0.819	1.094	0.819	2.49	SAND	0.5	1.14	83.7	2.74	229.3	non-LIQ	0.956	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	-2.2	115.0	115.0	103.8	4.3	4.2	24	23	27	4.16	1.11	34	1.103	0.823	1.103	0.823	2.33	SAND	0.5	1.13	111.2	2.06	229.6	non-LIQ	0.955	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	-2.4	115.0	115.0	120.2	4.7	3.9	21	26	30	3.83	1.09	36	1.113	0.827	1.113	0.827	2.27	SAND	0.5	1.13	128.5	1.85	237.9	non-LIQ	0.955	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	-2.5	115.0	115.0	86.4	4.5	5.2	29	21	23	4.63	1.14	31	1.122	0.832	1.122	0.832	2.46	SAND	0.5	1.13	92.1	2.57	236.4	non-LIQ	0.954	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	-2.7	115.0	115.0	94.6	3.8	4.0	24	21	24	4.22	1.11	31	1.132	0.836	1.132	0.836	2.35	SAND	0.5	1.12	100.5	2.12	212.7	non-LIQ	0.954	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	-2.9	115.0	115.0	58.3	2.8	4.9	33	15	16	4.89	1.18	24	1.141	0.840	1.141	0.840	2.55	SAND	0.5	1.12	61.8	3.05	188.4	non-LIQ	0.954	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	-3.0	115.0	115.0	24.3	1.6	6.7	52	7	8	5.00	1.20	15	1.151	0.845	1.151	0.845	2.90	non-LIQ CLAY	1	1.25	NA	5.70	non-LIQ	non-LIQ	0.953	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	-3.2	115.0	115.0	19.6	0.8	3.9	47	6	6	5.00	1.20	13	1.160	0.849	1.160	0.849	2.82	non-LIQ CLAY	1	1.25	NA	4.95	non-LIQ	non-LIQ	0.953	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	-3.3	115.0	115.0	17.8	0.6	3.5	47	5	6	5.00	1.20	12	1.170	0.853	1.170	0.853	2.82	non-LIQ CLAY	1	1.24	NA	4.98	non-LIQ	non-LIQ	0.953	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	-3.5	115.0	115.0	16.7	0.6	3.4	49	5	5	5.00	1.20	11	1.179	0.858	1.179	0.858	2.84	non-LIQ CLAY	1	1.23	NA	5.17	non-LIQ	non-LIQ	0.952	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	-3.7	115.0	115.0	16.1	0.5	3.4	49	5	5	5.00	1.20	11	1.189	0.862	1.189	0.862	2.86	non-LIQ CLAY	1	1.23	NA	5.30	non-LIQ	non-LIQ	0.952	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	-3.8	115.0	115.0	16.7	0.5	3.2	47	5	5	5.00	1.20	11	1.198	0.866	1.198	0.866	2.82	non-LIQ CLAY	1	1.22	NA	5.00	non-LIQ	non-LIQ	0.951	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	-4.0	115.0	115.0	16.1	0.6	3.8	52	5	5	5.00	1.20	11	1.208	0.871	1.208	0.871	2.89	non-LIQ CLAY	1	1.22	NA	5.62	non-LIQ	non-LIQ	0.951	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	-4.2	115.0	115.0	16.2	0.6	3.7	51	5	5	5.00	1.20	11	1.217	0.875	1.217	0.875	2.88	non-LIQ CLAY	1	1.21	NA	5.53	non-LIQ	non-LIQ	0.951	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	-4.3	115.0	115.0	22.4	0.9	4.2	46	6	7	5.00	1.20	13	1.226	0.879	1.226	0.879	2.80	non-LIQ CLAY	1	1.20	NA	4.77	non-LIQ	non-LIQ	0.950	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	-4.5	115.0	115.0	27.3	1.0	3.8	41	7	8	5.00	1.20	15	1.236	0.883	1.236	0.883	2.70	non-LIQ CLAY	1	1.20	NA	4.01	non-LIQ	non-LIQ	0.950	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	-4.7	115.0	115.0	17.9	1.0	5.4	56	6	6	5.00	1.20	12	1.245	0.888	1.245	0.888	2.96	non-LIQ CLAY	1	1.19	NA	6.28	non-LIQ	non-LIQ	0.950	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	-4.8	115.0	115.0	16.8	1.0	5.8	59	5	6	5.00	1.20	12	1.255	0.892	1.255	0.892	3.00	non-LIQ CLAY	1	1.19	NA	6.78	non-LIQ	non-LIQ	0.949	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	-5.0	115.0	115.0	16.0	0.9	5.8	60	5	6	5.00	1.20	12	1.264	0.896	1.264	0.896	3.03	non-LIQ CLAY	1	1.18	NA	7.04	non-LIQ	non-LIQ	0.949	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	-5.2	115.0	115.0	15.7	0.9	5.7	61	5	6	5.00	1.20	12	1.274	0.901	1.274	0.901	3.03	non-LIQ CLAY	1	1.17	NA	7.10	non-LIQ	non-LIQ	0.948	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	-5.3	115.0	115.0	15.9	0.9	5.5	59	5	6	5.00	1.20	12	1.283	0.905	1.283	0.905	3.01	non-LIQ CLAY	1	1.17	NA	6.91	non-LIQ	non-LIQ	0.948	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	-5.5	115.0	115.0	15.6	0.9	5.6	61	5	5	5.00	1.20	12	1.292	0.909	1.292	0.909	3.03	non-LIQ CLAY	1	1.16	NA	7.11	non-LIQ	non-LIQ	0.948	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-27

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{vo} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
22.64	-5.6	115.0	115.0	15.2	0.8	5.3	60	5	5	5.00	1.20	11	1.302	0.914	1.302	0.914	3.03	non-LIQ CLAY	1	1.16	NA	7.06	non-LIQ	non-LIQ	0.947	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	-5.8	115.0	115.0	14.4	0.8	5.3	62	5	5	5.00	1.20	11	1.311	0.918	1.311	0.918	3.05	non-LIQ CLAY	1	1.15	NA	7.34	non-LIQ	non-LIQ	0.947	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	-6.0	115.0	115.0	15.1	0.7	5.0	60	5	5	5.00	1.20	11	1.321	0.922	1.321	0.922	3.02	non-LIQ CLAY	1	1.15	NA	6.94	non-LIQ	non-LIQ	0.946	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	-6.1	115.0	115.0	13.9	0.7	5.2	63	5	5	5.00	1.20	11	1.330	0.927	1.330	0.927	3.06	non-LIQ CLAY	1	1.14	NA	7.47	non-LIQ	non-LIQ	0.946	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.29	-6.3	115.0	115.0	12.7	0.7	5.3	66	4	5	5.00	1.20	11	1.339	0.931	1.339	0.931	3.11	non-LIQ CLAY	1	1.14	NA	8.02	non-LIQ	non-LIQ	0.946	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	-6.5	115.0	115.0	12.6	0.7	5.3	67	4	5	5.00	1.20	11	1.349	0.935	1.349	0.935	3.11	non-LIQ CLAY	1	1.13	NA	8.11	non-LIQ	non-LIQ	0.945	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	-6.6	115.0	115.0	10.7	0.6	6.1	74	4	4	5.00	1.20	10	1.358	0.939	1.358	0.939	3.22	non-LIQ CLAY	1	1.13	NA	9.51	non-LIQ	non-LIQ	0.945	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	-6.8	115.0	115.0	10.2	0.6	5.9	76	4	4	5.00	1.20	10	1.368	0.944	1.368	0.944	3.24	non-LIQ CLAY	1	1.12	NA	9.77	non-LIQ	non-LIQ	0.945	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	-7.0	115.0	115.0	11.6	0.6	5.1	69	4	4	5.00	1.20	10	1.377	0.948	1.377	0.948	3.14	non-LIQ CLAY	1	1.12	NA	8.47	non-LIQ	non-LIQ	0.944	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	-7.1	115.0	115.0	9.8	0.6	5.9	77	4	4	5.00	1.20	10	1.386	0.952	1.386	0.952	3.25	non-LIQ CLAY	1	1.11	NA	10.02	non-LIQ	non-LIQ	0.944	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	-7.3	115.0	115.0	7.3	0.5	7.2	94	3	3	5.00	1.20	9	1.396	0.957	1.396	0.957	3.45	non-LIQ CLAY	1	1.11	NA	13.21	non-LIQ	non-LIQ	0.943	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	-7.4	115.0	115.0	5.2	0.4	8.6	117	3	3	5.00	1.20	9	1.405	0.961	1.405	0.961	3.68	non-LIQ CLAY	1	1.10	NA	17.63	non-LIQ	non-LIQ	0.943	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.61	-7.6	115.0	115.0	5.7	0.4	7.9	110	3	3	5.00	1.20	9	1.415	0.965	1.415	0.965	3.61	non-LIQ CLAY	1	1.10	NA	16.15	non-LIQ	non-LIQ	0.943	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	-7.8	115.0	115.0	5.6	0.5	8.9	114	3	3	5.00	1.20	9	1.424	0.970	1.424	0.970	3.65	non-LIQ CLAY	1	1.09	NA	17.07	non-LIQ	non-LIQ	0.942	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	-7.9	115.0	115.0	5.2	0.5	9.9	122	3	3	5.00	1.20	9	1.433	0.974	1.433	0.974	3.73	non-LIQ CLAY	1	1.09	NA	18.62	non-LIQ	non-LIQ	0.942	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	-8.1	115.0	115.0	6.1	0.5	8.3	107	3	3	5.00	1.20	9	1.443	0.978	1.443	0.978	3.59	non-LIQ CLAY	1	1.08	NA	15.72	non-LIQ	non-LIQ	0.941	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	-8.3	115.0	115.0	6.8	0.5	7.9	101	3	3	5.00	1.20	9	1.452	0.983	1.452	0.983	3.52	non-LIQ CLAY	1	1.08	NA	14.46	non-LIQ	non-LIQ	0.941	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	-8.4	115.0	115.0	6.5	0.6	9.0	107	3	3	5.00	1.20	9	1.462	0.987	1.462	0.987	3.58	non-LIQ CLAY	1	1.07	NA	15.63	non-LIQ	non-LIQ	0.941	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	-8.6	115.0	115.0	8.0	0.6	8.0	94	4	4	5.00	1.20	9	1.471	0.991	1.471	0.991	3.45	non-LIQ CLAY	1	1.07	NA	13.22	non-LIQ	non-LIQ	0.940	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	-8.8	115.0	115.0	10.6	0.7	6.7	80	4	4	5.00	1.20	10	1.481	0.995	1.481	0.995	3.28	non-LIQ CLAY	1	1.06	NA	10.44	non-LIQ	non-LIQ	0.940	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	-8.9	115.0	115.0	12.4	0.8	6.7	74	5	5	5.00	1.20	11	1.490	1.000	1.490	1.000	3.22	non-LIQ CLAY	1	1.06	NA	9.47	non-LIQ	non-LIQ	0.940	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	-9.1	115.0	115.0	13.4	1.0	7.3	74	5	5	5.00	1.20	11	1.500	1.004	1.500	1.004	3.21	non-LIQ CLAY	1	1.05	NA	9.42	non-LIQ	non-LIQ	0.939	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	-9.3	115.0	115.0	12.4	0.9	7.5	77	5	5	5.00	1.20	11	1.509	1.009	1.509	1.009	3.25	non-LIQ CLAY	1	1.05	NA	10.00	non-LIQ	non-LIQ	0.939	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	-9.4	115.0	115.0	11.7	0.9	7.6	80	5	5	5.00	1.20	11	1.519	1.013	1.519	1.013	3.28	non-LIQ CLAY	1	1.04	NA	10.43	non-LIQ	non-LIQ	0.938	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	-9.6	115.0	115.0	11.3	0.8	7.1	79	4	4	5.00	1.20	10	1.528	1.017	1.528	1.017	3.28	non-LIQ CLAY	1	1.04	NA	10.40	non-LIQ	non-LIQ	0.938	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	-9.7	115.0	115.0	13.6	0.9	6.4	71	5	5	5.00	1.20	11	1.538	1.022	1.538	1.022	3.17	non-LIQ CLAY	1	1.04	NA	8.90	non-LIQ	non-LIQ	0.938	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	-9.9	115.0	115.0	17.8	0.9	5.2	59	6	6	5.00	1.20	12	1.547	1.026	1.547	1.026	3.01	non-LIQ CLAY	1	1.03	NA	6.87	non-LIQ	non-LIQ	0.937	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-10.1	115.0	115.0	21.0	1.0	4.6	53	6	6	5.00	1.20	13	1.557	1.030	1.557	1.030	2.91	non-LIQ CLAY	1	1.03	NA	5.80	non-LIQ	non-LIQ	0.937	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-10.2	115.0	115.0	23.2	1.0	4.4	50	7	7	5.00	1.20	13	1.566	1.034	1.566	1.034	2.87	non-LIQ CLAY	1	1.02	NA	5.38	non-LIQ	non-LIQ	0.937	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-10.4	115.0	115.0	25.9	1.2	4.5	48	7	8	5.00	1.20	14	1.576	1.039	1.576	1.039	2.83	non-LIQ CLAY	1	1.02	NA	5.09	non-LIQ	non-LIQ	0.936	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-10.6	115.0	115.0	26.6	1.2	4.6	48	8	8	5.00	1.20	14	1.585	1.043	1.585	1.043	2.83	non-LIQ CLAY	1	1.01	NA	5.08	non-LIQ	non-LIQ	0.936	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-10.7	115.0	115.0	26.4	1.2	4.4	47	8	8	5.00	1.20	14	1.594	1.047	1.594	1.047	2.82	non-LIQ CLAY	1	1.01	NA	4.97	non-LIQ	non-LIQ	0.935	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-10.9	115.0	115.0	26.7	1.4	5.1	50	8	8	5.00	1.20	14	1.604	1.052	1.604	1.052	2.86	non-LIQ CLAY	1	1.01	NA	5.33	non-LIQ	non-LIQ	0.935	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-11.1	115.0	115.0	26.1	1.3	4.9	50	8	8	5.00	1.20	14	1.613	1.056	1.613	1.056	2.86	non-LIQ CLAY	1	1.00	NA	5.32	non-LIQ	non-LIQ	0.935	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-11.2	115.0	115.0	24.9	1.2	5.0	51	7	7	5.00	1.20	14	1.623	1.060	1.623	1.060	2.88	non-LIQ CLAY	1	1.00	NA	5.54	non-LIQ	non-LIQ	0.934	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-11.4	115.0	115.0	25.5	1.1	4.3	48	7	7	5.00	1.20	14	1.632	1.065	1.632	1.065	2.84	non-LIQ CLAY	1	0.99	NA	5.11	non-LIQ	non-LIQ	0.934	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-11.5	115.0	115.0	24.7	1.1	4.3	49	7	7	5.00	1.20	14	1.641	1.069	1.641	1.069	2.84	non-LIQ CLAY	1	0.99	NA	5.17	non-LIQ	non-LIQ	0.933	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-11.7	115.0	115.0	24.0	1.0	4.2	49	7	7	5.00	1.20	13	1.651	1.073	1.651	1.073	2.85	non-LIQ CLAY	1	0.99	NA	5.24	non-LIQ	non-LIQ	0.933	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-11.9	115.0	115.0	24.3	1.0	4.0	48	7	7	5.00	1.20	13	1.660	1.078	1.660	1.078	2.84	non-LIQ CLAY	1	0.98	NA	5.10	non-LIQ	non-LIQ	0.933	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-12.0	115.0	115.0	26.8	1.1	4.0	46	8	8	5.00	1.20	14	1.670	1.082	1.670	1.082	2.80	non-LIQ CLAY	1	0.98	NA	4.80	non-LIQ	non-LIQ	0.932	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-12.2	115.0	115.0	26.2	1.1	4.2	47	8	7	5.00	1.20	14	1.679	1.086	1.679	1.086	2.82	non-LIQ CLAY	1	0.97	NA	4.98	non-LIQ	non-LIQ	0.932	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-12.4	115.0	115.0	24.0	1.1	4.4	50	7	7	5.00	1.20	13	1.688	1.090	1.688	1.090	2.87	non-LIQ CLAY	1	0.97	NA	5.44	non-LIQ	non-LIQ	0.932	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-12.5	115.0	115.0	23.9	1.1	4.6	51	7	7	5.00	1.20	13	1.698	1.095	1.698	1.095	2.89	non-LIQ CLAY	1	0.97	NA	5.61	non-LIQ	non-LIQ	0.931	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-12.7	115.0	115.0	23.4	1.1	4.7	52	7	7	5.00	1.20	13	1.707	1.099	1.707	1.099	2.91	non-LIQ CLAY	1	0.96	NA	5.75	non-LIQ	non-LIQ	0.931	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-12.9	115.0	115.0	21.1	1.0	4.6	54	6	6	5.00	1.20	13	1.717	1.104	1.717	1.104	2.94	non-LIQ CLAY	1	0.96	NA	6.07	non-LIQ	non-LIQ	0.930	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-13.0	115.0	115.0	20.7	0.9	4.4	54	6	6	5.00	1.20	12	1.726	1.108	1.726	1.108	2.94	non-LIQ CLAY	1	0.96	NA	6.07	non-LIQ	non-LIQ	0.930	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-13.2	115.0	115.0	21.8	0.9	4.2	52	7	6	5.00	1.20	13	1.735	1.112	1.735	1.112	2.90	non-LIQ CLAY	1	0.95	NA	5.73	non-LIQ	non-LIQ	0.928	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-13.4	115.0	115.0	22.3	0.9	4.2	52	7	7	5.00	1.20	13	1.745	1.116	1.745	1.116	2.90	non-LIQ CLAY	1	0.95	NA	5.68	non-LIQ	non-LIQ	0.927	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-13.5	115.0	115.0	23.4	0.9	3.9	49	7	7	5.00	1.20	13	1.754	1.121	1.754	1.121	2.86	non-LIQ CLAY	1	0.94	NA	5.29	non-LIQ	non-LIQ	0.926	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-13.7	115.0	115.0	24.1	1.0	4.1	50	7	7	5.00	1.20	13	1.764	1.125	1.764	1.125	2.86	non-LIQ CLAY	1	0.94	NA	5.34	non-LIQ	non-LIQ	0.924	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-13.8	115.0	115.0	23.3	0.9	4.0	50	7	7	5.00	1.20	13	1.773	1.129	1.773	1.129	2.87	non-LIQ CLAY	1	0.94	NA	5.42	non-LIQ	non-LIQ	0.923	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-14.0	115.0	115.0	22.3	0.9	4.0	51.4	6.7	6.5	5.0	1.2	13.0	1.78	1.13	1.78	1.13	2.89	non-LIQ CLAY	1	0.93	NA	5.61	non-LIQ	non-LIQ	0.922	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.17	-14.2	115.0	115.0	20.6	0.9	4.3	54.7	6.4	6.1	5.0	1.2	12.0	1.79	1.14	1.79	1.14	2.94	non-LIQ CLAY	1	0.93	NA	6.12	non-LIQ	non-LIQ	0.920	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.33	-14.3	115.0	115.0	19.7	0.8	4.3	55.7	6.1	5.9	5.0	1.2	12.0	1.80	1.14	1.80	1.14	2.96	non-LIQ CLAY	1	0.93	NA	6.29	non-LIQ	non-LIQ	0.919	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.50	-14.5	115.0	115.0	17.3	0.8	4.9	61.8	5.7	5.5	5.0	1.2	12.0	1.81	1.15	1.81	1.15	3.05	non-LIQ CLAY	1	0.92	NA	7.30	non-LIQ	non-LIQ	0.918	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.66	-14.7	115.0	115.0	14.6	0.9	6.1	71.7	5.3	5.1	5.0	1.2	11.0	1.82	1.15	1.82	1.15	3.18	non-LIQ CLAY	1	0.92	NA	9.02	non-LIQ	non-LIQ	0.916	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.82	-14.8	115.0	115.0	14.4	0.9	6.4	73.5	5.3	5.1	5.0	1.2	11.0	1.83	1.16	1.83	1.16	3.21	non-LIQ CLAY	1	0.92	NA	9.33	non-LIQ	non-LIQ	0.915	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.99	-15.0	115.0	115.0	23.4	1.0	4.4	52.6	7.1	6.8	5.0	1.2	13.0	1.84	1.16	1.84	1.16	2.91	non-LIQ CLAY	1	0.91	NA	5.79	non-LIQ	non-LIQ	0.914	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.15	-15.2	115.0	115.0	23.8	1.2	5.1	54.6	7.3	7.0	5.0	1.2	13.0	1.85	1.16	1.85	1.16	2.94	non-LIQ CLAY	1	0.91	NA	6.11	non-LIQ	non-LIQ	0.912	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.32	-15.3	115.0	115.0	22.0	1.0	4.7	55.2	6.8	6.5	5.0	1.2	13.0	1.86	1.17	1.86	1.17	2.95	non-LIQ CLAY	1	0.91	NA	6.21	non-LIQ	non-LIQ	0.911	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.48	-15.5	115.0	115.0	21.5	0.9	4.2	53.8	6.6	6.3	5.0	1.2	13.0	1.87	1.17	1.87	1.17	2.93	non-LIQ CLAY	1	0.90	NA	5.99	non-LIQ	non-LIQ	0.910	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.64	-15.6	115.0	115.0	20.4	0.8	3.8	53.8	6.2	5.9	5.0	1.2	12.0	1.88	1.18	1.88	1.18	2.93	non-LIQ CLAY	1	0.90	NA	5.98	non-LIQ	non-LIQ	0.908	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.81	-15.8	115.0	115.0	19.6	0.8	3.9	55.3	6.1	5.7	5.0	1.2	12.0	1.89	1.18	1.89	1.18	2.95	non-LIQ CLAY	1	0.90	NA	6.23	non-LIQ	non-LIQ	0.907	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.97	-16.0	115.0	115.0	17.5	0.7	4.1	59.3	5.6	5.3	5.0	1.2	11.0	1.90	1.19	1.90	1.19	3.01	non-LIQ CLAY	1	0.89	NA	6.89	non-LIQ	non-LIQ	0.906	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-16.1	115.0	115.0	13.9	0.7	4.8	69.3	4.9	4.6	5.0	1.2	11.0	1.91	1.19	1.91	1.19	3.15	non-LIQ CLAY	1	0.89	NA	8.58	non-LIQ	non-LIQ	0.904	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-16.3	115.0	115.0	16.2	0.7	4.2	62.1	5.4	5.0	5.0	1.2	11.0	1.91	1.19	1.91	1.19	3.05	non-LIQ CLAY	1	0.89	NA	7.35	non-LIQ	non-LIQ	0.903	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-16.5	115.0	115.0	19.0	0.7	3.8	55.9	5.9	5.6	5.0	1.2	12.0	1.92	1.20	1.92	1.20	2.96	non-LIQ CLAY	1	0.88	NA	6.32	non-LIQ	non-LIQ	0.902	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-16.6	115.0	115.0	18.6	0.8	4.5	59.8	6.0	5.6	5.0	1.2	12.0	1.93	1.20	1.93	1.20	3.02	non-LIQ CLAY	1	0.88	NA	6.96	non-LIQ	non-LIQ	0.900	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-16.8	115.0	115.0	18.3	0.9	4.7	61.2	6.0	5.6	5.0	1.2	12.0	1.94	1.21	1.94	1.21	3.04	non-LIQ CLAY	1	0.88	NA	7.20	non-LIQ	non-LIQ	0.899	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-17.0	115.0	115.0	19.6	0.9	4.6	58.8	6.3	5.9	5.0	1.2	12.0	1.95	1.21	1.95	1.21	3.00	non-LIQ CLAY	1	0.87	NA	6.79	non-LIQ	non-LIQ	0.898	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-17.1	115.0	115.0	19.5	0.9	4.5	58.8	6.3	5.8	5.0	1.2	12.0	1.96	1.22	1.96	1.22	3.00	non-LIQ CLAY	1	0.87	NA	6.60	non-LIQ	non-LIQ	0.896	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-17.3	115.0	115.0	19.8	0.8	4.1	56.7	6.2	5.8	5.0	1.2	12.0	1.97	1.22	1.97	1.22	2.97	non-LIQ CLAY	1	0.87	NA	6.46	non-LIQ	non-LIQ	0.895	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-17.5	115.0	115.0	20.0	0.8	4.0	56.2	6.3	5.8	5.0	1.2	12.0	1.98	1.22	1.98	1.22	2.97	non-LIQ CLAY	1	0.86	NA	6.37	non-LIQ	non-LIQ	0.894	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-17.6	115.0	115.0	19.3	0.8	4.3	58.5	6.2	5.7	5.0	1.2	12.0	1.99	1.23	1.99	1.23	3.00	non-LIQ CLAY	1	0.86	NA	6.74	non-LIQ	non-LIQ	0.892	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-17.8	115.0	115.0	20.7	0.9	4.2	56.1	6.5	6.0	5.0	1.2	12.0	2.00	1.23	2.00	1.23	2.96	non-LIQ CLAY	1	0.86	NA	6.35	non-LIQ	non-LIQ	0.891	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-17.9	115.0	115.0	21.2	0.9	4.2	55.6	6.6	6.1	5.0	1.2	12.0	2.01	1.24	2.01	1.24	2.96	non-LIQ CLAY	1	0.86	NA	6.27	non-LIQ	non-LIQ	0.890	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-18.1	115.0	115.0	22.3	0.9	3.9	53.3	6.8	6.3	5.0	1.2	13.0	2.02	1.24	2.02	1.24	2.92	non-LIQ CLAY	1	0.85	NA	5.91	non-LIQ	non-LIQ	0.888	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-18.3	115.0	115.0	23.3	0.9	3.9	52.2	7.0	6.5	5.0	1.2	13.0	2.03	1.25	2.03	1.25	2.90	non-LIQ CLAY	1	0.85	NA	5.74	non-LIQ	non-LIQ	0.887	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-18.4	115.0	115.0	24.1	1.0	3.9	51.6	7.2	6.7	5.0	1.2	13.0	2.04	1.25	2.04	1.25	2.89	non-LIQ CLAY	1	0.85	NA	5.64	non-LIQ	non-LIQ	0.886	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-18.6	115.0	115.0	24.6	0.9	3.8	50.8	7.3	6.7	5.0	1.2	13.0	2.05	1.25	2.05	1.25	2.88	non-LIQ CLAY	1	0.84	NA	5.52	non-LIQ	non-LIQ	0.884	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-18.8	115.0	115.0	24.3	1.0	4.0	51.9	7.3	6.7	5.0	1.2	13.0	2.06	1.26	2.06	1.26	2.90	non-LIQ CLAY	1	0.84	NA	5.69	non-LIQ	non-LIQ	0.883	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-18.9	115.0	115.0	23.1	0.9	4.0	53.3	7.0	6.4	5.0	1.2	13.0	2.07	1.26	2.07	1.26	2.92	non-LIQ CLAY	1	0.84	NA	5.90	non-LIQ	non-LIQ	0.882	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-19.1	115.0	115.0	21.6	1.1	5.2	59.9	7.0	6.4	5.0	1.2	13.0	2.08	1.27	2.08	1.27	3.02	non-LIQ CLAY	1	0.83	NA	6.99	non-LIQ	non-LIQ	0.880	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-19.3	115.0	115.0	22.2	1.5	6.9	65.1	7.5	6.9	5.0	1.2	13.0	2.08	1.27	2.08	1.27	3.09	non-LIQ CLAY	1	0.83	NA	7.86	non-LIQ	non-LIQ	0.879	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-19.4	115.0	115.0	31.8	2.0	6.4	54.5	9.8	8.9	5.0	1.2	16.0	2.09	1.28	2.09	1.28	2.94	non-LIQ CLAY	1	0.83	NA	6.10	non-LIQ	non-LIQ	0.878	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-19.6	115.0	115.0	40.9	2.4	5.9	47.6	11.8	10.7	5.0	1.2	18.0	2.10	1.28	2.10	1.28	2.83	non-LIQ CLAY	1	0.83	NA	5.03	non-LIQ	non-LIQ	0.876	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-19.8	115.0	115.0	42.7	2.9	6.7	49.4	12.5	11.4	5.0	1.2	19.0	2.11	1.28	2.11	1.28	2.86	non-LIQ CLAY	1	0.82	NA	5.30	non-LIQ	non-LIQ	0.875	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-19.9	115.0	115.0	60.7	3.4	5.7	39.9	16.3	14.7	5.0	1.2	23.0	2.12	1.29	2.12	1.29	2.69	non-LIQ CLAY	1	0.82	NA	3.93	non-LIQ	non-LIQ	0.874	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-20.1	115.0	115.0	52.7	3.5	6.6	45.0	14.8	13.4	5.0	1.2	21.0	2.13	1.29	2.13	1.29	2.78	non-LIQ CLAY	1	0.82	NA	4.65	non-LIQ	non-LIQ	0.872	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'MOIST	Unit Weight (pcf) γ'SAT	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{No} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
37.24	-20.2	115.0	115.0	65.5	3.1	4.8	36.1	16.9	15.2	5.0	1.2	23.0	2.14	1.30	2.14	1.30	2.62	non-LIQ CLAY	1	0.82	NA	3.42	non-LIQ	non-LIQ	0.871	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.40	-20.4	115.0	115.0	76.4	2.6	3.4	27.5	18.0	16.2	4.5	1.1	23.0	2.15	1.30	2.15	1.30	2.43	SAND	0.5	0.90	65	2.42	158	0.445	0.870	0.660	0.620	0.72	NA	NA	NA	NA	NA	0.00	18.00	1.71	0.03
37.57	-20.6	115.0	115.0	169.7	4.3	2.5	15.6	34.6	31.2	2.7	1.1	35.0	2.16	1.31	2.16	1.31	2.09	SAND	0.5	0.90	144	1.44	208	non-LIQ	0.868	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.73	-20.7	115.0	115.0	193.7	4.2	2.1	13.0	38.1	34.3	1.9	1.0	37.0	2.17	1.31	2.17	1.31	2.00	SAND	0.5	0.90	164	1.30	214	non-LIQ	0.867	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.89	-20.9	115.0	115.0	149.3	5.1	3.4	20.1	32.2	28.9	3.6	1.1	35.0	2.18	1.31	2.18	1.31	2.23	SAND	0.5	0.90	127	1.75	221	non-LIQ	0.866	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-21.1	115.0	115.0	116.3	4.5	3.9	24.2	26.4	23.6	4.2	1.1	30.0	2.19	1.32	2.19	1.32	2.34	SAND	0.5	0.90	98	2.10	207	non-LIQ	0.864	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-21.2	115.0	115.0	123.6	4.7	3.8	23.3	27.7	24.8	4.1	1.1	31.0	2.20	1.32	2.20	1.32	2.32	SAND	0.5	0.89	104	2.02	211	non-LIQ	0.863	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-21.4	115.0	115.0	236.6	4.7	2.0	11.0	45.2	40.4	1.2	1.0	43.0	2.21	1.33	2.21	1.33	1.92	SAND	0.5	0.89	200	1.21	242	non-LIQ	0.862	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-21.6	115.0	115.0	281.2	4.7	1.7	8.5	51.7	46.1	0.4	1.0	47.0	2.22	1.33	2.22	1.33	1.82	SAND	0.5	0.89	237	1.12	265	non-LIQ	0.860	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-21.7	115.0	115.0	278.1	4.9	1.8	9.0	51.6	45.9	0.6	1.0	47.0	2.23	1.34	2.23	1.34	1.84	SAND	0.5	0.89	234	1.14	266	non-LIQ	0.859	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-21.9	115.0	115.0	294.2	3.6	1.2	6.1	51.9	46.1	0.0	1.0	46.0	2.24	1.34	2.24	1.34	1.70	SAND	0.5	0.89	247	1.04	256	non-LIQ	0.858	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-22.0	115.0	115.0	317.8	3.5	1.1	5.1	55.0	48.7	0.0	1.0	49.0	2.24	1.34	2.24	1.34	1.64	SAND	0.5	0.89	266	1.00	266	non-LIQ	0.856	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.21	-22.2	115.0	115.0	319.1	3.2	1.0	4.6	54.7	48.4	0.0	1.0	48.0	2.25	1.35	2.25	1.35	1.61	SAND	0.5	0.89	267	1.00	267	non-LIQ	0.855	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-22.4	115.0	115.0	305.0	3.0	1.0	4.7	52.4	46.3	0.0	1.0	46.0	2.26	1.35	2.26	1.35	1.62	SAND	0.5	0.88	255	1.00	255	non-LIQ	0.854	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.53	-22.5	115.0	115.0	286.4	2.8	1.0	4.9	49.4	43.6	0.0	1.0	44.0	2.27	1.36	2.27	1.36	1.63	SAND	0.5	0.88	239	1.00	239	non-LIQ	0.852	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-22.7	115.0	115.0	303.5	2.6	0.9	3.9	51.3	45.2	0.0	1.0	45.0	2.28	1.36	2.28	1.36	1.57	SAND	0.5	0.88	253	1.00	253	non-LIQ	0.851	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-22.9	115.0	115.0	306.3	2.2	0.7	3.2	50.9	44.8	0.0	1.0	45.0	2.29	1.37	2.29	1.37	1.52	SAND	0.5	0.88	255	1.00	255	non-LIQ	0.850	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-23.0	115.0	115.0	270.2	1.7	0.6	3.1	44.8	39.4	0.0	1.0	39.0	2.30	1.37	2.30	1.37	1.52	SAND	0.5	0.88	224	1.00	224	non-LIQ	0.848	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-23.2	115.0	115.0	251.8	1.3	0.5	2.7	41.4	36.3	0.0	1.0	36.0	2.31	1.38	2.31	1.38	1.49	SAND	0.5	0.88	209	1.00	209	non-LIQ	0.847	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-23.4	115.0	115.0	226.2	1.8	0.8	5.1	39.2	34.3	0.0	1.0	34.0	2.32	1.38	2.32	1.38	1.64	SAND	0.5	0.88	187	1.00	187	non-LIQ	0.846	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-23.5	115.0	115.0	120.3	2.4	2.0	16.7	24.9	21.8	2.9	1.1	26.0	2.33	1.38	2.33	1.38	2.13	SAND	0.5	0.87	99	1.51	150	0.395	0.844	0.660	0.620	0.64	NA	NA	NA	NA	NA	0.00	23.00	1.37	0.03
40.68	-23.7	115.0	115.0	57.5	2.0	3.5	32.8	14.3	12.5	4.9	1.2	20.0	2.34	1.39	2.34	1.39	2.55	SAND	0.5	0.87	47	3.01	143	0.350	0.843	0.660	0.620	0.56	NA	NA	NA	NA	NA	0.00	15.00	1.94	0.04
40.85	-23.9	115.0	115.0	33.5	1.5	4.6	49.3	9.8	8.6	5.0	1.2	15.0	2.35	1.39	2.35	1.39	2.86	non-LIQ CLAY	1	0.76	NA	5.27	non-LIQ	non-LIQ	0.842	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-24.0	115.0	115.0	32.5	1.2	3.7	46.3	9.3	8.1	5.0	1.2	15.0	2.36	1.40	2.36	1.40	2.81	non-LIQ CLAY	1	0.76	NA	4.83	non-LIQ	non-LIQ	0.840	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-24.2	115.0	115.0	30.0	1.4	4.8	52.8	9.1	7.9	5.0	1.2	14.0	2.37	1.40	2.37	1.40	2.91	non-LIQ CLAY	1	0.76	NA	5.82	non-LIQ	non-LIQ	0.839	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.34	-24.3	115.0	115.0	27.5	1.3	4.6	54.1	8.5	7.3	5.0	1.2	14.0	2.38	1.41	2.38	1.41	2.93	non-LIQ CLAY	1	0.75	NA	6.04	non-LIQ	non-LIQ	0.838	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-24.5	115.0	115.0	31.0	1.3	4.2	49.7	9.1	7.9	5.0	1.2	14.0	2.39	1.41	2.39	1.41	2.86	non-LIQ CLAY	1	0.75	NA	5.34	non-LIQ	non-LIQ	0.836	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-24.7	115.0	115.0	39.1	1.6	4.2	44.7	11.0	9.5	5.0	1.2	16.0	2.40	1.41	2.40	1.41	2.78	non-LIQ CLAY	1	0.75	NA	4.59	non-LIQ	non-LIQ	0.835	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-24.8	115.0	115.0	42.7	4.4	10.3	60.4	NA	NA	5.0	1.2	#VALUE!	2.41	1.42	2.41	1.42	3.03	non-LIQ CLAY	1	0.75	NA	7.06	non-LIQ	non-LIQ	0.834	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-25.0	115.0	115.0	159.3	5.3	3.3	19.5	34.2	29.5	3.5	1.1	35.0	2.41	1.42	2.41	1.42	2.22	SAND	0.5	0.86	130	1.70	221	non-LIQ	0.832	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-25.2	115.0	115.0	268.1	6.0	2.3	11.5	51.6	44.4	1.4	1.0	47.0	2.42	1.43	2.42	1.43	1.94	SAND	0.5	0.86	218	1.23	269	non-LIQ	0.831	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.32	-25.3	115.0	115.0	295.5	6.1	2.1	10.1	55.7	47.9	0.9	1.0	50.0	2.43	1.43	2.43	1.43	1.89	SAND	0.5	0.86	240	1.18	283	non-LIQ	0.830	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.49	-25.5	115.0	115.0	289.0	7.7	2.7	12.5	56.5	48.5	1.7	1.0	52.0	2.44	1.44	2.44	1.44	1.98	SAND	0.5	0.86	234	1.28	300	non-LIQ	0.828	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-25.7	115.0	115.0	342.8	8.4	2.5	10.7	65.3	56.0	1.1	1.0	58.0	2.45	1.44	2.45	1.44	1.91	SAND	0.5	0.86	278	1.20	334	non-LIQ	0.827	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-25.8	115.0	115.0	366.3	9.2	2.5	10.6	69.6	59.5	1.1	1.0	62.0	2.46	1.44	2.46	1.44	1.91	SAND	0.5	0.86	296	1.20	354	non-LIQ	0.826	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-26.0	115.0	115.0	340.0	7.5	2.2	9.9	63.9	54.6	0.8	1.0	57.0	2.47	1.45	2.47	1.45	1.88	SAND	0.5	0.85	275	1.17	321	non-LIQ	0.824	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.14	-26.1	115.0	115.0	271.7	5.8	2.1	10.9	51.9	44.3	1.2	1.0	47.0	2.48	1.45	2.48	1.45	1.92	SAND	0.5	0.85	219	1.21	265	non-LIQ	0.823	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-26.3	115.0	115.0	231.5	5.9	2.5	13.6	46.0	39.2	2.1	1.0	43.0	2.49	1.46	2.49	1.46	2.03	SAND	0.5	0.85	186	1.33	249	non-LIQ	0.822	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-26.5	115.0	115.0	191.1	5.1	2.7	15.7	39.1	33.2	2.7	1.1	38.0	2.50	1.46	2.50	1.46	2.10	SAND	0.5	0.85	154	1.45	223	non-LIQ	0.820	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-26.6	115.0	115.0	154.6	4.7	3.0	18.9	32.9	28.0	3.4	1.1	33.0	2.51	1.47	2.51	1.47	2.20	SAND	0.5	0.85	124	1.66	206	non-LIQ	0.819	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-26.8	115.0	115.0	149.1	3.8	2.6	17.5	31.2	26.5	3.1	1.1	31.0	2.52	1.47	2.52	1.47	2.16	SAND	0.5	0.85	120	1.56	187	non-LIQ	0.818	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-27.0	115.0	115.0	171.3	3.0	1.7	12.6	33.5	28.4	1.8	1.0	31.0	2.53	1.47	2.53	1.47	1.99	SAND	0.5	0.85	137	1.28	176	non-LIQ	0.816	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.13	-27.1	115.0	115.0	176.5	2.2	1.3	9.8	33.1	28.0	0.8	1.0	29.0	2.54	1.48	2.54	1.48	1.88	SAND	0.5	0.85	141	1.17	165	non-LIQ	0.815	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.29	-27.3	115.0	115.0	154.3	1.5	1.0	9.2	28.7	24.2	0.6	1.0	25.0	2.55	1.48	2.55	1.48	1.85	SAND	0.5	0.84	123	1.14	141	0.339	0.814	0.640	0.600	0.57	NA	NA	NA	NA	NA	0.00	25.00	1.22	0.02
44.46	-27.5	115.0	115.0	137.8	1.6	1.2	11.3	26.4	22.3	1.3	1.0	24.0	2.56	1.49	2.56	1.49	1.94	SAND	0.5	0.84	110	1.22	134	0.306	0.812	0.640	0.600	0.51	NA	NA	NA	NA	NA	0.00	23.00	1.37	0.03
44.62	-27.6	115.0	115.0	114.7	2.0	1.7	16.1	23.6	19.8	2.8	1.1	24.0	2.57	1.49	2.57	1.49	2.11	SAND	0.5	0.84	91	1.48	135	0.307	0.811	0.640	0.600	0.51	NA	NA	NA	NA	NA	0.00	21.00	1.50	0.03
44.78	-27.8	115.0	115.0	113.4	1.9	1.7	16.2	23.3	19.6	2.8	1.1	23.0	2.57	1.50	2.57	1.50	2.11	SAND	0.5	0.84	90	1.48	133	0.299	0.810	0.640	0.600	0.50	NA	NA	NA	NA	NA	0.00	21.00	1.50	0.03
44.95	-28.0	115.0	115.0	126.7	3.4	2.7	19.8	27.3	22.9	3.6	1.1	28.0	2.58	1.50	2.58	1.50	2.22	SAND	0.5	0.84	101	1.73	174	non-LIQ	0.808	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-28.1	115.0	115.0	142.4	4.5	3.2	20.3	30.9	25.9	3.7	1.1	32.0	2.59	1.50	2.59	1.50	2.24	SAND	0.5	0.84	113	1.77	200	non-LIQ	0.807	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-28.3	115.0	115.0	77.9	4.4	5.6	38.3	20.5	17.2	5.0	1.2	26.0	2.60	1.51	2.60	1.51	2.66	non-LIQ CLAY	1	0.70	NA	3.71	non-LIQ	non-LIQ	0.806	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-28.4	115.0	115.0	64.5	3.5	5.5	41.2	17.5	14.6	5.0	1.2	23.0	2.61	1.51	2.61	1.51	2.71	non-LIQ CLAY	1	0.70	NA	4.10	non-LIQ	non-LIQ	0.804	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-28.6	115.0	115.0	48.0	2.7	5.7	47.4	13.8	11.5	5.0	1.2	19.0	2.62	1.52	2.62	1.52	2.82	non-LIQ CLAY	1	0.70	NA	5.00	non-LIQ	non-LIQ	0.803	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-28.8	115.0	115.0	47.3	1.8	3.8	40.8	12.8	10.6	5.0	1.2	18.0	2.63	1.52	2.63	1.52	2.71	non-LIQ CLAY	1	0.70	NA	4.04	non-LIQ	non-LIQ	0.802	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-28.9	115.0	115.0	43.6	1.7	3.9	43.0	12.0	10.0	5.0	1.2	17.0	2.64	1.53	2.64	1.53	2.75	non-LIQ CLAY	1	0.69	NA	4.35	non-LIQ	non-LIQ	0.800	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-29.1	115.0	115.0	31.4	1.6	5.0	54.6	9.7	8.1	5.0	1.2	15.0	2.65	1.53	2.65	1.53	2.94	non-LIQ CLAY	1	0.69	NA	6.11	non-LIQ	non-LIQ	0.799	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-29.3	115.0	115.0	25.7	1.4	5.3	61.1	8.4	7.0	5.0	1.2	13.0	2.66	1.53	2.66	1.53	3.04	non-LIQ CLAY	1	0.69	NA	7.18	non-LIQ	non-LIQ	0.798	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-29.4	115.0	115.0	24.9	1.1	4.3	58.2	7.9	6.6	5.0	1.2	13.0	2.67	1.54	2.67	1.54	3.00	non-LIQ CLAY	1	0.69	NA	6.69	non-LIQ	non-LIQ	0.796	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-29.6	115.0	115.0	22.9	1.0	4.3	60.7	7.5	6.2	5.0	1.2	12.0	2.68	1.54	2.68	1.54	3.03	non-LIQ CLAY	1	0.69	NA	7.10	non-LIQ	non-LIQ	0.795	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-29.8	115.0	115.0	21.4	1.1	5.0	65.5	7.3	6.0	5.0	1.2	12.0	2.69	1.55	2.69	1.55	3.10	non-LIQ CLAY	1	0.68	NA	7.92	non-LIQ	non-LIQ	0.794	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-29.9	115.0	115.0	25.5	0.9	3.7	54.8	7.9	6.5	5.0	1.2	13.0	2.70	1.55	2.70	1.55	2.94	non-LIQ CLAY	1	0.68	NA	6.15	non-LIQ	non-LIQ	0.792	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-30.1	115.0	115.0	21.0	1.6	7.4	74.8	7.8	6.4	5.0	1.2	13.0	2.71	1.56	2.71	1.56	3.22	non-LIQ CLAY	1	0.68	NA	9.57	non-LIQ	non-LIQ	0.791	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-30.2	115.0	115.0	53.3	1.3	2.5	30.3	12.9	10.6	4.7	1.2	17.0	2.72	1.56	2.72	1.56	2.49	SAND	0.5	0.82	41	2.72	113	0.213	0.790	0.630	0.590	0.36	NA	NA	NA	NA	NA	0.00	13.00	2.15	0.04
47.41	-30.4	115.0	115.0	37.5	1.3	3.5	45.1	10.6	8.7	5.0	1.2	15.0	2.73	1.57	2.73	1.57	2.76	non-LIQ CLAY	1	0.68	NA	4.65	non-LIQ	non-LIQ	0.788	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-30.6	115.0	115.0	25.6	0.9	3.6	54.7	7.9	6.5	5.0	1.2	13.0	2.74	1.57	2.74	1.57	2.94	non-LIQ CLAY	1	0.67	NA	6.13	non-LIQ	non-LIQ	0.787	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-30.7	115.0	115.0	21.5	0.8	3.9	60.9	7.0	5.8	5.0	1.2	12.0	2.75	1.57	2.75	1.57	3.04	non-LIQ CLAY	1	0.67	NA	7.15	non-LIQ	non-LIQ	0.785	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-30.9	115.0	115.0	20.2	0.8	3.9	62.8	6.7	5.5	5.0	1.2	12.0	2.75	1.58	2.75	1.58	3.06	non-LIQ CLAY	1	0.67	NA	7.47	non-LIQ	non-LIQ	0.784	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-31.1	115.0	115.0	18.3	0.8	4.1	67.4	6.3	5.2	5.0	1.2	11.0	2.76	1.58	2.76	1.58	3.13	non-LIQ CLAY	1	0.67	NA	8.26	non-LIQ	non-LIQ	0.783	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-31.2	115.0	115.0	18.3	0.7	4.0	66.8	6.3	5.2	5.0	1.2	11.0	2.77	1.59	2.77	1.59	3.12	non-LIQ CLAY	1	0.67	NA	8.16	non-LIQ	non-LIQ	0.781	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-31.4	115.0	115.0	18.5	0.7	4.0	66.7	6.4	5.2	5.0	1.2	11.0	2.78	1.59	2.78	1.59	3.12	non-LIQ CLAY	1	0.67	NA	8.14	non-LIQ	non-LIQ	0.780	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-31.6	115.0	115.0	18.9	0.8	4.1	66.5	6.5	5.3	5.0	1.2	11.0	2.79	1.60	2.79	1.60	3.11	non-LIQ CLAY	1	0.66	NA	8.10	non-LIQ	non-LIQ	0.779	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.72	-31.7	115.0	115.0	21.0	0.9	4.3	64.4	7.1	5.8	5.0	1.2	12.0	2.80	1.60	2.80	1.60	3.09	non-LIQ CLAY	1	0.66	NA	7.75	non-LIQ	non-LIQ	0.778	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-31.9	115.0	115.0	23.8	1.1	4.4	61.1	7.8	6.3	5.0	1.2	13.0	2.81	1.60	2.81	1.60	3.04	non-LIQ CLAY	1	0.66	NA	7.19	non-LIQ	non-LIQ	0.776	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-32.1	115.0	115.0	24.1	1.2	5.0	63.1	8.0	6.5	5.0	1.2	13.0	2.82	1.61	2.82	1.61	3.07	non-LIQ CLAY	1	0.66	NA	7.52	non-LIQ	non-LIQ	0.775	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-32.2	115.0	115.0	24.5	1.2	5.1	63.2	8.2	6.6	5.0	1.2	13.0	2.83	1.61	2.83	1.61	3.07	non-LIQ CLAY	1	0.66	NA	7.53	non-LIQ	non-LIQ	0.774	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-32.4	115.0	115.0	26.7	1.3	4.9	60.1	8.7	7.0	5.0	1.2	13.0	2.84	1.62	2.84	1.62	3.02	non-LIQ CLAY	1	0.65	NA	7.01	non-LIQ	non-LIQ	0.772	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-32.5	115.0	115.0	32.1	2.4	7.6	64.0	10.8	8.7	5.0	1.2	15.0	2.85	1.62	2.85	1.62	3.08	non-LIQ CLAY	1	0.65	NA	7.67	non-LIQ	non-LIQ	0.771	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.70	-32.7	115.0	115.0	60.5	3.2	5.2	42.8	16.7	13.4	5.0	1.2	21.0	2.86	1.63	2.86	1.63	2.74	non-LIQ CLAY	1	0.65	NA	4.32	non-LIQ	non-LIQ	0.770	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.87	-32.9	115.0	115.0	445.8	4.2	0.9	3.2	74.1	59.7	0.0	1.0	60.0	2.87	1.63	2.87	1.63	1.52	SAND	0.5	0.81	339	1.00	339	non-LIQ	0.768	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.03	-33.0	115.0	115.0	317.1	5.8	1.8	9.0	58.8	47.3	0.6	1.0	49.0	2.88	1.63	2.88	1.63	1.84	SAND	0.5	0.80	241	1.14	275	non-LIQ	0.767	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.20	-33.2	115.0	115.0	188.6	5.0	2.7	16.2	38.8	31.2	2.8	1.1	36.0	2.89	1.64	2.89	1.64	2.11	SAND	0.5	0.80	143	1.48	212	non-LIQ	0.765	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.36	-33.4	115.0	115.0	85.9	3.2	3.7	28.9	20.5	16.5	4.6	1.1	23.0	2.90	1.64	2.90	1.64	2.46	SAND	0.5	0.80	65	2.57	167	non-LIQ	0.764	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.52	-33.5	115.0	115.0	49.2	2.0	4.1	42.9	13.6	10.9	5.0	1.2	18.0	2.90	1.65	2.90	1.65	2.74	non-LIQ CLAY	1	0.64	NA	4.34	non-LIQ	non-LIQ	0.763	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.69	-33.7	115.0	115.0	44.5	3.1	7.1	55.0	13.8	11.0	5.0	1.2	18.0	2.91	1.65	2.91	1.65	2.95	non-LIQ CLAY	1	0.64	NA	6.17	non-LIQ	non-LIQ	0.761	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.85	-33.9	115.0	115.0	127.1	5.0	3.9	24.8	29.0	23.2	4.3	1.1	30.0	2.92	1.66	2.92	1.66	2.36	SAND	0.5	0.80	96	2.16	207	non-LIQ	0.760	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.02	-34.0	115.0	115.0	311.1	6.6	2.1	10.4	59.0	47.1	1.0	1.0	49.0	2.93	1.66	2.93	1.66	1.90	SAND	0.5	0.80	235	1.19	279	non-LIQ	0.759	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.18	-34.2	115.0	115.0	370.8	6.3	1.7	7.7	67.2	53.6	0.2	1.0	54.0	2.94	1.66	2.94	1.66	1.78	SAND	0.5	0.80	279	1.09	305	non-LIQ	0.757	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.35	-34.4	115.0	115.0	278.8	7.0	2.5	12.7	54.6	43.5	1.8	1.0	47.0	2.95	1.67	2.95	1.67	1.99	SAND	0.5	0.80	210	1.29	270	non-LIQ	0.756	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.51	-34.5	115.0	115.0	161.0	4.7	2.9	18.7	34.2	27.2	3.4	1.1	32.0	2.96	1.67	2.96	1.67	2.19	SAND	0.5	0.80	121	1.65	199	non-LIQ	0.755	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.67	-34.7	115.0	115.0	190.6	6.3	3.3	18.7	40.5	32.1	3.4	1.1	38.0	2.97	1.68	2.97	1.68	2.19	SAND	0.5	0.79	143	1.64	235	non-LIQ	0.754	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

C-30

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
51.84	-34.8	115.0	115.0	147.9	6.2	4.2	24.1	33.5	26.6	4.2	1.1	34.0	2.98	1.68	2.98	1.68	2.34	SAND	0.5	0.79	111	2.09	232	non-LIQ	0.752	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.00	-35.0	115.0	115.0	157.5	5.0	3.2	20.0	34.0	26.9	3.6	1.1	33.0	2.99	1.69	2.99	1.69	2.23	SAND	0.5	0.79	118	1.74	205	non-LIQ	0.751	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.17	-35.2	115.0	115.0	404.6	3.3	0.8	2.9	66.9	52.9	0.0	1.0	53.0	3.00	1.69	3.00	1.69	1.51	SAND	0.5	0.79	303	1.00	303	non-LIQ	0.749	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.33	-35.3	115.0	115.0	358.2	1.9	0.5	1.7	57.5	45.4	0.0	1.0	45.0	3.01	1.69	3.01	1.69	1.41	SAND	0.5	0.79	268	1.00	268	non-LIQ	0.748	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.49	-35.5	115.0	115.0	303.3	1.8	0.6	2.8	50.0	39.5	0.0	1.0	39.0	3.02	1.70	3.02	1.70	1.50	SAND	0.5	0.79	226	1.00	226	non-LIQ	0.747	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.66	-35.7	115.0	115.0	186.1	3.0	1.6	11.9	36.0	28.4	1.5	1.0	31.0	3.03	1.70	3.03	1.70	1.96	SAND	0.5	0.79	139	1.25	173	non-LIQ	0.745	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.82	-35.8	115.0	115.0	103.5	3.7	3.6	26.2	24.0	18.9	4.4	1.1	26.0	3.04	1.71	3.04	1.71	2.40	SAND	0.5	0.79	77	2.29	177	non-LIQ	0.744	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.99	-36.0	115.0	115.0	72.4	3.7	5.1	40.3	19.5	15.3	5.0	1.2	23.0	3.05	1.71	3.05	1.71	2.70	non-LIQ CLAY	1	0.62	NA	3.97	non-LIQ	non-LIQ	0.743	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.15	-36.2	115.0	115.0	67.0	1.7	2.5	27.6	15.8	12.4	4.5	1.1	19.0	3.06	1.72	3.06	1.72	2.43	SAND	0.5	0.79	50	2.44	121	0.245	0.741	0.610	0.570	0.43	NA	NA	NA	NA	NA	0.00	14.00	2.00	0.04
53.31	-36.3	115.0	115.0	27.9	1.2	4.4	58.4	8.9	7.0	5.0	1.2	13.0	3.07	1.72	3.07	1.72	3.00	non-LIQ CLAY	1	0.62	NA	6.72	non-LIQ	non-LIQ	0.740	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.48	-36.5	115.0	115.0	32.6	0.9	2.7	46.3	9.3	7.3	5.0	1.2	14.0	3.08	1.72	3.08	1.72	2.81	non-LIQ CLAY	1	0.61	NA	4.83	non-LIQ	non-LIQ	0.739	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.64	-36.6	115.0	115.0	31.7	1.3	4.2	54.3	9.7	7.6	5.0	1.2	14.0	3.08	1.73	3.08	1.73	2.94	non-LIQ CLAY	1	0.61	NA	6.07	non-LIQ	non-LIQ	0.737	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.81	-36.8	115.0	115.0	36.5	1.5	4.1	50.6	10.9	8.5	5.0	1.2	15.0	3.09	1.73	3.09	1.73	2.88	non-LIQ CLAY	1	0.61	NA	5.49	non-LIQ	non-LIQ	0.736	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.97	-37.0	115.0	115.0	39.9	1.6	3.9	47.8	11.5	9.0	5.0	1.2	16.0	3.10	1.74	3.10	1.74	2.83	non-LIQ CLAY	1	0.61	NA	5.06	non-LIQ	non-LIQ	0.735	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.13	-37.1	115.0	115.0	45.5	1.6	3.4	42.9	12.5	9.8	5.0	1.2	17.0	3.11	1.74	3.11	1.74	2.74	non-LIQ CLAY	1	0.61	NA	4.33	non-LIQ	non-LIQ	0.733	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.30	-37.3	115.0	115.0	46.9	1.7	3.6	42.9	12.9	10.1	5.0	1.2	17.0	3.12	1.75	3.12	1.75	2.74	non-LIQ CLAY	1	0.61	NA	4.33	non-LIQ	non-LIQ	0.732	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.46	-37.5	115.0	115.0	47.2	1.8	3.8	44.0	13.1	10.2	5.0	1.2	17.0	3.13	1.75	3.13	1.75	2.76	non-LIQ CLAY	1	0.60	NA	4.49	non-LIQ	non-LIQ	0.731	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.63	-37.6	115.0	115.0	46.9	1.8	3.8	44.1	13.1	10.2	5.0	1.2	17.0	3.14	1.76	3.14	1.76	2.77	non-LIQ CLAY	1	0.60	NA	4.50	non-LIQ	non-LIQ	0.729	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.79	-37.8	115.0	115.0	47.1	1.8	3.8	43.8	13.1	10.2	5.0	1.2	17.0	3.15	1.76	3.15	1.76	2.76	non-LIQ CLAY	1	0.60	NA	4.47	non-LIQ	non-LIQ	0.728	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.95	-38.0	115.0	115.0	49.5	1.7	3.4	41.1	13.4	10.4	5.0	1.2	17.0	3.16	1.76	3.16	1.76	2.71	non-LIQ CLAY	1	0.60	NA	4.08	non-LIQ	non-LIQ	0.727	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.12	-38.1	115.0	115.0	47.6	1.8	3.8	43.8	13.2	10.2	5.0	1.2	17.0	3.17	1.77	3.17	1.77	2.76	non-LIQ CLAY	1	0.60	NA	4.46	non-LIQ	non-LIQ	0.725	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.28	-38.3	115.0	115.0	47.2	1.8	3.9	44.5	13.2	10.2	5.0	1.2	17.0	3.18	1.77	3.18	1.77	2.77	non-LIQ CLAY	1	0.60	NA	4.57	non-LIQ	non-LIQ	0.724	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.45	-38.5	115.0	115.0	48.4	2.0	4.1	44.7	13.6	10.5	5.0	1.2	18.0	3.19	1.78	3.19	1.78	2.78	non-LIQ CLAY	1	0.60	NA	4.60	non-LIQ	non-LIQ	0.723	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.61	-38.6	115.0	115.0	49.0	1.9	3.8	43.4	13.6	10.5	5.0	1.2	18.0	3.20	1.78	3.20	1.78	2.75	non-LIQ CLAY	1	0.59	NA	4.41	non-LIQ	non-LIQ	0.721	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.77	-38.8	115.0	115.0	48.9	1.8	3.7	43.1	13.5	10.4	5.0	1.2	17.0	3.21	1.78	3.21	1.78	2.75	non-LIQ CLAY	1	0.59	NA	4.37	non-LIQ	non-LIQ	0.720	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.94	-38.9	115.0	115.0	50.1	1.8	3.6	42.2	13.7	10.6	5.0	1.2	18.0	3.22	1.79	3.22	1.79	2.73	non-LIQ CLAY	1	0.59	NA	4.24	non-LIQ	non-LIQ	0.719	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.10	-39.1	115.0	115.0	45.3	1.8	4.0	46.1	12.9	9.9	5.0	1.2	17.0	3.23	1.79	3.23	1.79	2.80	non-LIQ CLAY	1	0.59	NA	4.81	non-LIQ	non-LIQ	0.717	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.27	-39.3	115.0	115.0	41.8	1.7	4.1	48.1	12.1	9.3	5.0	1.2	16.0	3.24	1.80	3.24	1.80	2.84	non-LIQ CLAY	1	0.59	NA	5.10	non-LIQ	non-LIQ	0.716	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.43	-39.4	115.0	115.0	41.4	1.6	3.8	47.1	11.9	9.1	5.0	1.2	16.0	3.24	1.80	3.24	1.80	2.82	non-LIQ CLAY	1	0.59	NA	4.95	non-LIQ	non-LIQ	0.715	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.59	-39.6	115.0	115.0	40.3	1.6	4.0	48.9	11.8	9.0	5.0	1.2	16.0	3.25	1.81	3.25	1.81	2.85	non-LIQ CLAY	1	0.59	NA	5.21	non-LIQ	non-LIQ	0.713	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.76	-39.8	115.0	115.0	39.9	1.6	4.1	49.5	11.7	9.0	5.0	1.2	16.0	3.26	1.81	3.26	1.81	2.86	non-LIQ CLAY	1	0.58	NA	5.31	non-LIQ	non-LIQ	0.712	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.92	-39.9	115.0	115.0	38.6	1.5	3.9	49.6	11.3	8.7	5.0	1.2	15.0	3.27	1.82	3.27	1.82	2.86	non-LIQ CLAY	1	0.58	NA	5.33	non-LIQ	non-LIQ	0.711	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.09	-40.1	115.0	115.0	39.3	1.4	3.6	47.7	11.4	8.7	5.0	1.2	15.0	3.28	1.82	3.28	1.82	2.83	non-LIQ CLAY	1	0.58	NA	5.04	non-LIQ	non-LIQ	0.709	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.25	-40.3	115.0	115.0	39.0	1.4	3.5	47.7	11.3	8.6	5.0	1.2	15.0	3.29	1.82	3.29	1.82	2.83	non-LIQ CLAY	1	0.58	NA	5.04	non-LIQ	non-LIQ	0.708	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.41	-40.4	115.0	115.0	34.6	1.3	3.9	52.3	10.4	7.9	5.0	1.2	15.0	3.30	1.83	3.30	1.83	2.91	non-LIQ CLAY	1	0.58	NA	5.75	non-LIQ	non-LIQ	0.707	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.58	-40.6	115.0	115.0	31.6	1.2	3.9	54.6	9.7	7.4	5.0	1.2	14.0	3.31	1.83	3.31	1.83	2.94	non-LIQ CLAY	1	0.58	NA	6.11	non-LIQ	non-LIQ	0.705	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.74	-40.7	115.0	115.0	31.0	1.1	3.6	54.0	9.5	7.2	5.0	1.2	14.0	3.32	1.84	3.32	1.84	2.93	non-LIQ CLAY	1	0.58	NA	6.01	non-LIQ	non-LIQ	0.704	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.91	-40.9	115.0	115.0	33.3	1.1	3.4	51.1	9.9	7.5	5.0	1.2	14.0	3.33	1.84	3.33	1.84	2.89	non-LIQ CLAY	1	0.57	NA	5.56	non-LIQ	non-LIQ	0.703	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.07	-41.1	115.0	115.0	36.8	1.3	3.4	48.9	10.8	8.1	5.0	1.2	15.0	3.34	1.85	3.34	1.85	2.85	non-LIQ CLAY	1	0.57	NA	5.22	non-LIQ	non-LIQ	0.701	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.23	-41.2	115.0	115.0	39.0	1.3	3.4	47.3	11.2	8.5	5.0	1.2	15.0	3.35	1.85	3.35	1.85	2.82	non-LIQ CLAY	1	0.57	NA	4.98	non-LIQ	non-LIQ	0.700	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.40	-41.4	115.0	115.0	39.8	1.3	3.4	47.0	11.4	8.6	5.0	1.2	15.0	3.36	1.85	3.36	1.85	2.82	non-LIQ CLAY	1	0.57	NA	4.93	non-LIQ	non-LIQ	0.699	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.56	-41.6	115.0	115.0	40.8	1.4	3.3	46.2	11.6	8.8	5.0	1.2	16.0	3.37	1.86	3.37	1.86	2.80	non-LIQ CLAY	1	0.57	NA	4.82	non-LIQ	non-LIQ	0.697	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.73	-41.7	115.0	115.0	41.9	1.5	3.6	47.1	12.0	9.1	5.0	1.2	16.0	3.38	1.86	3.38	1.86	2.82	non-LIQ CLAY	1	0.57	NA	4.94	non-LIQ	non-LIQ	0.696	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.89	-41.9	115.0	115.0	42.9	1.7	3.9	47.9	12.4	9.4	5.0	1.2	16.0	3.39	1.87	3.39	1.87	2.83	non-LIQ CLAY	1	0.57	NA	5.06	non-LIQ	non-LIQ	0.695	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.06	-42.1	115.0	115.0	44.3	1.8	4.2	48.1	12.9	9.7	5.0	1.2	17.0	3.40	1.87	3.40	1.87	2.84	non-LIQ CLAY	1	0.57	NA	5.10	non-LIQ	non-LIQ	0.693	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.22	-42.2	115.0	115.0	43.2	1.9	4.3	49.6	12.7	9.5	5.0	1.2	16.0	3.41	1.88	3.41	1.88	2.86	non-LIQ CLAY	1	0.56	NA	5.32	non-LIQ	non-LIQ	0.692	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.38	-42.4	115.0	115.0	42.8	2.0	4.6	50.9	12.8	9.6	5.0	1.2	16.0	3.41	1.88	3.41	1.88	2.88	non-LIQ CLAY	1	0.56	NA	5.52	non-LIQ	non-LIQ	0.691	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.55	-42.6	115.0	115.0	44.1	2.1	4.9	51.2	13.2	9.9	5.0	1.2	17.0	3.42	1.88	3.42	1.88	2.89	non-LIQ CLAY	1	0.56	NA	5.58	non-LIQ	non-LIQ	0.689	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.71	-42.7	115.0	115.0	43.2	2.2	5.0	52.2	13.0	9.7	5.0	1.2	17.0	3.43	1.89	3.43	1.89	2.90	non-LIQ CLAY	1	0.56	NA	5.73	non-LIQ	non-LIQ	0.688	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.88	-42.9	115.0	115.0	43.3	2.1	4.8	51.6	13.0	9.7	5.0	1.2	17.0	3.44	1.89	3.44	1.89	2.89	non-LIQ CLAY	1	0.56	NA	5.64	non-LIQ	non-LIQ	0.687	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.04	-43.0	115.0	115.0	42.9	2.2	5.1	52.8	13.0	9.7	5.0	1.2	17.0	3.45	1.90	3.45	1.90	2.91	non-LIQ CLAY	1	0.56	NA	5.83	non-LIQ	non-LIQ	0.685	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.20	-43.2	115.0	115.0	45.1	2.2	4.8	50.5	13.4	10.0	5.0	1.2	17.0	3.46	1.90	3.46	1.90	2.88	non-LIQ CLAY	1	0.56	NA	5.47	non-LIQ	non-LIQ	0.684	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.37	-43.4	115.0	115.0	46.8	3.3	7.1	57.4	14.8	11.0	5.0	1.2	18.0	3.47	1.91	3.47	1.91	2.98	non-LIQ CLAY	1	0.56	NA	6.56	non-LIQ	non-LIQ	0.683	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.53	-43.5	115.0	115.0	69.4	4.4	6.3	46.7	19.9	14.8	5.0	1.2	23.0	3.48	1.91	3.48	1.91	2.81	non-LIQ CLAY	1	0.55	NA	4.89	non-LIQ	non-LIQ	0.681	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.70	-43.7	115.0	115.0	80.5	5.7	7.1	46.1	22.9	17.0	5.0	1.2	25.0	3.49	1.91	3.49	1.91	2.80	non-LIQ CLAY	1	0.55	NA	4.80	non-LIQ	non-LIQ	0.680	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.86	-43.9	115.0	115.0	84.9	6.3	7.5	46.2	24.2	17.9	5.0	1.2	27.0	3.50	1.92	3.50	1.92	2.80	non-LIQ CLAY	1	0.55	NA	4.81	non-LIQ	non-LIQ	0.679	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.02	-44.0	115.0	115.0	117.2	7.5	6.4	38.0	30.8	22.8	5.0	1.2	32.0	3.51	1.92	3.51	1.92	2.65	non-LIQ CLAY	1	0.55	NA	3.66	non-LIQ	non-LIQ	0.677	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.19	-44.2	115.0	115.0	100.2	6.9	6.9	41.9	27.3	20.3	5.0	1.2	29.0	3.52	1.93	3.52	1.93	2.73	non-LIQ CLAY	1	0.55	NA	4.20	non-LIQ	non-LIQ	0.676	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.35	-44.4	115.0	115.0	71.1	4.8	6.8	47.7	20.5	15.2	5.0	1.2	23.0	3.53	1.93	3.53	1.93	2.83	non-LIQ CLAY	1	0.55	NA	5.04	non-LIQ	non-LIQ	0.675	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.52	-44.5	115.0	115.0	56.6	3.2	5.7	49.1	16.6	12.3	5.0	1.2	20.0	3.54	1.94	3.54	1.94	2.85	non-LIQ CLAY	1	0.55	NA	5.26	non-LIQ	non-LIQ	0.673	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.68	-44.7	115.0	115.0	62.8	2.9	4.5	43.1	17.4	12.8	5.0	1.2	20.0	3.55	1.94	3.55	1.94	2.75	non-LIQ CLAY	1	0.55	NA	4.37	non-LIQ	non-LIQ	0.672	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.84	-44.8	115.0	115.0	60.0	3.1	5.2	46.4	17.1	12.6	5.0	1.2	20.0	3.56	1.94	3.56	1.94	2.81	non-LIQ CLAY	1	0.54	NA	4.85	non-LIQ	non-LIQ	0.671	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.01	-45.0	115.0	115.0	60.3	2.7	4.4	43.6	16.8	12.3	5.0	1.2	20.0	3.57	1.95	3.57	1.95	2.76	non-LIQ CLAY	1	0.54	NA	4.44	non-LIQ	non-LIQ	0.669	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.17	-45.2	115.0	115.0	59.0	2.4	4.0	42.5	16.2	11.9	5.0	1.2	19.0	3.57	1.95	3.57	1.95	2.74	non-LIQ CLAY	1	0.54	NA	4.28	non-LIQ	non-LIQ	0.668	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.34	-45.3	115.0	115.0	56.5	2.1	3.7	41.9	15.4	11.3	5.0	1.2	19.0	3.58	1.96	3.58	1.96	2.73	non-LIQ CLAY	1	0.54	NA	4.20	non-LIQ	non-LIQ	0.667	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.50	-45.5	115.0	115.0	51.9	1.9	3.6	43.6	14.4	10.6	5.0	1.2	18.0	3.59	1.96	3.59	1.96	2.76	non-LIQ CLAY	1	0.54	NA	4.43	non-LIQ	non-LIQ	0.665	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.66	-45.7	115.0	115.0	48.0	1.7	3.5	44.8	13.5	9.9	5.0	1.2	17.0	3.60	1.97	3.60	1.97	2.78	non-LIQ CLAY	1	0.54	NA	4.62	non-LIQ	non-LIQ	0.664	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.83	-45.8	115.0	115.0	46.7	1.8	3.8	46.7	13.4	9.8	5.0	1.2	17.0	3.61	1.97	3.61	1.97	2.81	non-LIQ CLAY	1	0.54	NA	4.89	non-LIQ	non-LIQ	0.663	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.99	-46.0	115.0	115.0	51.7	1.8	3.5	43.3	14.3	10.5	5.0	1.2	18.0	3.62	1.97	3.62	1.97	2.75	non-LIQ CLAY	1	0.54	NA	4.39	non-LIQ	non-LIQ	0.661	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.16	-46.2	115.0	115.0	51.1	1.8	3.6	43.9	14.2	10.4	5.0	1.2	17.0	3.63	1.98	3.63	1.98	2.76	non-LIQ CLAY	1	0.53	NA	4.49	non-LIQ	non-LIQ	0.660	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.32	-46.3	115.0	115.0	49.6	1.9	3.8	45.3	14.0	10.2	5.0	1.2	17.0	3.64	1.98	3.64	1.98	2.79	non-LIQ CLAY	1	0.53	NA	4.68	non-LIQ	non-LIQ	0.659	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.48	-46.5	115.0	115.0	54.9	1.9	3.5	42.1	15.0	11.0	5.0	1.2	18.0	3.65	1.99	3.65	1.99	2.73	non-LIQ CLAY	1	0.53	NA	4.23	non-LIQ	non-LIQ	0.657	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.65	-46.7	115.0	115.0	52.6	2.2	4.1	45.7	14.9	10.9	5.0	1.2	18.0	3.66	1.99	3.66	1.99	2.79	non-LIQ CLAY	1	0.53	NA	4.74	non-LIQ	non-LIQ	0.656	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.81	-46.8	115.0	115.0	52.1	2.4	4.5	47.6	15.0	10.9	5.0	1.2	18.0	3.67	2.00	3.67	2.00	2.83	non-LIQ CLAY	1	0.53	NA	5.02	non-LIQ	non-LIQ	0.655	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.98	-47.0	115.0	115.0	57.9	3.1	5.4	48.4	16.8	12.2	5.0	1.2	20.0	3.68	2.00	3.68	2.00	2.84	non-LIQ CLAY	1	0.53	NA	5.14	non-LIQ	non-LIQ	0.653	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.14	-47.1	115.0	115.0	80.1	2.5	3.2	29.3	19.2	14.0	4.7	1.1	21.0	3.69	2.01	3.69	2.01	2.47	SAND	0.5	0.73	55	2.62	144	0.357	0.652	0.550	0.510	0.70	NA	NA	NA	NA	NA	0.00	16.00	1.87	0.04
64.30	-47.3	115.0	115.0	72.0	2.5	3.4	36.8	18.7	13.6	5.0	1.2	21.0	3.70	2.01	3.70	2.01	2.63	non-LIQ CLAY	1	0.53	NA	3.51	non-LIQ	non-LIQ	0.651	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.47	-47.5	115.0	115.0	70.4	2.6	3.7	38.4	18.6	13.5	5.0	1.2	21.0	3.71	2.01	3.71	2.01	2.66	non-LIQ CLAY	1	0.53	NA	3.72	non-LIQ	non-LIQ	0.649	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.63	-47.6	115.0	115.0	54.8	2.9	5.3	49.6	16.1	11.7	5.0	1.2	19.0	3.72	2.02	3.72	2.02	2.86	non-LIQ CLAY	1	0.52	NA	5.32	non-LIQ	non-LIQ	0.648	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.80	-47.8	115.0	115.0	48.6	2.4	4.9	50.9	14.5	10.5	5.0	1.2	18.0	3.73	2.02	3.73	2.02	2.88	non-LIQ CLAY	1	0.52	NA	5.53	non-LIQ	non-LIQ	0.647	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.96	-48.0	115.0	115.0	37.7	2.0	5.2	58.0	12.0	8.7	5.0	1.2	15.0	3.74	2.03	3.74	2.03	2.99	non-LIQ CLAY	1	0.52	NA	6.66	non-LIQ	non-LIQ	0.645	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.12	-48.1	115.0	115.0	38.5	1.6	4.2	53.7	11.8	8.5	5.0	1.2	15.0	3.74	2.03	3.74	2.03	2.93	non-LIQ CLAY	1	0.52	NA	5.97	non-LIQ	non-LIQ	0.644	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.29	-48.3	115.0	115.0	39.3	1.7	4.3	53.7	12.0	8.7	5.0	1.2	15.0	3.75	2.04	3.75	2.04	2.93	non-LIQ CLAY	1	0.52	NA	5.97	non-LIQ	non-LIQ	0.643	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.45	-48.5	115.0	115.0	37.4	1.7	4.5	56.0	11.7	8.4	5.0	1.2	15.0	3.76	2.04	3.76	2.04	2.96	non-LIQ CLAY	1	0.52	NA	6.34	non-LIQ	non-LIQ	0.641	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.62	-48.6	115.0	115.0	37.1	1.7	4.5	56.0	11.6	8.3	5.0	1.2	15.0	3.77	2.04	3.77	2.04	2.96	non-LIQ CLAY	1	0.52	NA	6.33	non-LIQ	non-LIQ	0.640	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.78	-48.8	115.0	115.0	35.4	1.7	4.8	58.7	11.3	8.1	5.0	1.2	15.0	3.78	2.05	3.78	2.05	3.00	non-LIQ CLAY	1	0.52	NA	6.77	non-LIQ	non-LIQ	0.639	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.94	-48.9	115.0	115.0	29.3	1.6	5.4	66.3	10.1	7.2	5.0	1.2	14.0	3.79	2.05	3.79	2.05	3.11	non-LIQ CLAY	1	0.52	NA	8.08	non-LIQ	non-LIQ	0.637	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.11	-49.1	115.0	115.0	26.3	1.4	5.3	69.5	9.3	6.7	5.0	1.2	13.0	3.80	2.06	3.80	2.06	3.15	non-LIQ CLAY	1	0.51	NA	8.63	non-LIQ	non-LIQ	0.636	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.27	-49.3	115.0	115.0	26.0	1.2	4.5	66.8	9.0	6.4	5.0	1.2	13.0	3.81	2.06	3.81	2.06	3.12	non-LIQ CLAY	1	0.51	NA	8.16	non-LIQ	non-LIQ	0.635	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ'_{MOIST}	γ'_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$							G_{max}	γ	ε_{vc}	ΔS			ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
66.44	-49.4	115.0	115.0	24.8	1.3	5.0	70.7	8.9	6.3	5.0	1.2	13.0	3.82	2.07	3.82	2.07	3.17	non-LIQ CLAY	1	0.51	NA	8.83	non-LIQ	non-LIQ	non-LIQ	0.633	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.60	-49.6	115.0	115.0	23.4	1.2	5.1	72.8	8.5	6.1	5.0	1.2	12.0	3.83	2.07	3.83	2.07	3.20	non-LIQ CLAY	1	0.51	NA	9.21	non-LIQ	non-LIQ	non-LIQ	0.632	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.77	-49.8	115.0	115.0	24.1	1.0	4.1	67.9	8.4	6.0	5.0	1.2	12.0	3.84	2.07	3.84	2.07	3.13	non-LIQ CLAY	1	0.51	NA	8.34	non-LIQ	non-LIQ	non-LIQ	0.631	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.93	-49.9	115.0	115.0	24.4	1.0	4.0	67.0	8.4	6.0	5.0	1.2	12.0	3.85	2.08	3.85	2.08	3.12	non-LIQ CLAY	1	0.51	NA	8.19	non-LIQ	non-LIQ	non-LIQ	0.629	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.09	-50.1	115.0	115.0	25.5	1.0	3.7	64.1	8.6	6.1	5.0	1.2	12.0	3.86	2.08	3.86	2.08	3.08	non-LIQ CLAY	1	0.51	NA	7.69	non-LIQ	non-LIQ	non-LIQ	0.628	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.26	-50.3	115.0	115.0	27.0	1.1	4.2	64.7	9.1	6.5	5.0	1.2	13.0	3.87	2.09	3.87	2.09	3.09	non-LIQ CLAY	1	0.51	NA	7.79	non-LIQ	non-LIQ	non-LIQ	0.627	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.42	-50.4	115.0	115.0	35.4	1.4	3.9	55.4	11.0	7.8	5.0	1.2	14.0	3.88	2.09	3.88	2.09	2.95	non-LIQ CLAY	1	0.51	NA	6.24	non-LIQ	non-LIQ	non-LIQ	0.625	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.59	-50.6	115.0	115.0	42.9	1.8	4.1	51.6	12.9	9.1	5.0	1.2	16.0	3.89	2.10	3.89	2.10	2.89	non-LIQ CLAY	1	0.50	NA	5.63	non-LIQ	non-LIQ	non-LIQ	0.624	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.75	-50.8	115.0	115.0	49.0	1.5	3.1	43.9	13.6	9.7	5.0	1.2	17.0	3.90	2.10	3.90	2.10	2.76	non-LIQ CLAY	1	0.50	NA	4.48	non-LIQ	non-LIQ	non-LIQ	0.623	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.91	-50.9	115.0	115.0	43.7	1.5	3.4	47.8	12.6	9.0	5.0	1.2	16.0	3.90	2.10	3.90	2.10	2.83	non-LIQ CLAY	1	0.50	NA	5.05	non-LIQ	non-LIQ	non-LIQ	0.621	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.08	-51.1	115.0	115.0	41.4	1.6	3.8	50.9	12.3	8.7	5.0	1.2	15.0	3.91	2.11	3.91	2.11	2.88	non-LIQ CLAY	1	0.50	NA	5.53	non-LIQ	non-LIQ	non-LIQ	0.620	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.24	-51.2	115.0	115.0	47.2	2.4	5.2	53.5	14.4	10.2	5.0	1.2	17.0	3.92	2.11	3.92	2.11	2.92	non-LIQ CLAY	1	0.50	NA	5.94	non-LIQ	non-LIQ	non-LIQ	0.619	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.41	-51.4	115.0	115.0	70.0	2.8	4.0	40.5	18.9	13.3	5.0	1.2	21.0	3.93	2.12	3.93	2.12	2.70	non-LIQ CLAY	1	0.50	NA	4.01	non-LIQ	non-LIQ	non-LIQ	0.617	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.57	-51.6	115.0	115.0	56.3	3.1	5.5	50.6	16.7	11.8	5.0	1.2	19.0	3.94	2.12	3.94	2.12	2.88	non-LIQ CLAY	1	0.50	NA	5.51	non-LIQ	non-LIQ	non-LIQ	0.616	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.73	-51.7	115.0	115.0	54.5	2.7	4.9	49.2	16.0	11.3	5.0	1.2	19.0	3.95	2.13	3.95	2.13	2.85	non-LIQ CLAY	1	0.50	NA	5.27	non-LIQ	non-LIQ	non-LIQ	0.615	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.90	-51.9	115.0	115.0	40.2	2.1	5.1	57.5	12.7	9.0	5.0	1.2	16.0	3.96	2.13	3.96	2.13	2.99	non-LIQ CLAY	1	0.50	NA	6.58	non-LIQ	non-LIQ	non-LIQ	0.613	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.06	-52.1	115.0	115.0	44.9	2.6	5.9	57.4	14.2	10.0	5.0	1.2	17.0	3.97	2.13	3.97	2.13	2.98	non-LIQ CLAY	1	0.50	NA	6.57	non-LIQ	non-LIQ	non-LIQ	0.612	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.23	-52.2	115.0	115.0	56.3	2.1	3.7	44.2	15.7	11.0	5.0	1.2	18.0	3.98	2.14	3.98	2.14	2.77	non-LIQ CLAY	1	0.49	NA	4.52	non-LIQ	non-LIQ	non-LIQ	0.611	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.39	-52.4	115.0	115.0	40.5	1.8	4.5	55.2	12.5	8.8	5.0	1.2	16.0	3.99	2.14	3.99	2.14	2.95	non-LIQ CLAY	1	0.49	NA	6.21	non-LIQ	non-LIQ	non-LIQ	0.609	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.55	-52.6	115.0	115.0	27.2	1.4	5.0	68.9	9.6	6.7	5.0	1.2	13.0	4.00	2.15	4.00	2.15	3.15	non-LIQ CLAY	1	0.49	NA	8.53	non-LIQ	non-LIQ	non-LIQ	0.608	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.72	-52.7	115.0	115.0	23.4	1.0	4.3	71.0	8.4	5.9	5.0	1.2	12.0	4.01	2.15	4.01	2.15	3.17	non-LIQ CLAY	1	0.49	NA	8.90	non-LIQ	non-LIQ	non-LIQ	0.607	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.88	-52.9	115.0	115.0	24.9	1.1	4.5	69.5	8.8	6.2	5.0	1.2	12.0	4.02	2.16	4.02	2.16	3.15	non-LIQ CLAY	1	0.49	NA	8.63	non-LIQ	non-LIQ	non-LIQ	0.605	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

C-131

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
$CRR\ r = CRR_{7.5} \times Cm \times K\ sigma$

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines (Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

$F_L = CRR\ r / CSR\ i$

R-11-021

Emean (%)	75			Present Ground El.	24.2	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	13.5	=Field Water Table Depth	Acc. max =	0.710 g		Earthq. M=	7.3				
C_E	1.25			Future Ground El.	24.2	C_B	1.00	120	19.2	=Design Water El.	10.7	=Field Water El.				Cm=	1.07				

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-		-		-	-	-	-				-		-	-	-	-	-	-	-		-	-
5	19.2	27	CL	85.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	31	42	1.00	High N	0.00	LARGE	high N
10	14.2	13	CL	90.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	22	31	1.00	High N	0.00	LARGE	high N
11.5	12.7	11	CL	85.0	0.69	0.69	1.23	0.85	1.20	1.00	1	1	0.97	0.49	0.64	17	26	1.00	0.31	0.33	0.52	Fines
15	9.2	4	CL	85.0	0.90	0.85	1.11	0.85	1.00	0.67	2	2	0.97	0.59	0.68	3	9	1.00	0.10	0.11	0.16	Fines
20	4.2	7	CH	81.0	1.20	1.00	1.02	0.95	1.20	1.00	1	1	0.95	0.73	0.72	10	17	1.00	0.18	0.20	0.27	Fines
25	-0.8	46	GP-GM	5.0	1.50	1.14	0.96	0.95	1.00	0.67	2	2	0.94	0.88	0.74	35	35	1.00	High N	0.00	LARGE	high N
30	-5.8	21	SC-SM	30.0	1.80	1.29	0.90	1.00	1.20	1.00	1	1	0.93	1.02	0.76	28	37	1.00	High N	0.00	LARGE	high N
35	-10.8	24	CL	65.0	2.10	1.43	0.85	1.00	1.00	0.67	2	2	0.89	1.16	0.74	17	25	0.98	0.30	0.32	0.43	Fines
40	-15.8	5	CH	95.0	2.40	1.57	0.81	1.00	1.20	1.00	1	1	0.85	1.31	0.72	6	12	0.96	0.13	0.14	0.19	Fines
45	-20.8	22	SC/CL	45.0	2.70	1.72	0.78	1.00	1.00	0.67	2	2	0.81	1.45	0.69	14	22	0.94	0.24	0.24	0.35	Fines
50	-25.8	18	CL	80.0	3.00	1.86	0.75	1.00	1.20	1.00	1	1	0.77	1.60	0.67	20	29	0.92	0.42	0.42	0.62	Fines

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines (Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-030

Emean (%)	75			Present Ground El.	15.4	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	7.5	=Field Water Table Depth	Acc. max =	0.710	g			Earthq. M=	7.3			
C_E	1.25			Future Ground El.	15.4	C_B	1.00	120	10.4	=Design Water El.	7.9	=Field Water El.						Cm=	1.07			

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	10.4	20	CL	55.0	0.30	0.30	1.70	0.80	1.20	1.00	1	1	0.99	0.30	0.46	41	54	1.00	High N	0.00	LARGE	high N
10	5.4	11	CL	51.0	0.60	0.52	1.41	0.85	1.00	0.67	2	2	0.98	0.44	0.61	11	18	1.00	0.19	0.21	0.34	Fines
15	0.4	4	CH	51.0	0.90	0.67	1.25	0.85	1.20	1.00	1	1	0.97	0.59	0.68	6	13	1.00	0.14	0.15	0.22	Fines
20	-4.6	44	SC	21.0	1.20	0.81	1.14	0.95	1.00	0.67	2	2	0.95	0.73	0.72	40	47	1.00	High N	0.00	LARGE	high N
25	-9.6	0	CH	84.0	1.50	0.95	1.05	0.95	1.20	1.00	1	1	0.94	0.88	0.74	-	5	1.00	0.07	0.08	0.10	Fines
30	-14.6	19	CH	51.0	1.80	1.10	0.98	1.00	1.00	0.67	2	2	0.93	1.02	0.76	15	24	1.00	0.27	0.28	0.37	Fines
35	-19.6	9	CL	51.0	2.10	1.24	0.92	1.00	1.20	1.00	1	1	0.89	1.16	0.74	12	20	0.98	0.21	0.22	0.30	Fines
40	-24.6	21	CL	51.0	2.40	1.39	0.87	1.00	1.00	0.67	2	2	0.85	1.31	0.72	15	23	0.96	0.26	0.27	0.37	Fines
45	-29.6	21	CL	63.0	2.70	1.53	0.83	1.00	1.20	1.00	1	1	0.81	1.45	0.69	26	36	0.94	High N	0.00	LARGE	high N
50	-34.6	18	CL	51.0	3.00	1.67	0.79	1.00	1.00	0.67	2	2	0.77	1.60	0.67	12	19	0.92	0.21	0.20	0.30	Fines
55	-39.6	41	CL	51.0	3.30	1.82	0.76	1.00	1.20	1.00	1	1	0.73	1.74	0.64	47	61	0.90	High N	0.00	LARGE	high N
60	-44.6	23	CL	51.0	3.60	1.96	0.73	1.00	1.00	0.67	2	2	0.69	1.88	0.60	14	22	0.88	0.24	0.22	0.37	Fines
65	-49.6	51	CL	51.0	3.90	2.11	0.70	1.00	1.20	1.00	1	1	0.64	2.03	0.57	54	70	0.88	High N	0.00	LARGE	high N
70	-54.6	76	SW-SM	5.0	4.20	2.25	0.68	1.00	1.00	0.67	2	2	0.60	2.17	0.54	43	43	0.87	High N	0.00	LARGE	high N

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-031

Emean (%)	75			Present Ground El.	19	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)		5.0	=Design Water Table Depth		11.8	=Field Water Table Depth	Acc. max =	0.710	g		Earthq. M=	7.3		
C_E	1.25			Future Ground El.	19	C_B	1.00	120		14	=Design Water El.		7.2	=Field Water El.					Cm=	1.07		

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	14	21	CH	51.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	24	34	1.00	High N	0.00	LARGE	high N
10	9	36	SC	46.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	61	78	1.00	High N	0.00	LARGE	high N
15	4	48	SP-SM	11.0	0.90	0.80	1.14	0.85	1.00	0.67	2	2	0.97	0.59	0.68	39	41	1.00	High N	0.00	LARGE	high N
20	-1	10	CL	51.0	1.20	0.94	1.05	0.95	1.20	1.00	1	1	0.95	0.73	0.72	15	23	1.00	0.26	0.27	0.38	Fines
25	-6	13	CH	51.0	1.50	1.09	0.98	0.95	1.00	0.67	2	2	0.94	0.88	0.74	10	17	1.00	0.18	0.19	0.26	Fines
30	-11	17	CL	51.0	1.80	1.23	0.92	1.00	1.20	1.00	1	1	0.93	1.02	0.76	23	33	1.00	High N	0.00	LARGE	high N
35	-16	21	CL	51.0	2.10	1.38	0.87	1.00	1.00	0.67	2	2	0.89	1.16	0.74	15	23	0.98	0.26	0.27	0.37	Fines
40	-21	20	CL	51.0	2.40	1.52	0.83	1.00	1.20	1.00	1	1	0.85	1.31	0.72	25	35	0.96	High N	0.00	LARGE	high N
45	-26	38	CL	51.0	2.70	1.66	0.79	1.00	1.00	0.67	2	2	0.81	1.45	0.69	25	35	0.94	High N	0.00	LARGE	high N
50	-31	17	CL	51.0	3.00	1.81	0.76	1.00	1.20	1.00	1	1	0.77	1.60	0.67	19	28	0.92	0.38	0.37	0.56	Fines
55	-36	54	SM	15.0	3.30	1.95	0.73	1.00	1.00	0.67	2	2	0.73	1.74	0.64	33	37	0.90	High N	0.00	LARGE	high N
60	-41	21	CH	51.0	3.60	2.10	0.71	1.00	1.20	1.00	1	1	0.69	1.88	0.60	22	32	0.88	High N	0.00	LARGE	high N
65	-46	39	CL	51.0	3.90	2.24	0.68	1.00	1.00	0.67	2	2	0.64	2.03	0.57	22	32	0.88	High N	0.00	LARGE	high N
70	-51	48	CL	51.0	4.20	2.38	0.66	1.00	1.20	1.00	1	1	0.60	2.17	0.54	48	62	0.87	High N	0.00	LARGE	high N

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-033
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
California

Computed by: SP
Checked by:

Date: 03/30/12

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework,* Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60},* ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 18.2 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 13.2 ft MSL
Water Level at Investigation = 9.4 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	1.372
Post-liquefaction Settlement (in)	0.670
Total Settlement (in)	**2.042**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
													σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$								G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)	γ_{MOIST}	γ_{SAT}	(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
2.13	16.1	115.0	115.0	20.6	0.0	0.2	7	4	11	0.19	1.01	11	0.122	0.122	0.122	0.122	1.77	SAND	0.5	1.70	33.2	1.08	36.0	0.08	0.995	0.46	0.430	Above Water	0.13	28688	284.4	0.67	1.32	0.672	NA	NA	0.000
2.30	15.9	115.0	115.0	20.7	0.1	0.5	12	4	11	1.51	1.03	13	0.132	0.132	0.132	0.132	1.96	SAND	0.5	1.70	33.3	1.25	41.7	0.08	0.995	0.46	0.430	Above Water	0.13	27397	299.1	0.62	1.16	0.047	NA	NA	0.000
2.46	15.7	115.0	115.0	20.2	0.2	1.0	17	4	12	3.10	1.06	15	0.141	0.141	0.141	0.141	2.15	SAND	0.5	1.70	32.4	1.55	50.3	0.09	0.994	0.46	0.430	Above Water	0.13	26313	310.7	0.61	1.11	0.043	NA	NA	0.000
2.62	15.6	115.0	115.0	21.1	0.2	0.9	16	4	12	2.88	1.06	15	0.151	0.151	0.151	0.151	2.12	SAND	0.5	1.70	34.0	1.49	50.7	0.09	0.994	0.46	0.430	Above Water	0.13	25337	321.1	0.60	1.10	0.042	NA	NA	0.000
2.79	15.4	115.0	115.0	23.2	0.3	1.2	18	5	12	3.15	1.06	16	0.160	0.160	0.160	0.160	2.16	SAND	0.5	1.70	37.3	1.57	58.5	0.10	0.993	0.46	0.430	Above Water	0.13	24399	339.9	0.51	0.86	0.035	NA	NA	0.000
2.95	15.3	115.0	115.0	25.3	0.4	1.7	20	5	14	3.61	1.08	18	0.170	0.170	0.170	0.170	2.23	SAND	0.5	1.70	40.6	1.74	70.6	0.11	0.993	0.46	0.430	Above Water	0.13	23596	359.7	0.43	0.65	0.025	NA	NA	0.000
3.12	15.1	115.0	115.0	25.2	0.6	2.3	24	6	14	4.16	1.11	19	0.179	0.179	0.179	0.179	2.34	SAND	0.5	1.70	40.4	2.07	83.6	0.13	0.993	0.46	0.430	Above Water	0.13	22816	371.7	0.42	0.62	0.025	NA	NA	0.000
3.28	14.9	115.0	115.0	26.0	0.8	3.0	27	6	14	4.46	1.13	21	0.189	0.189	0.189	0.189	2.41	SAND	0.5	1.70	41.7	2.35	98.0	0.17	0.992	0.46	0.430	Above Water	0.13	22142	386.2	0.39	0.55	0.021	NA	NA	0.000
3.44	14.8	115.0	115.0	25.5	0.9	3.6	30	6	14	4.69	1.15	21	0.198	0.198	0.198	0.198	2.48	SAND	0.5	1.70	41.0	2.67	109.6	0.20	0.992	0.46	0.430	Above Water	0.13	21518	394.5	0.40	0.57	0.022	NA	NA	0.000
3.61	14.6	115.0	115.0	23.7	1.0	4.0	33	6	13	4.87	1.18	21	0.208	0.208	0.208	0.208	2.55	SAND	0.5	1.70	38.0	3.01	114.3	0.22	0.992	0.46	0.430	Above Water	0.13	20904	394.9	0.46	0.71	0.029	NA	NA	0.000
3.77	14.4	115.0	115.0	26.6	0.8	2.9	27	6	14	4.48	1.13	20	0.217	0.217	0.217	0.217	2.41	SAND	0.5	1.70	42.7	2.37	101.0	0.18	0.991	0.46	0.430	Above Water	0.13	20367	407.8	0.43	0.64	0.025	NA	NA	0.000
3.94	14.3	115.0	115.0	21.1	0.6	3.0	31	5	11	4.77	1.16	18	0.227	0.227	0.227	0.227	2.51	SAND	0.5	1.70	34.0	2.80	95.2	0.16	0.991	0.46	0.430	Above Water	0.13	19835	389.2	0.65	1.24	0.050	NA	NA	0.000
4.10	14.1	115.0	115.0	22.1	0.6	2.6	29	5	11	4.63	1.15	17	0.236	0.236	0.236	0.236	2.46	SAND	0.5	1.70	35.4	2.57	91.0	0.15	0.990	0.46	0.430	Above Water	0.13	19367	397.0	0.65	1.24	0.048	NA	NA	0.000
4.27	13.9	115.0	115.0	22.1	0.6	2.7	30	5	11	4.69	1.15	17	0.246	0.246	0.246	0.246	2.48	SAND	0.5	1.70	35.5	2.66	94.4	0.16	0.990	0.46	0.430	Above Water	0.13	18901	404.0	0.66	1.26	0.052	NA	NA	0.000
4.43	13.8	115.0	115.0	23.9	0.6	2.7	29	6	12	4.60	1.14	18	0.255	0.255	0.255	0.255	2.45	SAND	0.5	1.70	38.4	2.53	97.3	0.17	0.990	0.46	0.430	Above Water	0.13	18488	418.1	0.60	1.10	0.042	NA	NA	0.000
4.59	13.6	115.0	115.0	24.0	0.6	2.7	29	6	11	4.62	1.14	18	0.264	0.264	0.264	0.264	2.46	SAND	0.5	1.70	38.5	2.56	98.5	0.17	0.989	0.46	0.430	Above Water	0.13	18099	423.6	0.62	1.15	0.044	NA	NA	0.000
4.76	13.4	115.0	115.0	22.3	0.5	2.4	29	5	10	4.62	1.14	17	0.274	0.274	0.274	0.274	2.46	SAND	0.5	1.70	35.6	2.56	91.7	0.15	0.989	0.46	0.430	Above Water	0.13	17708	418.6	0.74	1.54	0.063	NA	NA	0.000
4.92	13.3	115.0	115.0	19.8	0.5	2.3	30	5	9	4.74	1.16	16	0.283	0.283	0.283	0.283	2.50	SAND	0.5	1.70	31.8	2.74	87.4	0.14	0.989	0.46	0.430	Above Water	0.13	17360	409.4	0.95	2.25	0.086	NA	NA	0.000
5.09	13.1	115.0	115.0	18.7	0.4	2.1	35	5	9	4.97	1.20	16	0.293	0.293	0.293	0.290	2.59	SAND	0.5	1.70	30.1	3.27	98.2	0.17	0.988	0.46	0.430	0.39	NA	NA	NA	NA	NA	0.000	12	2.310	0.047
5.25	13.0	115.0	115.0	17.8	0.4	2.0	35	5	9	5.00	1.20	15	0.302	0.302	0.302	0.297	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.988	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.41	12.8	115.0	115.0	18.0	0.4	2.1	36	5	9	5.00	1.20	15	0.311	0.311	0.311	0.306	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.58	12.6	115.0	115.0	19.1	0.5	2.9	40	5	9	5.00	1.20	16	0.321	0.321	0.321	0.316	2.69	non-LIQ CLAY	1	1.70	NA	3.92	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.74	12.5	115.0	115.0	19.7	0.6	3.2	37	5	9	5.00	1.20	16	0.330	0.330	0.330	0.325	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.987	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
5.91	12.3	115.0	115.0	18.8	0.6	3.3	39	5	9	5.00	1.20	16	0.340	0.340	0.340	0.335	2.67	non-LIQ CLAY	1	1.70	NA	3.78	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.07	12.1	115.0	115.0	19.8	0.6	3.0	37	5	9	5.00	1.20	16	0.349	0.349	0.349	0.344	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.986	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.23	12.0	115.0	115.0	22.0	0.6	2.6	37	6	10	5.00	1.20	17	0.358	0.358	0.358	0.353	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.40	11.8	115.0	115.0	23.7	0.6	2.4	36	6	10	5.00	1.20	17	0.368	0.368	0.368	0.363	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.985	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.56	11.6	115.0	115.0	25.4	0.6	2.3	33	6	11	4.88	1.18	17	0.377	0.377	0.377	0.372	2.55	SAND	0.5	1.67	40.2	3.03	122.0	0.25	0.985	0.46	0.430	0.58	NA	NA	NA	NA	NA	0.000	14	2.000	0.038
6.73	11.5	115.0	115.0	25.5	0.6	2.4	33	6	11	4.90	1.18	17	0.387	0.387	0.387	0.382	2.56	SAND	0.5	1.65	39.9	3.09	123.3	0.25	0.984	0.46	0.430	0.59	NA	NA	NA	NA	NA	0.000	14	2.000	0.041
6.89	11.3	115.0	115.0	24.7	0.6	2.4	35	6	10	5.00	1.20	17	0.396	0.396	0.396	0.391	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	11.2	115.0	115.0	25.3	0.6	2.5	36	7	11	5.00	1.20	18	0.405	0.405	0.405	0.400	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.22	11.0	115.0	115.0	27.4	0.5	1.9	31	7	11	4.75	1.16	17	0.415	0.415	0.415	0.410	2.50	SAND	0.5	1.60	41.3	2.77	114.4	0.22	0.983	0.46	0.430	0.51	NA	NA	NA	NA	NA	0.000	13	2.150	0.044
7.38	10.8	115.0	115.0	28.1	0.5	1.9	30	7	11	4.72	1.16	17	0.424	0.424	0.424	0.419	2.49	SAND	0.5	1.58	41.9	2.72	113.9	0.22	0.983	0.46	0.430	0.51	NA	NA	NA	NA	NA	0.000	13	2.150	0.041
7.55	10.7	115.0	115.0	32.0	0.6	2.0	29	8	12	4.63	1.15	18	0.434	0.434	0.434	0.429	2.46	SAND	0.5	1.56	47.2	2.57	121.4	0.25	0.982	0.46	0.430	0.57	NA	NA	NA	NA	NA	0.000	14	2.000	0.041
7.71	10.5	115.0	115.0	33.6	0.8	2.5	31	8	13	4.78	1.16	20	0.443	0.443	0.443	0.438	2.51	SAND	0.5	1.54	49.1	2.82	138.4	0.33	0.982	0.46	0.430	0.76	NA	NA	NA	NA	NA	0.000	15	1.926	0.037
7.87	10.3	115.0	115.0	34.1	1.1	3.1	34	9	13	4.93	1.19	21	0.453	0.453	0.453	0.448	2.57	SAND	0.5	1.53	49.3	3.15	155.3	0.43	0.982	0.46	0.430	1.00	NA	NA	NA	NA	NA	0.000	16	1.859	0.036
8.04	10.2	115.0	115.0	34.2	1.1	3.2	36	9	13	5.00	1.20	21	0.462	0.462	0.462	0.457	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	10.0	115.0	115.0	32.2	0.9	2.8	35	8	12	5.00	1.20	20	0.472	0.472	0.472	0.467	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	9.8	115.0	115.0	29.8	0.8	2.7	36	8	11	5.00	1.20	19	0.481	0.481	0.481	0.476	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.53	9.7	115.0	115.0	29.3	0.7	2.5	36	8	11	5.00	1.20	18	0.490	0.490	0.490	0.485	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.69	9.5	115.0	115.0	29.3	0.8	2.8	36	8	11	5.00	1.20	18	0.500	0.500	0.500	0.495	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.86	9.3	115.0	115.0	31.0	0.9	2.9	36	8	12	5.00	1.20	19	0.509	0.508	0.509	0.504	2.61	non-LIQ CLAY	1	1.70	NA	3.39	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.02	9.2	115.0	115.0	28.4	0.9	3.2	38	7	11	5.00	1.20	18	0.519	0.512	0.519	0.512	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	9.0	115.0	115.0	21.8	0.8	3.8	38	6	8	5.00	1.20	15	0.528	0.516	0.528	0.516	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	8.9	115.0	115.0	17.0	0.7	3.9	40	5	6	5.00	1.20	13	0.536	0.520	0.538	0.520	2.68	non-LIQ CLAY	1	1.70	NA	3.89	non-LIQ	non-LIQ	0.978	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	8.7	115.0	115.0	14.1	0.5	3.3	41	4	5	5.00	1.20	12	0.547	0.525	0.547	0.525	2.71	non-LIQ CLAY	1	1.70	NA	4.04	non-LIQ	non-LIQ	0.978	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	8.5	115.0	115.0	12.3	0.3	2.7	41	3	5	5.00	1.20	11	0.557	0.529	0.557	0.529	2.70	non-LIQ CLAY	1	1.70	NA	4.03	non-LIQ	non-LIQ	0.977	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	8.4	115.0	115.0	11.7	0.3	2.2	39	3	4	5.00	1.20	10	0.566	0.533	0.566	0.533	2.67	non-LIQ CLAY	1	1.70	NA	3.76	non-LIQ	non-LIQ	0.977	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	8.2	115.0	115.0	11.5	0.2	2.0	38	3	4	5.00	1.20	10	0.576	0.538	0.576	0.538	2.66	non-LIQ CLAY	1	1.70	NA	3.72	non-LIQ	non-LIQ	0.977	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	8.0	115.0	115.0	11.5	0.2	2.0	38	3	4	5.00	1.20	10	0.585	0.542	0.585	0.542	2.66	non-LIQ CLAY	1	1.70	NA	3.69	non-LIQ	non-LIQ	0.976	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	7.9	115.0	115.0	11.6	0.1	1.1	35	3	4	5.00	1.20	10	0.594	0.546	0.594	0.546	2.60	non-LIQ CLAY	1	1.70	NA	3.34	non-LIQ	non-LIQ	0.976	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

C-35

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{vc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
10.50	7.7	115.0	115.0	12.5	0.1	1.2	39	3	5	5.00	1.20	11	0.604	0.551	0.604	0.551	2.68	non-LIQ CLAY	1	1.70	NA	3.85	non-LIQ	non-LIQ	0.976	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	7.5	115.0	115.0	14.4	0.2	1.2	39	4	5	5.00	1.20	11	0.613	0.555	0.613	0.555	2.67	non-LIQ CLAY	1	1.70	NA	3.78	non-LIQ	non-LIQ	0.975	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	7.4	115.0	115.0	16.2	0.2	1.3	38	4	6	5.00	1.20	12	0.623	0.559	0.623	0.559	2.65	non-LIQ CLAY	1	1.70	NA	3.67	non-LIQ	non-LIQ	0.975	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.99	7.2	115.0	115.0	17.4	0.2	1.4	38	5	6	5.00	1.20	12	0.632	0.564	0.632	0.564	2.65	non-LIQ CLAY	1	1.70	NA	3.62	non-LIQ	non-LIQ	0.974	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	7.1	115.0	115.0	17.8	0.2	1.3	36	5	6	5.00	1.20	13	0.641	0.568	0.641	0.568	2.61	non-LIQ CLAY	1	1.70	NA	3.41	non-LIQ	non-LIQ	0.974	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	6.9	115.0	115.0	17.3	0.2	1.3	37	5	6	5.00	1.20	12	0.651	0.572	0.651	0.572	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.974	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.48	6.7	115.0	115.0	18.5	0.2	1.3	36	5	6	5.00	1.20	13	0.660	0.576	0.660	0.576	2.61	non-LIQ CLAY	1	1.70	NA	3.38	non-LIQ	non-LIQ	0.973	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	6.6	115.0	115.0	18.9	0.3	1.5	37	5	7	5.00	1.20	13	0.670	0.581	0.670	0.581	2.63	non-LIQ CLAY	1	1.70	NA	3.52	non-LIQ	non-LIQ	0.973	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	6.4	115.0	115.0	18.8	0.3	1.4	36	5	7	5.00	1.20	13	0.679	0.585	0.679	0.585	2.62	non-LIQ CLAY	1	1.70	NA	3.44	non-LIQ	non-LIQ	0.972	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	6.2	115.0	115.0	19.0	0.3	1.6	38	5	7	5.00	1.20	13	0.689	0.590	0.689	0.590	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.972	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	6.1	115.0	115.0	20.1	0.3	1.7	37	5	7	5.00	1.20	13	0.698	0.594	0.698	0.594	2.64	non-LIQ CLAY	1	1.70	NA	3.57	non-LIQ	non-LIQ	0.972	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	5.9	115.0	115.0	19.9	0.4	1.8	39	5	7	5.00	1.20	13	0.707	0.598	0.707	0.598	2.67	non-LIQ CLAY	1	1.70	NA	3.79	non-LIQ	non-LIQ	0.971	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	5.7	115.0	115.0	20.0	0.4	1.9	39	5	7	5.00	1.20	13	0.717	0.603	0.717	0.603	2.67	non-LIQ CLAY	1	1.70	NA	3.80	non-LIQ	non-LIQ	0.971	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	5.6	115.0	115.0	19.8	0.4	1.8	39	5	7	5.00	1.20	13	0.726	0.607	0.726	0.607	2.67	non-LIQ CLAY	1	1.70	NA	3.79	non-LIQ	non-LIQ	0.971	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.80	5.4	115.0	115.0	19.3	0.3	1.8	40	5	7	5.00	1.20	13	0.736	0.611	0.736	0.611	2.68	non-LIQ CLAY	1	1.70	NA	3.87	non-LIQ	non-LIQ	0.970	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	5.2	115.0	115.0	18.4	0.3	1.8	40	5	6	5.00	1.20	13	0.745	0.615	0.745	0.615	2.70	non-LIQ CLAY	1	1.70	NA	3.99	non-LIQ	non-LIQ	0.970	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.12	5.1	115.0	115.0	17.5	0.3	1.9	40	5	6	5.00	1.20	12	0.754	0.620	0.754	0.620	2.69	non-LIQ CLAY	1	1.70	NA	3.93	non-LIQ	non-LIQ	0.969	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	4.9	115.0	115.0	17.8	0.3	1.7	39	5	6	5.00	1.20	12	0.764	0.624	0.764	0.624	2.67	non-LIQ CLAY	1	1.70	NA	3.78	non-LIQ	non-LIQ	0.969	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	4.8	115.0	115.0	18.3	0.3	1.6	40	5	6	5.00	1.20	13	0.773	0.628	0.773	0.628	2.69	non-LIQ CLAY	1	1.68	NA	3.89	non-LIQ	non-LIQ	0.969	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	4.6	115.0	115.0	18.1	0.3	1.7	40	5	6	5.00	1.20	13	0.783	0.633	0.783	0.633	2.69	non-LIQ CLAY	1	1.67	NA	3.95	non-LIQ	non-LIQ	0.968	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	4.4	115.0	115.0	17.3	0.2	1.2	38	5	6	5.00	1.20	12	0.792	0.637	0.792	0.637	2.65	non-LIQ CLAY	1	1.66	NA	3.62	non-LIQ	non-LIQ	0.968	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	4.3	115.0	115.0	16.6	0.2	1.1	38	4	6	5.00	1.20	12	0.802	0.641	0.802	0.641	2.65	non-LIQ CLAY	1	1.65	NA	3.62	non-LIQ	non-LIQ	0.967	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.11	4.1	115.0	115.0	16.7	0.2	1.1	37	4	6	5.00	1.20	12	0.811	0.646	0.811	0.646	2.64	non-LIQ CLAY	1	1.64	NA	3.57	non-LIQ	non-LIQ	0.967	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	3.9	115.0	115.0	16.5	0.2	1.0	36	4	5	5.00	1.20	12	0.821	0.650	0.821	0.650	2.61	non-LIQ CLAY	1	1.63	NA	3.40	non-LIQ	non-LIQ	0.967	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	3.8	115.0	115.0	15.9	0.2	1.0	37	4	5	5.00	1.20	11	0.830	0.654	0.830	0.654	2.63	non-LIQ CLAY	1	1.62	NA	3.51	non-LIQ	non-LIQ	0.966	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	3.6	115.0	115.0	15.7	0.1	0.8	35	4	5	5.00	1.20	11	0.839	0.659	0.839	0.659	2.60	non-LIQ CLAY	1	1.61	NA	3.34	non-LIQ	non-LIQ	0.966	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	3.4	115.0	115.0	16.3	0.1	0.8	36	4	5	5.00	1.20	11	0.849	0.663	0.849	0.663	2.61	non-LIQ CLAY	1	1.60	NA	3.39	non-LIQ	non-LIQ	0.966	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	3.3	115.0	115.0	17.6	0.2	1.0	35	5	6	5.00	1.20	12	0.858	0.667	0.858	0.667	2.60	non-LIQ CLAY	1	1.59	NA	3.34	non-LIQ	non-LIQ	0.965	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.09	3.1	115.0	115.0	20.8	0.2	1.0	32	5	6	4.85	1.17	12	0.868	0.671	0.868	0.671	2.54	SAND	0.5	1.26	24.6	2.97	73.1	0.12	0.965	0.58	0.540	0.22	NA	NA	NA	NA	NA	0.000	9	2.770	0.053
15.26	2.9	115.0	115.0	24.0	0.4	1.8	37	6	8	5.00	1.20	14	0.877	0.676	0.877	0.676	2.62	non-LIQ CLAY	1	1.57	NA	3.48	non-LIQ	non-LIQ	0.964	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.42	2.8	115.0	115.0	35.9	0.8	2.2	32	9	11	4.83	1.17	18	0.887	0.680	0.887	0.680	2.53	SAND	0.5	1.25	42.3	2.93	124.1	0.26	0.964	0.58	0.540	0.48	NA	NA	NA	NA	NA	0.000	14	2.000	0.038
15.58	2.6	115.0	115.0	96.1	1.3	1.3	12	19	23	1.48	1.03	25	0.896	0.684	0.896	0.684	1.96	SAND	0.5	1.24	113.0	1.25	140.8	0.34	0.964	0.58	0.540	0.63	NA	NA	NA	NA	NA	0.000	24	1.290	0.025
15.75	2.5	115.0	115.0	92.2	1.5	1.6	14	18	23	2.11	1.04	26	0.906	0.689	0.906	0.689	2.03	SAND	0.5	1.24	107.9	1.34	144.3	0.36	0.963	0.58	0.540	0.67	NA	NA	NA	NA	NA	0.000	24	1.290	0.026
15.91	2.3	115.0	115.0	43.8	0.6	1.5	21	10	12	3.75	1.09	17	0.915	0.693	0.915	0.693	2.25	SAND	0.5	1.24	51.1	1.81	92.4	0.15	0.963	0.59	0.550	0.28	NA	NA	NA	NA	NA	0.000	14	2.000	0.038
16.08	2.1	115.0	115.0	24.6	0.3	1.3	33	6	8	4.86	1.18	14	0.925	0.697	0.925	0.697	2.54	SAND	0.5	1.23	28.6	3.00	85.8	0.14	0.963	0.59	0.550	0.25	NA	NA	NA	NA	NA	0.000	11	2.460	0.050
16.24	2.0	115.0	115.0	19.2	0.2	1.1	36	5	6	5.00	1.20	12	0.934	0.702	0.934	0.702	2.61	non-LIQ CLAY	1	1.51	NA	3.39	non-LIQ	non-LIQ	0.962	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	1.8	115.0	115.0	18.5	0.2	1.0	36	5	6	5.00	1.20	12	0.943	0.706	0.943	0.706	2.62	non-LIQ CLAY	1	1.50	NA	3.45	non-LIQ	non-LIQ	0.962	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	1.6	115.0	115.0	17.1	0.2	1.2	39	5	6	5.00	1.20	12	0.953	0.710	0.953	0.710	2.67	non-LIQ CLAY	1	1.49	NA	3.79	non-LIQ	non-LIQ	0.961	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	1.5	115.0	115.0	17.1	0.2	1.3	40	5	6	5.00	1.20	12	0.962	0.715	0.962	0.715	2.69	non-LIQ CLAY	1	1.48	NA	3.93	non-LIQ	non-LIQ	0.961	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	1.3	115.0	115.0	18.3	0.2	1.1	37	5	6	5.00	1.20	12	0.972	0.719	0.972	0.719	2.63	non-LIQ CLAY	1	1.47	NA	3.50	non-LIQ	non-LIQ	0.961	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	1.1	115.0	115.0	18.6	0.3	1.4	39	5	6	5.00	1.20	12	0.981	0.723	0.981	0.723	2.67	non-LIQ CLAY	1	1.46	NA	3.77	non-LIQ	non-LIQ	0.960	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	1.0	115.0	115.0	17.9	0.2	1.4	40	5	6	5.00	1.20	12	0.990	0.727	0.990	0.727	2.69	non-LIQ CLAY	1	1.45	NA	3.90	non-LIQ	non-LIQ	0.960	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	0.8	115.0	115.0	16.0	0.3	1.7	36	4	5	5.00	1.20	11	1.000	0.732	1.000	0.732	2.61	non-LIQ CLAY	1	1.45	NA	3.40	non-LIQ	non-LIQ	0.959	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	0.6	115.0	115.0	15.8	0.3	1.9	38	4	5	5.00	1.20	11	1.009	0.736	1.009	0.736	2.65	non-LIQ CLAY	1	1.44	NA	3.63	non-LIQ	non-LIQ	0.959	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	0.5	115.0	115.0	15.9	0.3	2.1	39	4	5	5.00	1.20	11	1.019	0.741	1.019	0.741	2.67	non-LIQ CLAY	1	1.43	NA	3.82	non-LIQ	non-LIQ	0.959	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	0.3	115.0	115.0	15.7	0.3	2.2	40	4	5	5.00	1.20	11	1.028	0.745	1.028	0.745	2.69	non-LIQ CLAY	1	1.42	NA	3.93	non-LIQ	non-LIQ	0.958	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	0.2	115.0	115.0	15.8	0.4	2.6	43	4	5	5.00	1.20	11	1.037	0.749	1.037	0.749	2.74	non-LIQ CLAY	1	1.41	NA	4.29	non-LIQ	non-LIQ	0.958	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	0.0	115.0	115.0	14.1	0.4	3.1	48	4	5	5.00	1.20	11	1.047	0.753	1.047	0.753	2.83	non-LIQ CLAY	1	1.40	NA	5.03	non-LIQ	non-LIQ	0.958	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	-0.2	115.0	115.0	15.2	0.4	2.5	43	4	5	5.00	1.20	11	1.056	0.758	1.056	0.758	2.75	non-LIQ CLAY	1	1.40	NA	4.36	non-LIQ	non-LIQ	0.957	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	-0.3	115.0	115.0	13.8	0.3	2.1	43	4	4	5.00	1.20	10	1.066	0.762	1.066	0.762	2.74	non-LIQ CLAY	1	1.39	NA	4.32	non-LIQ	non-LIQ	0.957	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	-0.5	115.0	115.0	13.3	0.2	1.7	41	4	4	5.00	1.20	10	1.075	0.766	1.075	0.766	2.72	non-LIQ CLAY	1	1.38	NA	4.11	non-LIQ	non-LIQ	0.956	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	-0.7	115.0	115.0	12.4	0.2	1.8	44	3	4	5.00	1.20	10	1.084	0.771	1.084	0.771	2.76	non-LIQ CLAY	1	1.37	NA	4.45	non-LIQ	non-LIQ	0.956	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.03	-0.8	115.0	115.0	13.2	0.2	1.8	42	4	4	5.00	1.20	10	1.094	0.775	1.094	0.775	2.74	non-LIQ CLAY	1	1.37	NA	4.26	non-LIQ	non-LIQ	0.956	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	-1.0	115.0	115.0	14.0	0.3	1.9	42	4	4	5.00	1.20	10	1.103	0.779	1.103	0.779	2.72	non-LIQ CLAY	1	1.36	NA	4.17	non-LIQ	non-LIQ	0.955	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	-1.2	115.0	115.0	14.9	0.3	1.9	41	4	5	5.00	1.20	11	1.113	0.784	1.113	0.784	2.71	non-LIQ CLAY	1	1.35	NA	4.03	non-LIQ	non-LIQ	0.955	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	-1.3	115.0	115.0	14.7	0.3	2.0	42	4	5	5.00	1.20	11	1.122	0.788	1.122	0.788	2.72	non-LIQ CLAY	1	1.34	NA	4.17	non-LIQ	non-LIQ	0.954	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	-1.5	115.0	115.0	15.8	0.3	2.0	41	4	5	5.00	1.20	11	1.132	0.792	1.132	0.792	2.70	non-LIQ CLAY	1	1.34	NA	4.01	non-LIQ	non-LIQ	0.954	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	-1.7	115.0	115.0	17.1	0.3	1.9	38	4	5	5.00	1.20	11	1.141	0.797	1.141	0.797	2.65	non-LIQ CLAY	1	1.33	NA	3.66	non-LIQ	non-LIQ	0.954	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	-1.8	115.0	115.0	17.4	0.4	2.0	39	5	5	5.00	1.20	11	1.151	0.801	1.151	0.801	2.67	non-LIQ CLAY	1	1.32	NA	3.76	non-LIQ	non-LIQ	0.953	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	-2.0	115.0	115.0	16.6	0.3	1.7	37	4	5	5.00	1.20	11	1.160	0.805	1.160	0.805	2.64	non-LIQ CLAY	1	1.31	NA	3.58	non-LIQ	non-LIQ	0.953	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	-2.1	115.0	115.0	15.7	0.3	1.8	40	4	5	5.00	1.20	11	1.170	0.810	1.170	0.810	2.69	non-LIQ CLAY	1	1.31	NA	3.90	non-LIQ	non-LIQ	0.953	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	-2.3	115.0	115.0	14.5	0.3	2.1	43	4	5	5.00	1.20	10	1.179	0.814	1.179	0.814	2.76	non-LIQ CLAY	1	1.30	NA	4.42	non-LIQ	non-LIQ	0.952	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	-2.5	115.0	115.0	14.2	0.3	2.1	44	4	4	5.00	1.20	10	1.189	0.818	1.189	0.818	2.77	non-LIQ CLAY	1	1.29	NA	4.50	non-LIQ	non-LIQ	0.952	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	-2.6	115.0	115.0	14.8	0.3	1.9	42	4	5	5.00	1.20	11	1.198	0.822	1.198	0.822	2.73	non-LIQ CLAY	1	1.29	NA	4.21	non-LIQ	non-LIQ	0.951	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	-2.8	115.0	115.0	15.5	0.3	1.7	39	4	5	5.00	1.20	11	1.208	0.827	1.208	0.827	2.68	non-LIQ CLAY	1	1.28	NA	3.84	non-LIQ	non-LIQ	0.951	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	-3.0	115.0	115.0	16.1	0.2	1.3	36	4	5	5.00	1.20	11	1.217	0.831	1.217	0.831	2.60	non-LIQ CLAY	1	1.27	NA	3.35	non-LIQ	non-LIQ	0.951	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	-3.1	115.0	115.0	15.1	0.2	1.5	39	4	4	5.00	1.20	10	1.226	0.836	1.226	0.836	2.67	non-LIQ CLAY	1	1.27	NA	3.75	non-LIQ	non-LIQ	0.950	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	-3.3	115.0	115.0	15.8	0.3	1.7	40	4	5	5.00	1.20	11	1.236	0.840	1.236	0.840	2.68	non-LIQ CLAY	1	1.26	NA	3.88	non-LIQ	non-LIQ	0.950	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	-3.5	115.0	115.0	17.3	0.4	2.1	40	5	5	5.00	1.20	11	1.245	0.844	1.245	0.844	2.69	non-LIQ CLAY	1	1.25	NA	3.96	non-LIQ	non-LIQ	0.950	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	-3.6	115.0	115.0	18.3	0.5	2.6	42	5	6	5.00	1.20	12	1.255	0.848	1.255	0.848	2.73	non-LIQ CLAY	1	1.25	NA	4.21	non-LIQ	non-LIQ	0.949	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	-3.8	115.0	115.0	18.1	0.5	2.8	43	5	6	5.00	1.20	12	1.264	0.853	1.264	0.853	2.75	non-LIQ CLAY	1	1.24	NA	4.41	non-LIQ	non-LIQ	0.949	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	-4.0	115.0	115.0	15.8	0.4	2.8	47	5	5	5.00	1.20	11	1.274	0.857	1.274	0.857	2.82	non-LIQ CLAY	1	1.23	NA	4.95	non-LIQ	non-LIQ	0.948	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	-4.1	115.0	115.0	15.0	0.4	2.5	47	4	5	5.00	1.20	11	1.283	0.861	1.283	0.861	2.81	non-LIQ CLAY	1	1.23	NA	4.89	non-LIQ	non-LIQ	0.948	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	-4.3	115.0	115.0	15.6	0.4	2.4	45	4	5	5.00	1.20	11	1.292	0.866	1.292	0.866	2.79	non-LIQ CLAY	1	1.22	NA	4.68	non-LIQ	non-LIQ	0.948	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.64	-4.4	115.0	115.0	16.2	0.4	2.6	46	5	5	5.00	1.20	11	1.302	0.870	1.302	0.870	2.79	non-LIQ CLAY	1	1.22	NA	4.73	non-LIQ	non-LIQ	0.947	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	-4.6	115.0	115.0	16.5	0.5	2.8	46	5	5	5.00	1.20	11	1.311	0.874	1.311	0.874	2.80	non-LIQ CLAY	1	1.21	NA	4.81	non-LIQ	non-LIQ	0.947	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	-4.8	115.0	115.0	16.5	0.5	3.1	48	5	5	5.00	1.20	11	1.321	0.879	1.321	0.879	2.84	non-LIQ CLAY	1	1.20	NA	5.12	non-LIQ	non-LIQ	0.946	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	-4.9	115.0	115.0	17.9	0.6	3.3	47	5	6	5.00	1.20	12	1.330	0.883	1.330	0.883	2.82	non-LIQ CLAY	1	1.20	NA	4.98	non-LIQ	non-LIQ	0.946	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.29	-5.1	115.0	115.0	17.5	0.7	3.8	50	5	6	5.00	1.20	12	1.339	0.887	1.339	0.887	2.87	non-LIQ CLAY	1	1.19	NA	5.41	non-LIQ	non-LIQ	0.946	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	-5.3	115.0	115.0	18.5	0.7	3.8	49	5	6	5.00	1.20	12	1.349	0.892	1.349	0.892	2.85	non-LIQ CLAY	1	1.19	NA	5.23	non-LIQ	non-LIQ	0.945	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	-5.4	115.0	115.0	18.2	0.7	3.8	49	5	6	5.00	1.20	12	1.358	0.896	1.358	0.896	2.86	non-LIQ CLAY	1	1.18	NA	5.31	non-LIQ	non-LIQ	0.945	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	-5.6	115.0	115.0	16.7	0.5	3.3	49	5	5	5.00	1.20	11	1.368	0.900	1.368	0.900	2.86	non-LIQ CLAY	1	1.18	NA	5.29	non-LIQ	non-LIQ	0.945	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	-5.8	115.0	115.0	14.8	0.5	3.1	52	4	5	5.00	1.20	11	1.377	0.904	1.377	0.904	2.89	non-LIQ CLAY	1	1.17	NA	5.62	non-LIQ	non-LIQ	0.944	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	-5.9	115.0	115.0	14.7	0.4	3.0	51	4	5	5.00	1.20	11	1.386	0.909	1.386	0.909	2.89	non-LIQ CLAY	1	1.16	NA	5.58	non-LIQ	non-LIQ	0.944	0.66	0.620	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	-6.1	115.0	115.0	14.9	0.5	3.1	51	4	5	5.00	1.20	11	1.396	0.913	1.396	0.913	2.89	non-LIQ CLAY	1	1.16	NA	5.58	non-LIQ	non-LIQ	0.943	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	-6.2	115.0	115.0	14.9	0.4	2.9	51	4	5	5.00	1.20	11	1.405	0.917	1.405	0.917	2.88	non-LIQ CLAY	1	1.15	NA	5.47	non-LIQ	non-LIQ	0.943	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'MOIST	Unit Weight (pcf) γ'SAT	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{N_c} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
24.61	-6.4	115.0	115.0	14.4	0.4	2.8	51	4	5	5.00	1.20	11	1.415	0.922	1.415	0.922	2.89	non-LIQ CLAY	1	1.15	NA	5.57	non-LIQ	non-LIQ	0.943	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	-6.6	115.0	115.0	14.2	0.4	2.8	51	4	5	5.00	1.20	10	1.424	0.926	1.424	0.926	2.89	non-LIQ CLAY	1	1.14	NA	5.59	non-LIQ	non-LIQ	0.942	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	-6.7	115.0	115.0	13.6	0.4	2.9	53	4	4	5.00	1.20	10	1.433	0.930	1.433	0.930	2.92	non-LIQ CLAY	1	1.14	NA	5.88	non-LIQ	non-LIQ	0.942	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	-6.9	115.0	115.0	13.4	0.4	2.9	54	4	4	5.00	1.20	10	1.443	0.935	1.443	0.935	2.93	non-LIQ CLAY	1	1.13	NA	5.99	non-LIQ	non-LIQ	0.941	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	-7.1	115.0	115.0	14.1	0.4	3.2	54	4	5	5.00	1.20	11	1.452	0.939	1.452	0.939	2.94	non-LIQ CLAY	1	1.13	NA	6.06	non-LIQ	non-LIQ	0.941	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	-7.2	115.0	115.0	14.8	0.5	3.5	55	5	5	5.00	1.20	11	1.462	0.943	1.462	0.943	2.94	non-LIQ CLAY	1	1.12	NA	6.14	non-LIQ	non-LIQ	0.941	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	-7.4	115.0	115.0	15.1	0.5	3.4	54	5	5	5.00	1.20	11	1.471	0.948	1.471	0.948	2.93	non-LIQ CLAY	1	1.12	NA	5.99	non-LIQ	non-LIQ	0.940	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	-7.6	115.0	115.0	15.2	0.4	2.9	51	5	5	5.00	1.20	11	1.481	0.952	1.481	0.952	2.88	non-LIQ CLAY	1	1.11	NA	5.54	non-LIQ	non-LIQ	0.940	0.67	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	-7.7	115.0	115.0	15.8	0.4	2.6	48	5	5	5.00	1.20	11	1.490	0.956	1.490	0.956	2.84	non-LIQ CLAY	1	1.11	NA	5.12	non-LIQ	non-LIQ	0.940	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	-7.9	115.0	115.0	17.0	0.4	2.3	45	5	5	5.00	1.20	11	1.500	0.960	1.500	0.960	2.78	non-LIQ CLAY	1	1.10	NA	4.64	non-LIQ	non-LIQ	0.939	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	-8.1	115.0	115.0	17.4	0.4	2.1	43	5	5	5.00	1.20	11	1.509	0.965	1.509	0.965	2.75	non-LIQ CLAY	1	1.10	NA	4.41	non-LIQ	non-LIQ	0.939	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	-8.2	115.0	115.0	18.5	0.5	2.6	45	5	5	5.00	1.20	12	1.519	0.969	1.519	0.969	2.79	non-LIQ CLAY	1	1.09	NA	4.70	non-LIQ	non-LIQ	0.938	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	-8.4	115.0	115.0	25.7	0.6	2.5	38	7	7	5.00	1.20	13	1.528	0.973	1.528	0.973	2.64	non-LIQ CLAY	1	1.09	NA	3.60	non-LIQ	non-LIQ	0.938	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	-8.5	115.0	115.0	30.3	0.9	3.0	37	8	8	5.00	1.20	15	1.538	0.978	1.538	0.978	2.64	non-LIQ CLAY	1	1.08	NA	3.58	non-LIQ	non-LIQ	0.938	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	-8.7	115.0	115.0	32.7	1.1	3.3	37	9	9	5.00	1.20	16	1.547	0.982	1.547	0.982	2.64	non-LIQ CLAY	1	1.08	NA	3.60	non-LIQ	non-LIQ	0.937	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-8.9	115.0	115.0	34.6	1.1	3.3	36	9	9	5.00	1.20	16	1.557	0.987	1.557	0.987	2.62	non-LIQ CLAY	1	1.07	NA	3.46	non-LIQ	non-LIQ	0.937	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-9.0	115.0	115.0	31.9	1.1	3.5	39	8	9	5.00	1.20	15	1.566	0.991	1.566	0.991	2.67	non-LIQ CLAY	1	1.07	NA	3.76	non-LIQ	non-LIQ	0.937	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-9.2	115.0	115.0	27.9	1.0	3.6	42	8	8	5.00	1.20	14	1.576	0.995	1.576	0.995	2.73	non-LIQ CLAY	1	1.06	NA	4.20	non-LIQ	non-LIQ	0.936	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-9.4	115.0	115.0	21.4	0.8	3.5	47	6	6	5.00	1.20	13	1.585	0.999	1.585	0.999	2.82	non-LIQ CLAY	1	1.06	NA	4.99	non-LIQ	non-LIQ	0.936	0.68	0.630	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-9.5	115.0	115.0	19.8	0.6	3.2	47	6	6	5.00	1.20	12	1.594	1.004	1.594	1.004	2.82	non-LIQ CLAY	1	1.05	NA	4.98	non-LIQ	non-LIQ	0.935	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-9.7	115.0	115.0	18.6	0.5	2.9	48	5	6	5.00	1.20	12	1.604	1.008	1.604	1.008	2.83	non-LIQ CLAY	1	1.05	NA	5.02	non-LIQ	non-LIQ	0.935	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-9.9	115.0	115.0	16.8	0.5	3.0	51	5	5	5.00	1.20	11	1.613	1.012	1.613	1.012	2.88	non-LIQ CLAY	1	1.05	NA	5.50	non-LIQ	non-LIQ	0.935	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-10.0	115.0	115.0	17.9	0.4	2.5	46	5	5	5.00	1.20	11	1.623	1.017	1.623	1.017	2.81	non-LIQ CLAY	1	1.04	NA	4.85	non-LIQ	non-LIQ	0.934	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-10.2	115.0	115.0	21.0	0.5	2.2	41	6	6	5.00	1.20	12	1.632	1.021	1.632	1.021	2.71	non-LIQ CLAY	1	1.04	NA	4.08	non-LIQ	non-LIQ	0.934	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-10.3	115.0	115.0	21.7	0.5	2.4	42	6	6	5.00	1.20	12	1.641	1.025	1.641	1.025	2.72	non-LIQ CLAY	1	1.03	NA	4.17	non-LIQ	non-LIQ	0.933	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-10.5	115.0	115.0	22.6	0.5	2.2	39	6	6	5.00	1.20	12	1.651	1.030	1.651	1.030	2.68	non-LIQ CLAY	1	1.03	NA	3.86	non-LIQ	non-LIQ	0.933	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-10.7	115.0	115.0	21.3	0.4	2.1	40	6	6	5.00	1.20	12	1.660	1.034	1.660	1.034	2.70	non-LIQ CLAY	1	1.02	NA	4.00	non-LIQ	non-LIQ	0.933	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-10.8	115.0	115.0	17.4	0.4	2.3	46	5	5	5.00	1.20	11	1.670	1.038	1.670	1.038	2.80	non-LIQ CLAY	1	1.02	NA	4.82	non-LIQ	non-LIQ	0.932	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-11.0	115.0	115.0	16.4	0.3	2.1	47	5	5	5.00	1.20	11	1.679	1.043	1.679	1.043	2.81	non-LIQ CLAY	1	1.01	NA	4.89	non-LIQ	non-LIQ	0.932	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-11.2	115.0	115.0	13.6	0.4	2.7	56	4	4	5.00	1.20	10	1.688	1.047	1.688	1.047	2.96	non-LIQ CLAY	1	1.01	NA	6.34	non-LIQ	non-LIQ	0.932	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-11.3	115.0	115.0	12.6	0.4	3.1	60	4	4	5.00	1.20	10	1.698	1.051	1.698	1.051	3.03	non-LIQ CLAY	1	1.01	NA	7.06	non-LIQ	non-LIQ	0.931	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-11.5	115.0	115.0	12.7	0.4	2.9	59	4	4	5.00	1.20	10	1.707	1.055	1.707	1.055	3.01	non-LIQ CLAY	1	1.00	NA	6.86	non-LIQ	non-LIQ	0.931	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-11.7	115.0	115.0	13.3	0.4	2.7	56	4	4	5.00	1.20	10	1.717	1.060	1.717	1.060	2.97	non-LIQ CLAY	1	1.00	NA	6.40	non-LIQ	non-LIQ	0.930	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-11.8	115.0	115.0	13.1	0.4	3.1	60	4	4	5.00	1.20	10	1.726	1.064	1.726	1.064	3.02	non-LIQ CLAY	1	0.99	NA	6.92	non-LIQ	non-LIQ	0.930	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-12.0	115.0	115.0	19.5	0.5	2.6	47	6	6	5.00	1.20	12	1.735	1.068	1.735	1.068	2.81	non-LIQ CLAY	1	0.99	NA	4.86	non-LIQ	non-LIQ	0.928	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-12.2	115.0	115.0	23.5	0.7	3.1	45	7	7	5.00	1.20	13	1.745	1.073	1.745	1.073	2.77	non-LIQ CLAY	1	0.99	NA	4.57	non-LIQ	non-LIQ	0.927	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-12.3	115.0	115.0	26.8	0.9	3.5	44	7	7	5.00	1.20	14	1.754	1.077	1.754	1.077	2.76	non-LIQ CLAY	1	0.98	NA	4.48	non-LIQ	non-LIQ	0.926	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-12.5	115.0	115.0	28.6	1.0	3.7	43	8	8	5.00	1.20	14	1.764	1.081	1.764	1.081	2.75	non-LIQ CLAY	1	0.98	NA	4.40	non-LIQ	non-LIQ	0.924	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-12.6	115.0	115.0	29.4	1.1	3.8	44	8	8	5.00	1.20	15	1.773	1.086	1.773	1.086	2.76	non-LIQ CLAY	1	0.97	NA	4.43	non-LIQ	non-LIQ	0.923	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-12.8	115.0	115.0	29.7	1.0	3.5	42	8	8	5.00	1.20	15	1.783	1.090	1.783	1.090	2.73	non-LIQ CLAY	1	0.97	NA	4.21	non-LIQ	non-LIQ	0.922	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.17	-13.0	115.0	115.0	28.0	0.9	3.3	42	8	8	5.00	1.20	14	1.792	1.094	1.792	1.094	2.74	non-LIQ CLAY	1	0.97	NA	4.26	non-LIQ	non-LIQ	0.920	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.33	-13.1	115.0	115.0	27.2	0.8	3.1	42	7	7	5.00	1.20	14	1.801	1.099	1.801	1.099	2.73	non-LIQ CLAY	1	0.96	NA	4.25	non-LIQ	non-LIQ	0.919	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.50	-13.3	115.0	115.0	27.5	0.9	3.2	43	8	7	5.00	1.20	14	1.811	1.103	1.811	1.103	2.74	non-LIQ CLAY	1	0.96	NA	4.30	non-LIQ	non-LIQ	0.918	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.66	-13.5	115.0	115.0	28.1	0.9	3.1	42	8	7	5.00	1.20	14	1.820	1.107	1.820	1.107	2.73	non-LIQ CLAY	1	0.96	NA	4.20	non-LIQ	non-LIQ	0.916	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.82	-13.6	115.0	115.0	28.3	0.9	3.1	42	8	8	5.00	1.20	14	1.830	1.111	1.830	1.111	2.73	non-LIQ CLAY	1	0.95	NA	4.19	non-LIQ	non-LIQ	0.915	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.99	-13.8	115.0	115.0	27.9	0.9	3.3	43	8	7	5.00	1.20	14	1.839	1.116	1.839	1.116	2.74	non-LIQ CLAY	1	0.95	NA	4.33	non-LIQ	non-LIQ	0.914	0.70	0.650	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
32.15	-14.0	115.0	115.0	26.9	0.9	3.2	43	7	7	5.00	1.20	14	1.849	1.120	1.849	1.120	2.76	non-LIQ CLAY	1	0.94	NA	4.42	non-LIQ	non-LIQ	0.912	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
32.32	-14.1	115.0	115.0	25.7	0.8	3.0	43	7	7	5.00	1.20	13	1.858	1.125	1.858	1.125	2.75	non-LIQ CLAY	1	0.94	NA	4.41	non-LIQ	non-LIQ	0.911	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
32.48	-14.3	115.0	115.0	24.6	0.8	3.1	45	7	7	5.00	1.20	13	1.868	1.129	1.868	1.129	2.78	non-LIQ CLAY	1	0.94	NA	4.63	non-LIQ	non-LIQ	0.910	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
32.64	-14.4	115.0	115.0	24.7	0.8	3.3	46	7	7	5.00	1.20	13	1.877	1.133	1.877	1.133	2.80	non-LIQ CLAY	1	0.93	NA	4.76	non-LIQ	non-LIQ	0.908	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
32.81	-14.6	115.0	115.0	24.7	0.9	3.6	47	7	7	5.00	1.20	13	1.887	1.137	1.887	1.137	2.82	non-LIQ CLAY	1	0.93	NA	4.98	non-LIQ	non-LIQ	0.907	0.69	0.640	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
32.97	-14.8	115.0	115.0	25.2	0.9	3.5	46.6	7.2	6.9	5.0	1.2	13.0	1.90	1.14	1.90	1.14	2.81	non-LIQ CLAY	1	0.93	NA	4.87	non-LIQ	non-LIQ	0.906	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-14.9	115.0	115.0	24.4	0.8	3.3	46.6	7.0	6.7	5.0	1.2	13.0	1.91	1.15	1.91	1.15	2.81	non-LIQ CLAY	1	0.92	NA	4.88	non-LIQ	non-LIQ	0.904	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-15.1	115.0	115.0	24.2	1.0	4.0	49.9	7.1	6.9	5.0	1.2	13.0	1.91	1.15	1.91	1.15	2.87	non-LIQ CLAY	1	0.92	NA	5.38	non-LIQ	non-LIQ	0.903	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-15.3	115.0	115.0	28.3	1.0	3.7	45.2	8.0	7.6	5.0	1.2	14.0	1.92	1.15	1.92	1.15	2.79	non-LIQ CLAY	1	0.92	NA	4.66	non-LIQ	non-LIQ	0.902	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-15.4	115.0	115.0	25.8	1.0	3.9	48.1	7.5	7.1	5.0	1.2	14.0	1.93	1.16	1.93	1.16	2.84	non-LIQ CLAY	1	0.91	NA	5.10	non-LIQ	non-LIQ	0.900	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-15.6	115.0	115.0	22.9	0.8	3.6	49.6	6.7	6.4	5.0	1.2	13.0	1.94	1.16	1.94	1.16	2.86	non-LIQ CLAY	1	0.91	NA	5.33	non-LIQ	non-LIQ	0.899	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-15.8	115.0	115.0	21.3	0.7	3.4	50.4	6.3	6.0	5.0	1.2	12.0	1.95	1.17	1.95	1.17	2.87	non-LIQ CLAY	1	0.91	NA	5.45	non-LIQ	non-LIQ	0.898	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-15.9	115.0	115.0	21.0	0.6	3.1	49.6	6.2	5.9	5.0	1.2	12.0	1.96	1.17	1.96	1.17	2.86	non-LIQ CLAY	1	0.90	NA	5.32	non-LIQ	non-LIQ	0.896	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-16.1	115.0	115.0	20.5	0.6	3.1	50.2	6.1	5.8	5.0	1.2	12.0	1.97	1.18	1.97	1.18	2.87	non-LIQ CLAY	1	0.90	NA	5.41	non-LIQ	non-LIQ	0.895	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-16.3	115.0	115.0	21.9	0.6	2.7	46.6	6.3	5.9	5.0	1.2	12.0	1.98	1.18	1.98	1.18	2.81	non-LIQ CLAY	1	0.90	NA	4.88	non-LIQ	non-LIQ	0.894	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-16.4	115.0	115.0	22.7	0.6	2.8	46.1	6.5	6.1	5.0	1.2	12.0	1.99	1.18	1.99	1.18	2.80	non-LIQ CLAY	1	0.89	NA	4.80	non-LIQ	non-LIQ	0.892	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-16.6	115.0	115.0	25.3	0.7	2.8	43.9	7.0	6.6	5.0	1.2	13.0	2.00	1.19	2.00	1.19	2.76	non-LIQ CLAY	1	0.89	NA	4.48	non-LIQ	non-LIQ	0.891	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-16.7	115.0	115.0	27.5	0.8	3.1	43.5	7.6	7.2	5.0	1.2	14.0	2.01	1.19	2.01	1.19	2.76	non-LIQ CLAY	1	0.89	NA	4.43	non-LIQ	non-LIQ	0.890	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-16.9	115.0	115.0	28.9	1.0	3.6	45.1	8.1	7.7	5.0	1.2	14.0	2.02	1.20	2.02	1.20	2.78	non-LIQ CLAY	1	0.88	NA	4.65	non-LIQ	non-LIQ	0.888	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-17.1	115.0	115.0	30.2	1.1	3.8	45.0	8.5	8.0	5.0	1.2	15.0	2.03	1.20	2.03	1.20	2.78	non-LIQ CLAY	1	0.88	NA	4.63	non-LIQ	non-LIQ	0.887	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-17.2	115.0	115.0	28.8	1.2	4.2	48.0	8.3	7.8	5.0	1.2	14.0	2.04	1.21	2.04	1.21	2.84	non-LIQ CLAY	1	0.88	NA	5.09	non-LIQ	non-LIQ	0.886	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-17.4	115.0	115.0	28.4	1.2	4.2	48.2	8.3	7.7	5.0	1.2	14.0	2.05	1.21	2.05	1.21	2.84	non-LIQ CLAY	1	0.87	NA	5.12	non-LIQ	non-LIQ	0.884	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-17.6	115.0	115.0	27.2	1.3	4.7	51.2	8.1	7.6	5.0	1.2	14.0	2.06	1.22	2.06	1.22	2.89	non-LIQ CLAY	1	0.87	NA	5.57	non-LIQ	non-LIQ	0.883	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-17.7	115.0	115.0	28.0	1.2	4.5	49.9	8.3	7.7	5.0	1.2	14.0	2.07	1.22	2.07	1.22	2.87	non-LIQ CLAY	1	0.87	NA	5.37	non-LIQ	non-LIQ	0.882	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-17.9	115.0	115.0	26.6	1.2	4.4	51.1	7.9	7.4	5.0	1.2	14.0	2.08	1.22	2.08	1.22	2.89	non-LIQ CLAY	1	0.86	NA	5.55	non-LIQ	non-LIQ	0.880	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-18.1	115.0	115.0	26.5	1.0	4.0	49.2	7.8	7.2	5.0	1.2	14.0	2.08	1.23	2.08	1.23	2.85	non-LIQ CLAY	1	0.86	NA	5.26	non-LIQ	non-LIQ	0.879	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-18.2	115.0	115.0	26.6	1.0	3.8	48.7	7.8	7.2	5.0	1.2	14.0	2.09	1.23	2.09	1.23	2.85	non-LIQ CLAY	1	0.86	NA	5.19	non-LIQ	non-LIQ	0.878	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-18.4	115.0	115.0	25.3	0.9	3.7	49.4	7.4	6.9	5.0	1.2	13.0	2.10	1.24	2.10	1.24	2.86	non-LIQ CLAY	1	0.86	NA	5.30	non-LIQ	non-LIQ	0.876	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-18.6	115.0	115.0	25.7	0.9	3.6	48.8	7.5	6.9	5.0	1.2	13.0	2.11	1.24	2.11	1.24	2.85	non-LIQ CLAY	1	0.85	NA	5.21	non-LIQ	non-LIQ	0.875	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-18.7	115.0	115.0	25.6	0.9	3.4	47.6	7.4	6.8	5.0	1.2	13.0	2.12	1.25	2.12	1.25	2.83	non-LIQ CLAY	1	0.85	NA	5.03	non-LIQ	non-LIQ	0.874	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-18.9	115.0	115.0	25.3	0.8	3.1	46.8	7.3	6.7	5.0	1.2	13.0	2.13	1.25	2.13	1.25	2.81	non-LIQ CLAY	1	0.85	NA	4.90	non-LIQ	non-LIQ	0.872	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.24	-19.0	115.0	115.0	26.1	0.8	3.0	45.5	7.4	6.8	5.0	1.2	13.0	2.14	1.25	2.14	1.25	2.79	non-LIQ CLAY	1	0.84	NA	4.71	non-LIQ	non-LIQ	0.871	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.40	-19.2	115.0	115.0	27.8	0.9	3.1	44.6	7.8	7.1	5.0	1.2	14.0	2.15	1.26	2.15	1.26	2.78	non-LIQ CLAY	1	0.84	NA	4.58	non-LIQ	non-LIQ	0.870	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.57	-19.4	115.0	115.0	30.7	0.9	3.1	42.4	8.4	7.7	5.0	1.2	14.0	2.16	1.26	2.16	1.26	2.74	non-LIQ CLAY	1	0.84	NA	4.27	non-LIQ	non-LIQ	0.868	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.73	-19.5	115.0	115.0	35.0	1.2	3.3	41.3	9.5	8.7	5.0	1.2	15.0	2.17	1.27	2.17	1.27	2.72	non-LIQ CLAY	1	0.84	NA	4.11	non-LIQ	non-LIQ	0.867	0.690	0.640	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.89	-19.7	115.0	115.0	34.0	1.3	3.9	44.4	9.5	8.7	5.0	1.2	15.0	2.18	1.27	2.18	1.27	2.77	non-LIQ CLAY	1	0.83	NA	4.55	non-LIQ	non-LIQ	0.866	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-19.9	115.0	115.0	29.5	1.1	3.9	47.3	8.5	7.7	5.0	1.2	14.0	2.19	1.28	2.19	1.28	2.82	non-LIQ CLAY	1	0.83	NA	4.98	non-LIQ	non-LIQ	0.864	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-20.0	115.0	115.0	27.3	1.0	3.5	47.5	7.9	7.1	5.0	1.2	14.0	2.20	1.28	2.20	1.28	2.83	non-LIQ CLAY	1	0.83	NA	5.01	non-LIQ	non-LIQ	0.863	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-20.2	115.0	115.0	26.8	0.8	3.2	46.4	7.6	6.9	5.0	1.2	13.0	2.21	1.28	2.21	1.28	2.81	non-LIQ CLAY	1	0.82	NA	4.84	non-LIQ	non-LIQ	0.862	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-20.4	115.0	115.0	25.7	0.6	2.5	43.7	7.1	6.5	5.0	1.2	13.0	2.22	1.29	2.22	1.29	2.76	non-LIQ CLAY	1	0.82	NA	4.45	non-LIQ	non-LIQ	0.860	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-20.5	115.0	115.0	25.1	0.7	2.8	45.9	7.1	6.5	5.0	1.2	13.0	2.23	1.29	2.23	1.29	2.80	non-LIQ CLAY	1	0.82	NA	4.78	non-LIQ	non-LIQ	0.859	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-20.7	115.0	115.0	27.2	0.8	2.9	45.1	7.7	6.9	5.0	1.2	13.0	2.24	1.30	2.24	1.30	2.78	non-LIQ CLAY	1	0.82	NA	4.65	non-LIQ	non-LIQ	0.858	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-20.8	115.0	115.0	32.3	0.9	2.9	41.3	8.8	7.9	5.0	1.2	14.0	2.24	1.30	2.24	1.30	2.72	non-LIQ CLAY	1	0.81	NA	4.11	non-LIQ	non-LIQ	0.856	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							σ_v (tsf)	σ_v' (tsf)	σ_v (tsf)	σ_v' (tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1n})_{cs}$								(tsf)	(%)	(%)	(in)		(%)	(in)
39.21	-21.0	115.0	115.0	36.0	1.0	2.7	38.2	9.5	8.5	5.0	1.2	15.0	2.25	1.31	2.25	1.31	2.66	non-LIQ CLAY	1	0.81	NA	3.69	non-LIQ	non-LIQ	0.855	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-21.2	115.0	115.0	39.4	1.0	2.5	33.5	9.9	8.9	4.9	1.2	15.0	2.26	1.31	2.26	1.31	2.56	SAND	0.5	0.90	33	3.10	104	0.184	0.854	0.680	0.630	0.29	NA	NA	NA	NA	NA	0.00	12.00	2.31	0.04
39.53	-21.3	115.0	115.0	37.9	1.4	3.8	42.4	10.4	9.3	5.0	1.2	16.0	2.27	1.31	2.27	1.31	2.74	non-LIQ CLAY	1	0.81	NA	4.26	non-LIQ	non-LIQ	0.852	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-21.5	115.0	115.0	53.0	1.9	3.6	35.5	13.6	12.2	5.0	1.2	20.0	2.28	1.32	2.28	1.32	2.60	non-LIQ CLAY	1	0.80	NA	3.35	non-LIQ	non-LIQ	0.851	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-21.7	115.0	115.0	70.3	3.0	4.2	32.0	17.4	15.5	4.8	1.2	23.0	2.29	1.32	2.29	1.32	2.53	SAND	0.5	0.89	59	2.92	173	non-LIQ	0.850	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-21.8	115.0	115.0	101.3	3.4	3.4	24.2	23.0	20.5	4.2	1.1	27.0	2.30	1.33	2.30	1.33	2.34	SAND	0.5	0.89	86	2.10	179	non-LIQ	0.848	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-22.0	115.0	115.0	101.9	3.2	3.1	23.1	22.8	20.3	4.1	1.1	26.0	2.31	1.33	2.31	1.33	2.32	SAND	0.5	0.89	86	2.00	172	non-LIQ	0.847	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-22.2	115.0	115.0	130.6	2.9	2.2	16.7	27.0	24.1	2.9	1.1	28.0	2.32	1.34	2.32	1.34	2.13	SAND	0.5	0.89	110	1.51	166	non-LIQ	0.846	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-22.3	115.0	115.0	132.4	2.8	2.1	16.2	27.2	24.2	2.8	1.1	28.0	2.33	1.34	2.33	1.34	2.11	SAND	0.5	0.89	111	1.48	164	non-LIQ	0.844	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.68	-22.5	115.0	115.0	117.4	3.6	3.0	21.3	25.7	22.8	3.8	1.1	29.0	2.34	1.34	2.34	1.34	2.27	SAND	0.5	0.89	98	1.84	181	non-LIQ	0.843	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.85	-22.7	115.0	115.0	72.1	2.7	3.8	30.0	17.4	15.5	4.7	1.2	23.0	2.35	1.35	2.35	1.35	2.49	SAND	0.5	0.89	60	2.70	163	non-LIQ	0.842	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-22.8	115.0	115.0	44.6	1.5	3.3	37.8	11.7	10.3	5.0	1.2	17.0	2.36	1.35	2.36	1.35	2.65	non-LIQ CLAY	1	0.78	NA	3.64	non-LIQ	non-LIQ	0.840	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-23.0	115.0	115.0	34.4	1.0	3.0	41.4	9.3	8.3	5.0	1.2	15.0	2.37	1.36	2.37	1.36	2.72	non-LIQ CLAY	1	0.78	NA	4.13	non-LIQ	non-LIQ	0.839	0.680	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.34	-23.1	115.0	115.0	34.2	0.9	2.6	39.5	9.1	8.0	5.0	1.2	15.0	2.38	1.36	2.38	1.36	2.68	non-LIQ CLAY	1	0.78	NA	3.87	non-LIQ	non-LIQ	0.838	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-23.3	115.0	115.0	33.8	0.9	2.7	40.6	9.1	8.0	5.0	1.2	15.0	2.39	1.37	2.39	1.37	2.70	non-LIQ CLAY	1	0.77	NA	4.02	non-LIQ	non-LIQ	0.836	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-23.5	115.0	115.0	34.2	1.0	3.1	42.0	9.4	8.2	5.0	1.2	15.0	2.40	1.37	2.40	1.37	2.73	non-LIQ CLAY	1	0.77	NA	4.21	non-LIQ	non-LIQ	0.835	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-23.6	115.0	115.0	38.5	1.3	3.4	41.1	10.4	9.2	5.0	1.2	16.0	2.41	1.37	2.41	1.37	2.71	non-LIQ CLAY	1	0.77	NA	4.09	non-LIQ	non-LIQ	0.834	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-23.8	115.0	115.0	38.8	1.5	4.0	43.6	10.8	9.4	5.0	1.2	16.0	2.41	1.38	2.41	1.38	2.76	non-LIQ CLAY	1	0.77	NA	4.43	non-LIQ	non-LIQ	0.832	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-24.0	115.0	115.0	38.9	1.8	4.8	46.7	11.1	9.7	5.0	1.2	17.0	2.42	1.38	2.42	1.38	2.81	non-LIQ CLAY	1	0.76	NA	4.86	non-LIQ	non-LIQ	0.831	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.32	-24.1	115.0	115.0	39.4	1.9	4.8	46.5	11.3	9.8	5.0	1.2	17.0	2.43	1.39	2.43	1.39	2.81	non-LIQ CLAY	1	0.76	NA	4.86	non-LIQ	non-LIQ	0.830	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.49	-24.3	115.0	115.0	44.8	2.3	5.1	45.0	12.6	11.0	5.0	1.2	18.0	2.44	1.39	2.44	1.39	2.78	non-LIQ CLAY	1	0.76	NA	4.64	non-LIQ	non-LIQ	0.828	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-24.5	115.0	115.0	46.9	2.9	6.2	47.7	13.5	11.8	5.0	1.2	19.0	2.45	1.40	2.45	1.40	2.83	non-LIQ CLAY	1	0.76	NA	5.03	non-LIQ	non-LIQ	0.827	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-24.6	115.0	115.0	50.0	3.5	6.9	48.8	14.6	12.7	5.0	1.2	20.0	2.46	1.40	2.46	1.40	2.85	non-LIQ CLAY	1	0.76	NA	5.20	non-LIQ	non-LIQ	0.826	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-24.8	115.0	115.0	71.5	2.1	3.0	27.4	16.8	14.6	4.5	1.1	21.0	2.47	1.40	2.47	1.40	2.42	SAND	0.5	0.87	59	2.41	141	0.342	0.824	0.670	0.630	0.54	NA	NA	NA	NA	NA	0.00	17.00	1.78	0.04
43.14	-24.9	115.0	115.0	86.5	4.4	5.0	31.7	21.8	18.9	4.8	1.2	27.0	2.48	1.41	2.48	1.41	2.52	SAND	0.5	0.87	72	2.89	209	non-LIQ	0.823	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-25.1	115.0	115.0	61.7	5.1	8.3	48.4	17.9	15.5	5.0	1.2	24.0	2.49	1.41	2.49	1.41	2.84	non-LIQ CLAY	1	0.75	NA	5.14	non-LIQ	non-LIQ	0.822	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-25.3	115.0	115.0	73.4	4.4	6.0	39.5	19.6	16.9	5.0	1.2	25.0	2.50	1.42	2.50	1.42	2.68	non-LIQ CLAY	1	0.75	NA	3.67	non-LIQ	non-LIQ	0.820	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-25.4	115.0	115.0	79.2	5.0	6.3	39.0	21.0	18.1	5.0	1.2	27.0	2.51	1.42	2.51	1.42	2.67	non-LIQ CLAY	1	0.74	NA	3.80	non-LIQ	non-LIQ	0.819	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-25.6	115.0	115.0	111.6	6.2	5.6	30.4	27.1	23.3	4.7	1.2	32.0	2.52	1.43	2.52	1.43	2.49	SAND	0.5	0.86	91	2.74	249	non-LIQ	0.818	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-25.8	115.0	115.0	135.4	5.9	4.3	24.6	30.8	26.5	4.2	1.1	34.0	2.53	1.43	2.53	1.43	2.35	SAND	0.5	0.86	110	2.14	235	non-LIQ	0.816	0.670	0.630	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.13	-25.9	115.0	115.0	108.2	6.0	5.5	30.7	26.4	22.6	4.8	1.2	31.0	2.54	1.44	2.54	1.44	2.50	SAND	0.5	0.86	88	2.77	243	non-LIQ	0.815	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.29	-26.1	115.0	115.0	91.6	4.5	4.9	31.1	22.4	19.2	4.8	1.2	27.0	2.55	1.44	2.55	1.44	2.51	SAND	0.5	0.86	74	2.82	209	non-LIQ	0.814	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.46	-26.3	115.0	115.0	81.3	5.0	6.2	38.6	21.5	18.4	5.0	1.2	27.0	2.56	1.44	2.56	1.44	2.66	non-LIQ CLAY	1	0.73	NA	3.74	non-LIQ	non-LIQ	0.812	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.62	-26.4	115.0	115.0	76.5	4.5	5.9	39.0	20.3	17.3	5.0	1.2	26.0	2.57	1.45	2.57	1.45	2.67	non-LIQ CLAY	1	0.73	NA	3.80	non-LIQ	non-LIQ	0.811	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.78	-26.6	115.0	115.0	108.0	5.0	4.6	26.1	25.6	21.9	4.6	1.1	29.0	2.57	1.45	2.57	1.45	2.44	SAND	0.5	0.85	87	2.49	217	non-LIQ	0.810	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.95	-26.8	115.0	115.0	120.5	6.1	5.0	28.1	28.5	24.3	4.6	1.1	32.0	2.58	1.46	2.58	1.46	2.44	SAND	0.5	0.85	97	2.49	241	non-LIQ	0.808	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-26.9	115.0	115.0	228.4	4.9	2.1	12.1	44.4	37.8	1.6	1.0	41.0	2.59	1.46	2.59	1.46	1.97	SAND	0.5	0.85	184	1.26	232	non-LIQ	0.807	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-27.1	115.0	115.0	332.3	4.5	1.4	6.4	58.9	50.1	0.1	1.0	50.0	2.60	1.47	2.60	1.47	1.72	SAND	0.5	0.85	267	1.05	280	non-LIQ	0.806	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-27.2	115.0	115.0	430.7	4.5	1.0	3.6	72.3	61.4	0.0	1.0	61.0	2.61	1.47	2.61	1.47	1.55	SAND	0.5	0.85	345	1.00	345	non-LIQ	0.804	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-27.4	115.0	115.0	397.2	4.7	1.2	4.7	68.2	57.8	0.0	1.0	58.0	2.62	1.47	2.62	1.47	1.62	SAND	0.5	0.85	318	1.00	318	non-LIQ	0.803	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-27.6	115.0	115.0	362.9	3.8	1.0	4.3	61.8	52.3	0.0	1.0	52.0	2.63	1.48	2.63	1.48	1.60	SAND	0.5	0.85	290	1.00	290	non-LIQ	0.802	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-27.7	115.0	115.0	397.5	4.5	1.1	4.4	67.8	57.3	0.0	1.0	57.0	2.64	1.48	2.64	1.48	1.60	SAND	0.5	0.84	317	1.00	317	non-LIQ	0.800	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-27.9	115.0	115.0	364.5	3.6	0.9	3.6	64.5	54.4	0.0	1.0	54.0	2.65	1.49	2.65	1.49	1.55	SAND	0.5	0.84	307	1.00	307	non-LIQ	0.799	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-28.1	115.0	115.0	349.8	5.1	1.5	6.6	62.3	52.5	0.1	1.0	53.0	2.66	1.49	2.66	1.49	1.73	SAND	0.5	0.84	278	1.06	294	non-LIQ	0.798	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-28.2	115.0	115.0	327.9	3.3	1.0	4.7	56.3	47.4	0.0	1.0	47.0	2.67	1.50	2.67	1.50	1.62	SAND	0.5	0.84	261	1.00	261	non-LIQ	0.796	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-28.4	115.0	115.0	321.2	2.6	0.8	3.7	54.0	45.4	0.0	1.0	45.0	2.68	1.50	2.68	1.50	1.56	SAND	0.5	0.84	255	1.00	255	non-LIQ	0.795	0.660	0.620	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-28.6	115.0	115.0	322.1	2.5	0.8	3.4	53.8	45.2	0.0	1.0	45.0	2.69	1.50	2.69	1.50	1.54	SAND	0.5	0.84	255	1.00	255	non-LIQ	0.794	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-28.7	115.0	115.0	272.6	2.2	0.8	4.5	46.6	39.0	0.0	1.0	39.0	2.70	1.51	2.70	1.51	1.61	SAND	0.5	0.84	216	1.00	216	non-LIQ	0.792	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-28.9	115.0	115.0	227.8	1.7	0.7	5.0	39.3	32.9	0.0	1.0	33.0	2.71	1.51	2.71	1.51	1.64	SAND	0.5	0.84	180	1.00	180	non-LIQ	0.791	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-29.0	115.0	115.0	247.9	6.5	2.6	13.6	49.2	41.1	2.1	1.0	45.0	2.72	1.52	2.72	1.52	2.02	SAND	0.5	0.84	196	1.33	261	non-LIQ	0.790	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.41	-29.2	115.0	115.0	325.3	5.5	1.7	8.1	59.4	49.6	0.3	1.0	51.0	2.73	1.52	2.73	1.52	1.80	SAND	0.5	0.83	256	1.11	284	non-LIQ	0.788	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-29.4	115.0	115.0	275.7	3.9	1.4	7.8	50.1	41.7	0.3	1.0	42.0	2.74	1.53	2.74	1.53	1.78	SAND	0.5	0.83	217	1.10	238	non-LIQ	0.787	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-29.5	115.0	115.0	243.6	2.7	1.1	7.0	43.7	36.3	0.1	1.0	37.0	2.75	1.53	2.75	1.53	1.75	SAND	0.5	0.83	192	1.07	205	non-LIQ	0.785	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-29.7	115.0	115.0	203.1	2.7	1.3	9.4	37.9	31.5	0.7	1.0	33.0	2.75	1.53	2.75	1.53	1.86	SAND	0.5	0.83	159	1.15	184	non-LIQ	0.784	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-29.9	115.0	115.0	210.3	2.6	1.2	8.6	38.7	32.1	0.4	1.0	33.0	2.76	1.54	2.76	1.54	1.82	SAND	0.5	0.83	165	1.12	185	non-LIQ	0.783	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-30.0	115.0	115.0	248.2	3.2	1.3	7.9	45.2	37.4	0.3	1.0	38.0	2.77	1.54	2.77	1.54	1.79	SAND	0.5	0.83	194	1.10	214	non-LIQ	0.781	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-30.2	115.0	115.0	173.6	3.6	2.1	14.2	34.8	28.8	2.3	1.0	32.0	2.78	1.55	2.78	1.55	2.04	SAND	0.5	0.83	136	1.36	185	non-LIQ	0.780	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-30.4	115.0	115.0	87.2	2.9	3.3	26.6	20.3	16.8	4.4	1.1	23.0	2.79	1.55	2.79	1.55	2.41	SAND	0.5	0.83	68	2.34	159	0.453	0.779	0.650	0.610	0.74	NA	NA	NA	NA	NA	0.00	19.00	1.65	0.03
48.72	-30.5	115.0	115.0	55.2	2.1	3.8	38.6	14.6	12.0	5.0	1.2	19.0	2.80	1.56	2.80	1.56	2.66	non-LIQ CLAY	1	0.68	NA	3.75	non-LIQ	non-LIQ	0.778	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-30.7	115.0	115.0	37.2	1.4	3.9	46.7	10.6	8.8	5.0	1.2	16.0	2.81	1.56	2.81	1.56	2.81	non-LIQ CLAY	1	0.68	NA	4.89	non-LIQ	non-LIQ	0.776	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-30.9	115.0	115.0	36.7	1.0	2.8	41.8	10.0	8.2	5.0	1.2	15.0	2.82	1.56	2.82	1.56	2.73	non-LIQ CLAY	1	0.68	NA	4.19	non-LIQ	non-LIQ	0.775	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-31.0	115.0	115.0	29.2	0.8	2.8	47.5	8.4	6.9	5.0	1.2	13.0	2.83	1.57	2.83	1.57	2.83	non-LIQ CLAY	1	0.67	NA	5.00	non-LIQ	non-LIQ	0.774	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-31.2	115.0	115.0	23.9	0.7	2.9	52.9	7.3	5.9	5.0	1.2	12.0	2.84	1.57	2.84	1.57	2.91	non-LIQ CLAY	1	0.67	NA	5.84	non-LIQ	non-LIQ	0.772	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-31.3	115.0	115.0	21.8	0.7	3.4	58.4	7.0	5.7	5.0	1.2	12.0	2.85	1.58	2.85	1.58	3.00	non-LIQ CLAY	1	0.67	NA	6.73	non-LIQ	non-LIQ	0.771	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.70	-31.5	115.0	115.0	22.5	0.7	3.1	56.2	7.0	5.7	5.0	1.2	12.0	2.86	1.58	2.86	1.58	2.97	non-LIQ CLAY	1	0.67	NA	6.37	non-LIQ	non-LIQ	0.770	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.87	-31.7	115.0	115.0	20.2	0.7	3.4	60.9	6.6	5.4	5.0	1.2	11.0	2.87	1.59	2.87	1.59	3.04	non-LIQ CLAY	1	0.67	NA	7.14	non-LIQ	non-LIQ	0.768	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.03	-31.8	115.0	115.0	19.0	0.7	3.5	63.5	6.3	5.2	5.0	1.2	11.0	2.88	1.59	2.88	1.59	3.07	non-LIQ CLAY	1	0.67	NA	7.58	non-LIQ	non-LIQ	0.767	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.20	-32.0	115.0	115.0	18.5	0.6	3.3	63.7	6.2	5.1	5.0	1.2	11.0	2.89	1.59	2.89	1.59	3.07	non-LIQ CLAY	1	0.66	NA	7.61	non-LIQ	non-LIQ	0.765	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.36	-32.2	115.0	115.0	18.7	0.6	3.3	63.1	6.2	5.1	5.0	1.2	11.0	2.90	1.60	2.90	1.60	3.07	non-LIQ CLAY	1	0.66	NA	7.51	non-LIQ	non-LIQ	0.764	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.52	-32.3	115.0	115.0	18.4	0.6	3.1	62.9	6.1	5.0	5.0	1.2	11.0	2.90	1.60	2.90	1.60	3.06	non-LIQ CLAY	1	0.66	NA	7.49	non-LIQ	non-LIQ	0.763	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.69	-32.5	115.0	115.0	18.7	0.6	3.1	62.2	6.2	5.0	5.0	1.2	11.0	2.91	1.61	2.91	1.61	3.05	non-LIQ CLAY	1	0.66	NA	7.37	non-LIQ	non-LIQ	0.761	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.85	-32.7	115.0	115.0	19.1	0.6	3.1	61.5	6.3	5.1	5.0	1.2	11.0	2.92	1.61	2.92	1.61	3.04	non-LIQ CLAY	1	0.66	NA	7.24	non-LIQ	non-LIQ	0.760	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.02	-32.8	115.0	115.0	20.5	0.6	2.8	57.8	6.5	5.3	5.0	1.2	11.0	2.93	1.62	2.93	1.62	2.99	non-LIQ CLAY	1	0.65	NA	6.63	non-LIQ	non-LIQ	0.759	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.18	-33.0	115.0	115.0	21.8	0.7	3.3	56.9	7.0	5.7	5.0	1.2	12.0	2.94	1.62	2.94	1.62	3.01	non-LIQ CLAY	1	0.65	NA	6.82	non-LIQ	non-LIQ	0.757	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.35	-33.2	115.0	115.0	25.2	0.9	3.4	55.3	7.8	6.3	5.0	1.2	13.0	2.95	1.63	2.95	1.63	2.95	non-LIQ CLAY	1	0.65	NA	6.22	non-LIQ	non-LIQ	0.756	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.51	-33.3	115.0	115.0	27.0	0.9	3.2	52.7	8.2	6.6	5.0	1.2	13.0	2.96	1.63	2.96	1.63	2.91	non-LIQ CLAY	1	0.65	NA	5.80	non-LIQ	non-LIQ	0.755	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.67	-33.5	115.0	115.0	26.0	1.0	3.7	55.7	8.1	6.5	5.0	1.2	13.0	2.97	1.63	2.97	1.63	2.96	non-LIQ CLAY	1	0.65	NA	6.30	non-LIQ	non-LIQ	0.754	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.84	-33.6	115.0	115.0	23.6	0.9	3.8	59.2	7.6	6.1	5.0	1.2	12.0	2.98	1.64	2.98	1.64	3.01	non-LIQ CLAY	1	0.65	NA	6.86	non-LIQ	non-LIQ	0.752	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.00	-33.8	115.0	115.0	24.7	0.9	3.5	56.4	7.7	6.2	5.0	1.2	12.0	2.99	1.64	2.99	1.64	2.97	non-LIQ CLAY	1	0.64	NA	6.40	non-LIQ	non-LIQ	0.751	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.17	-34.0	115.0	115.0	24.2	0.8	3.5	57.3	7.6	6.1	5.0	1.2	12.0	3.00	1.65	3.00	1.65	2.98	non-LIQ CLAY	1	0.64	NA	6.55	non-LIQ	non-LIQ	0.749	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.33	-34.1	115.0	115.0	24.6	0.9	3.6	57.5	7.8	6.2	5.0	1.2	12.0	3.01	1.65	3.01	1.65	2.99	non-LIQ CLAY	1	0.64	NA	6.58	non-LIQ	non-LIQ	0.748	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.49	-34.3	115.0	115.0	25.7	1.0	3.9	57.7	8.1	6.5	5.0	1.2	13.0	3.02	1.66	3.02	1.66	2.99	non-LIQ CLAY	1	0.64	NA	6.61	non-LIQ	non-LIQ	0.747	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.66	-34.5	115.0	115.0	29.0	1.2	4.0	55.0	9.0	7.2	5.0	1.2	14.0	3.03	1.66	3.03	1.66	2.95	non-LIQ CLAY	1	0.64	NA	6.17	non-LIQ	non-LIQ	0.745	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.82	-34.6	115.0	115.0	29.0	1.5	5.3	60.1	9.4	7.5	5.0	1.2	14.0	3.04	1.66	3.04	1.66	3.02	non-LIQ CLAY	1	0.64	NA	7.02	non-LIQ	non-LIQ	0.744	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.99	-34.8	115.0	115.0	28.4	1.6	5.7	62.3	9.4	7.5	5.0	1.2	14.0	3.05	1.67	3.05	1.67	3.06	non-LIQ CLAY	1	0.63	NA	7.39	non-LIQ	non-LIQ	0.743	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.15	-35.0	115.0	115.0	27.0	1.7	6.1	65.4	9.2	7.3	5.0	1.2	14.0	3.06	1.67	3.06	1.67	3.10	non-LIQ CLAY	1	0.63	NA	7.91	non-LIQ	non-LIQ	0.741	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.31	-35.1	115.0	115.0	25.3	1.6	6.5	68.6	8.9	7.1	5.0	1.2	13.0	3.07	1.68	3.07	1.68	3.14	non-LIQ CLAY	1	0.63	NA	8.47	non-LIQ	non-LIQ	0.740	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.48	-35.3	115.0	115.0	23.9	1.5	6.2	69.5	8.5	6.7	5.0	1.2	13.0	3.08	1.68	3.08	1.68	3.15	non-LIQ CLAY	1	0.63	NA	8.63	non-LIQ	non-LIQ	0.739	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.64	-35.4	115.0	115.0	23.4	1.4	5.9	69.1	8.2	6.5	5.0	1.2	13.0	3.08	1.69	3.08	1.69	3.15	non-LIQ CLAY	1	0.63	NA	8.57	non-LIQ	non-LIQ	0.737	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
53.81	-35.6	115.0	115.0	24.0	1.3	5.3	66.3	8.2	6.5	5.0	1.2	13.0	3.09	1.69	3.09	1.69	3.11	non-LIQ CLAY	1	0.63	NA	8.08	non-LIQ	non-LIQ	0.736	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.97	-35.8	115.0	115.0	23.6	1.2	5.3	66.7	8.1	6.4	5.0	1.2	13.0	3.10	1.69	3.10	1.69	3.12	non-LIQ CLAY	1	0.62	NA	8.13	non-LIQ	non-LIQ	0.735	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.13	-35.9	115.0	115.0	23.1	1.2	5.3	67.4	8.0	6.3	5.0	1.2	13.0	3.11	1.70	3.11	1.70	3.13	non-LIQ CLAY	1	0.62	NA	8.26	non-LIQ	non-LIQ	0.733	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.30	-36.1	115.0	115.0	24.0	1.2	4.8	64.4	8.1	6.4	5.0	1.2	13.0	3.12	1.70	3.12	1.70	3.09	non-LIQ CLAY	1	0.62	NA	7.75	non-LIQ	non-LIQ	0.732	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.46	-36.3	115.0	115.0	25.0	1.2	4.7	62.8	8.3	6.6	5.0	1.2	13.0	3.13	1.71	3.13	1.71	3.06	non-LIQ CLAY	1	0.62	NA	7.46	non-LIQ	non-LIQ	0.731	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.63	-36.4	115.0	115.0	25.4	1.1	4.4	61.1	8.3	6.5	5.0	1.2	13.0	3.14	1.71	3.14	1.71	3.04	non-LIQ CLAY	1	0.62	NA	7.18	non-LIQ	non-LIQ	0.729	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.79	-36.6	115.0	115.0	27.3	1.2	4.4	59.1	8.8	6.9	5.0	1.2	13.0	3.15	1.72	3.15	1.72	3.01	non-LIQ CLAY	1	0.62	NA	6.85	non-LIQ	non-LIQ	0.728	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.95	-36.8	115.0	115.0	26.0	1.2	4.7	62.0	8.6	6.7	5.0	1.2	13.0	3.16	1.72	3.16	1.72	3.05	non-LIQ CLAY	1	0.62	NA	7.34	non-LIQ	non-LIQ	0.727	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.12	-36.9	115.0	115.0	23.9	1.2	5.0	65.8	8.2	6.4	5.0	1.2	13.0	3.17	1.72	3.17	1.72	3.10	non-LIQ CLAY	1	0.61	NA	7.97	non-LIQ	non-LIQ	0.725	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.28	-37.1	115.0	115.0	21.9	1.1	4.8	67.8	7.6	6.0	5.0	1.2	12.0	3.18	1.73	3.18	1.73	3.13	non-LIQ CLAY	1	0.61	NA	8.33	non-LIQ	non-LIQ	0.724	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.45	-37.3	115.0	115.0	22.2	0.9	4.3	65.1	7.5	5.9	5.0	1.2	12.0	3.19	1.73	3.19	1.73	3.09	non-LIQ CLAY	1	0.61	NA	7.86	non-LIQ	non-LIQ	0.723	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.61	-37.4	115.0	115.0	23.1	0.9	4.1	62.9	7.7	6.0	5.0	1.2	12.0	3.20	1.74	3.20	1.74	3.06	non-LIQ CLAY	1	0.61	NA	7.49	non-LIQ	non-LIQ	0.721	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.77	-37.6	115.0	115.0	23.5	0.9	4.0	62.3	7.8	6.1	5.0	1.2	12.0	3.21	1.74	3.21	1.74	3.06	non-LIQ CLAY	1	0.61	NA	7.38	non-LIQ	non-LIQ	0.720	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.94	-37.7	115.0	115.0	25.7	1.0	3.7	58.3	8.2	6.4	5.0	1.2	13.0	3.22	1.75	3.22	1.75	3.00	non-LIQ CLAY	1	0.61	NA	6.71	non-LIQ	non-LIQ	0.719	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.10	-37.9	115.0	115.0	26.9	1.2	4.3	59.8	8.7	6.8	5.0	1.2	13.0	3.23	1.75	3.23	1.75	3.02	non-LIQ CLAY	1	0.60	NA	6.95	non-LIQ	non-LIQ	0.717	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.27	-38.1	115.0	115.0	28.5	1.2	4.2	57.7	9.0	7.0	5.0	1.2	13.0	3.24	1.75	3.24	1.75	2.99	non-LIQ CLAY	1	0.60	NA	6.62	non-LIQ	non-LIQ	0.716	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.43	-38.2	115.0	115.0	28.5	1.2	4.3	58.1	9.1	7.0	5.0	1.2	13.0	3.24	1.76	3.24	1.76	2.99	non-LIQ CLAY	1	0.60	NA	6.69	non-LIQ	non-LIQ	0.715	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.59	-38.4	115.0	115.0	28.2	1.1	4.0	57.2	8.9	6.9	5.0	1.2	13.0	3.25	1.76	3.25	1.76	2.98	non-LIQ CLAY	1	0.60	NA	6.53	non-LIQ	non-LIQ	0.713	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.76	-38.6	115.0	115.0	28.1	1.2	4.2	58.2	9.0	6.9	5.0	1.2	13.0	3.26	1.77	3.26	1.77	3.00	non-LIQ CLAY	1	0.60	NA	6.70	non-LIQ	non-LIQ	0.712	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.92	-38.7	115.0	115.0	30.1	1.2	4.0	55.7	9.4	7.2	5.0	1.2	14.0	3.27	1.77	3.27	1.77	2.96	non-LIQ CLAY	1	0.60	NA	6.29	non-LIQ	non-LIQ	0.711	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.09	-38.9	115.0	115.0	30.2	1.3	4.2	56.4	9.5	7.3	5.0	1.2	14.0	3.28	1.78	3.28	1.78	2.97	non-LIQ CLAY	1	0.60	NA	6.40	non-LIQ	non-LIQ	0.709	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.25	-39.1	115.0	115.0	29.9	1.2	4.2	56.7	9.4	7.3	5.0	1.2	14.0	3.29	1.78	3.29	1.78	2.97	non-LIQ CLAY	1	0.59	NA	6.46	non-LIQ	non-LIQ	0.708	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.41	-39.2	115.0	115.0	31.1	1.3	4.2	56.1	9.7	7.5	5.0	1.2	14.0	3.30	1.78	3.30	1.78	2.96	non-LIQ CLAY	1	0.59	NA	6.35	non-LIQ	non-LIQ	0.707	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.58	-39.4	115.0	115.0	31.9	1.4	4.3	55.6	9.9	7.6	5.0	1.2	14.0	3.31	1.79	3.31	1.79	2.96	non-LIQ CLAY	1	0.59	NA	6.28	non-LIQ	non-LIQ	0.705	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.74	-39.5	115.0	115.0	32.3	1.4	4.4	56.0	10.1	7.8	5.0	1.2	14.0	3.32	1.79	3.32	1.79	2.96	non-LIQ CLAY	1	0.59	NA	6.34	non-LIQ	non-LIQ	0.704	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.91	-39.7	115.0	115.0	32.1	1.4	4.4	56.0	10.0	7.7	5.0	1.2	14.0	3.33	1.80	3.33	1.80	2.96	non-LIQ CLAY	1	0.59	NA	6.34	non-LIQ	non-LIQ	0.703	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.07	-39.9	115.0	115.0	30.7	1.4	4.4	57.4	9.7	7.4	5.0	1.2	14.0	3.34	1.80	3.34	1.80	2.98	non-LIQ CLAY	1	0.59	NA	6.57	non-LIQ	non-LIQ	0.701	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.23	-40.0	115.0	115.0	29.9	1.2	4.2	57.0	9.4	7.2	5.0	1.2	14.0	3.35	1.81	3.35	1.81	2.98	non-LIQ CLAY	1	0.59	NA	6.51	non-LIQ	non-LIQ	0.700	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.40	-40.2	115.0	115.0	30.7	1.3	4.3	56.9	9.7	7.4	5.0	1.2	14.0	3.36	1.81	3.36	1.81	2.98	non-LIQ CLAY	1	0.58	NA	6.49	non-LIQ	non-LIQ	0.699	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.56	-40.4	115.0	115.0	33.6	1.4	4.0	53.6	10.3	7.8	5.0	1.2	14.0	3.37	1.81	3.37	1.81	2.93	non-LIQ CLAY	1	0.58	NA	5.95	non-LIQ	non-LIQ	0.697	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.73	-40.5	115.0	115.0	35.2	1.5	4.2	53.1	10.7	8.2	5.0	1.2	15.0	3.38	1.82	3.38	1.82	2.92	non-LIQ CLAY	1	0.58	NA	5.86	non-LIQ	non-LIQ	0.696	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.89	-40.7	115.0	115.0	37.3	1.5	4.0	51.0	11.1	8.5	5.0	1.2	15.0	3.39	1.82	3.39	1.82	2.88	non-LIQ CLAY	1	0.58	NA	5.54	non-LIQ	non-LIQ	0.695	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.06	-40.9	115.0	115.0	39.6	1.5	3.7	48.3	11.5	8.7	5.0	1.2	15.0	3.40	1.83	3.40	1.83	2.84	non-LIQ CLAY	1	0.58	NA	5.13	non-LIQ	non-LIQ	0.693	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.22	-41.0	115.0	115.0	39.3	1.6	4.0	50.0	11.6	8.8	5.0	1.2	16.0	3.41	1.83	3.41	1.83	2.87	non-LIQ CLAY	1	0.58	NA	5.39	non-LIQ	non-LIQ	0.692	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.38	-41.2	115.0	115.0	39.4	1.6	4.1	50.1	11.6	8.8	5.0	1.2	16.0	3.41	1.84	3.41	1.84	2.87	non-LIQ CLAY	1	0.58	NA	5.41	non-LIQ	non-LIQ	0.691	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.55	-41.4	115.0	115.0	39.1	1.4	3.6	48.1	11.3	8.6	5.0	1.2	15.0	3.42	1.84	3.42	1.84	2.84	non-LIQ CLAY	1	0.57	NA	5.09	non-LIQ	non-LIQ	0.689	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.71	-41.5	115.0	115.0	35.6	1.2	3.5	50.1	10.5	8.0	5.0	1.2	15.0	3.43	1.84	3.43	1.84	2.87	non-LIQ CLAY	1	0.57	NA	5.41	non-LIQ	non-LIQ	0.688	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.88	-41.7	115.0	115.0	36.1	1.2	3.2	48.5	10.5	8.0	5.0	1.2	15.0	3.44	1.85	3.44	1.85	2.84	non-LIQ CLAY	1	0.57	NA	5.16	non-LIQ	non-LIQ	0.687	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.04	-41.8	115.0	115.0	32.5	1.1	3.5	52.7	9.8	7.4	5.0	1.2	14.0	3.45	1.85	3.45	1.85	2.91	non-LIQ CLAY	1	0.57	NA	5.81	non-LIQ	non-LIQ	0.685	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.20	-42.0	115.0	115.0	34.4	1.1	3.2	49.8	10.1	7.6	5.0	1.2	14.0	3.46	1.86	3.46	1.86	2.86	non-LIQ CLAY	1	0.57	NA	5.35	non-LIQ	non-LIQ	0.684	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.37	-42.2	115.0	115.0	38.9	1.4	3.6	48.8	11.3	8.6	5.0	1.2	15.0	3.47	1.86	3.47	1.86	2.85	non-LIQ CLAY	1	0.57	NA	5.20	non-LIQ	non-LIQ	0.683	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.53	-42.3	115.0	115.0	43.6	2.1	4.7	50.7	13.0	9.8	5.0	1.2	17.0	3.48	1.87	3.48	1.87	2.88	non-LIQ CLAY	1	0.57	NA	5.49	non-LIQ	non-LIQ	0.681	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.70	-42.5	115.0	115.0	48.7	2.0	4.0	45.6	13.8	10.4	5.0	1.2	17.0	3.49	1.87	3.49	1.87	2.79	non-LIQ CLAY	1	0.57	NA	4.73	non-LIQ	non-LIQ	0.680	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.86	-42.7	115.0	115.0	53.8	1.6	3.0	39.0	14.3	10.7	5.0	1.2	18.0	3.50	1.88	3.50	1.88	2.67	non-LIQ CLAY	1	0.56	NA	3.80	non-LIQ	non-LIQ	0.679	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.02	-42.8	115.0	115.0	40.0	1.3	3.3	47.0	11.5	8.6	5.0	1.2	15.0	3.51	1.88	3.51	1.88	2.82	non-LIQ CLAY	1	0.56	NA	4.94	non-LIQ	non-LIQ	0.677	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.19	-43.0	115.0	115.0	38.8	1.1	3.0	45.9	11.0	8.3	5.0	1.2	15.0	3.52	1.88	3.52	1.88	2.80	non-LIQ CLAY	1	0.56	NA	4.77	non-LIQ	non-LIQ	0.676	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.35	-43.2	115.0	115.0	37.9	1.4	3.8	50.4	11.2	8.4	5.0	1.2	15.0	3.53	1.89	3.53	1.89	2.87	non-LIQ CLAY	1	0.56	NA	5.45	non-LIQ	non-LIQ	0.675	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.52	-43.3	115.0	115.0	44.1	1.5	3.4	45.2	12.4	9.3	5.0	1.2	16.0	3.54	1.89	3.54	1.89	2.79	non-LIQ CLAY	1	0.56	NA	4.67	non-LIQ	non-LIQ	0.673	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.68	-43.5	115.0	115.0	42.5	1.6	3.7	47.4	12.2	9.1	5.0	1.2	16.0	3.55	1.90	3.55	1.90	2.82	non-LIQ CLAY	1	0.56	NA	4.99	non-LIQ	non-LIQ	0.672	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.84	-43.6	115.0	115.0	37.1	2.0	5.3	57.4	11.7	8.8	5.0	1.2	16.0	3.56	1.90	3.56	1.90	2.98	non-LIQ CLAY	1	0.56	NA	6.57	non-LIQ	non-LIQ	0.671	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.01	-43.8	115.0	115.0	60.6	3.1	5.1	45.6	17.1	12.8	5.0	1.2	20.0	3.57	1.91	3.57	1.91	2.79	non-LIQ CLAY	1	0.56	NA	4.73	non-LIQ	non-LIQ	0.669	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.17	-44.0	115.0	115.0	77.7	2.5	3.3	29.8	18.7	13.9	4.7	1.2	21.0	3.57	1.91	3.57	1.91	2.48	SAND	0.5	0.74	55	2.67	146	0.368	0.668	0.580	0.540	0.68	NA	NA	NA	NA	NA	0.00	16.00	1.87	0.04
62.34	-44.1	115.0	115.0	64.4	3.8	5.9	46.9	18.5	13.7	5.0	1.2	21.0	3.58	1.91	3.58	1.91	2.82	non-LIQ CLAY	1	0.55	NA	4.92	non-LIQ	non-LIQ	0.667	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.50	-44.3	115.0	115.0	105.1	5.5	5.3	36.5	27.2	20.2	5.0	1.2	29.0	3.59	1.92	3.59	1.92	2.62	non-LIQ CLAY	1	0.55	NA	3.47	non-LIQ	non-LIQ	0.665	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.66	-44.5	115.0	115.0	145.8	6.3	4.3	25.4	33.5	24.9	4.3	1.1	32.0	3.60	1.92	3.60	1.92	2.37	SAND	0.5	0.74	102	2.21	226	non-LIQ	0.664	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.83	-44.6	115.0	115.0	144.2	7.7	5.3	28.6	34.3	25.4	4.6	1.1	34.0	3.61	1.93	3.61	1.93	2.45	SAND	0.5	0.74	101	2.53	256	non-LIQ	0.663	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.99	-44.8	115.0	115.0	234.3	8.8	3.7	18.9	49.9	36.9	3.4	1.1	43.0	3.62	1.93	3.62	1.93	2.20	SAND	0.5	0.74	164	1.66	272	non-LIQ	0.661	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.16	-45.0	115.0	115.0	260.5	9.3	3.6	17.5	54.5	40.3	3.1	1.1	46.0	3.63	1.94	3.63	1.94	2.16	SAND	0.5	0.74	182	1.56	285	non-LIQ	0.660	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.32	-45.1	115.0	115.0	205.4	9.4	4.6	22.7	45.8	33.8	4.0	1.1	41.0	3.64	1.94	3.64	1.94	2.30	SAND	0.5	0.74	143	1.96	282	non-LIQ	0.659	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.48	-45.3	115.0	115.0	154.1	8.7	5.7	28.8	36.8	27.1	4.6	1.1	36.0	3.65	1.94	3.65	1.94	2.46	SAND	0.5	0.74	107	2.56	275	non-LIQ	0.657	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.65	-45.5	115.0	115.0	132.5	8.1	6.1	35.7	34.0	25.1	5.0	1.2	35.0	3.66	1.95	3.66	1.95	2.61	non-LIQ CLAY	1	0.54	NA	3.37	non-LIQ	non-LIQ	0.656	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.81	-45.6	115.0	115.0	232.2	6.2	2.7	15.3	47.2	34.7	2.6	1.0	39.0	3.67	1.95	3.67	1.95	2.08	SAND	0.5	0.74	162	1.42	230	non-LIQ	0.655	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.98	-45.8	115.0	115.0	294.2	4.9	1.7	9.4	54.9	40.4	0.7	1.0	42.0	3.68	1.96	3.68	1.96	1.86	SAND	0.5	0.74	204	1.15	236	non-LIQ	0.653	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.14	-45.9	115.0	115.0	312.1	3.6	1.2	6.5	55.4	40.7	0.1	1.0	41.0	3.69	1.96	3.69	1.96	1.72	SAND	0.5	0.73	217	1.05	228	non-LIQ	0.652	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.30	-46.1	115.0	115.0	324.8	3.6	1.1	6.1	57.3	42.0	0.0	1.0	42.0	3.70	1.97	3.70	1.97	1.70	SAND	0.5	0.73	225	1.04	234	non-LIQ	0.651	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.47	-46.3	115.0	115.0	328.5	4.8	1.5	7.8	59.7	43.7	0.3	1.0	44.0	3.71	1.97	3.71	1.97	1.78	SAND	0.5	0.73	228	1.10	249	non-LIQ	0.649	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.63	-46.4	115.0	115.0	181.8	4.1	2.3	15.8	37.2	27.2	2.7	1.1	31.0	3.72	1.97	3.72	1.97	2.10	SAND	0.5	0.73	126	1.46	183	non-LIQ	0.648	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.80	-46.6	115.0	115.0	107.1	4.3	4.0	28.5	25.5	18.6	4.6	1.1	26.0	3.73	1.98	3.73	1.98	2.45	SAND	0.5	0.73	74	2.52	187	non-LIQ	0.647	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.96	-46.8	115.0	115.0	95.2	3.1	3.3	27.3	22.3	16.3	4.5	1.1	23.0	3.74	1.98	3.74	1.98	2.42	SAND	0.5	0.73	66	2.40	158	0.445	0.645	0.560	0.520	0.86	NA	NA	NA	NA	NA	0.00	18.00	1.71	0.03
65.12	-46.9	115.0	115.0	42.7	2.0	4.7	52.8	13.0	9.5	5.0	1.2	16.0	3.74	1.99	3.74	1.99	2.91	non-LIQ CLAY	1	0.53	NA	5.83	non-LIQ	non-LIQ	0.644	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.29	-47.1	115.0	115.0	24.5	1.0	4.0	65.6	8.4	6.1	5.0	1.2	12.0	3.75	1.99	3.75	1.99	3.10	non-LIQ CLAY	1	0.53	NA	7.94	non-LIQ	non-LIQ	0.643	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.45	-47.3	115.0	115.0	23.4	0.7	2.9	61.3	7.7	5.6	5.0	1.2	12.0	3.76	2.00	3.76	2.00	3.04	non-LIQ CLAY	1	0.53	NA	7.22	non-LIQ	non-LIQ	0.641	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.62	-47.4	115.0	115.0	22.9	0.7	3.0	62.6	7.6	5.5	5.0	1.2	12.0	3.77	2.00	3.77	2.00	3.06	non-LIQ CLAY	1	0.53	NA	7.43	non-LIQ	non-LIQ	0.640	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.78	-47.6	115.0	115.0	23.2	0.7	2.8	61.1	7.6	5.5	5.0	1.2	12.0	3.78	2.00	3.78	2.00	3.04	non-LIQ CLAY	1	0.53	NA	7.18	non-LIQ	non-LIQ	0.639	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.94	-47.7	115.0	115.0	23.9	0.8	3.4	63.5	8.0	5.8	5.0	1.2	12.0	3.79	2.01	3.79	2.01	3.07	non-LIQ CLAY	1	0.53	NA	7.59	non-LIQ	non-LIQ	0.637	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.11	-47.9	115.0	115.0	26.6	0.9	3.5	60.7	8.7	6.3	5.0	1.2	13.0	3.80	2.01	3.80	2.01	3.03	non-LIQ CLAY	1	0.53	NA	7.11	non-LIQ	non-LIQ	0.636	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.27	-48.1	115.0	115.0	29.2	0.9	3.0	55.5	9.1	6.6	5.0	1.2	13.0	3.81	2.02	3.81	2.02	2.96	non-LIQ CLAY	1	0.52	NA	6.26	non-LIQ	non-LIQ	0.635	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.44	-48.2	115.0	115.0	27.3	0.8	2.9	56.9	8.6	6.2	5.0	1.2	12.0	3.82	2.02	3.82	2.02	2.98	non-LIQ CLAY	1	0.52	NA	6.48	non-LIQ	non-LIQ	0.633	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.60	-48.4	115.0	115.0	26.0	0.8	2.9	58.2	8.3	6.0	5.0	1.2	12.0	3.83	2.03	3.83	2.03	3.00	non-LIQ CLAY	1	0.52	NA	6.70	non-LIQ	non-LIQ	0.632	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.77	-48.6	115.0	115.0	25.7	0.8	2.9	58.9	8.3	6.0	5.0	1.2	12.0	3.84	2.03	3.84	2.03	3.01	non-LIQ CLAY	1	0.52	NA	6.81	non-LIQ	non-LIQ	0.631	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.93	-48.7	115.0	115.0	27.0	0.8	3.0	57.7	8.6	6.2	5.0	1.2	12.0	3.85	2.03	3.85	2.03	2.99	non-LIQ CLAY	1	0.52	NA	6.62	non-LIQ	non-LIQ	0.629	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.09	-48.9	115.0	115.0	28.7	1.0	3.3	57.9	9.1	6.6	5.0	1.2	13.0	3.86	2.04	3.86	2.04	2.99	non-LIQ CLAY	1	0.52	NA	6.65	non-LIQ	non-LIQ	0.628	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.26	-49.1	115.0	115.0	29.2	0.9	3.1	56.3	9.2	6.6	5.0	1.2	13.0	3.87	2.04	3.87	2.04	2.97	non-LIQ CLAY	1	0.52	NA	6.38	non-LIQ	non-LIQ	0.627	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.42	-49.2	115.0	115.0	28.2	0.8	2.9	56.1	8.8	6.3	5.0	1.2	13.0	3.88	2.05	3.88	2.05	2.96	non-LIQ CLAY	1	0.52	NA	6.35	non-LIQ	non-LIQ	0.625	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.59	-49.4	115.0	115.0	29.3	0.9	2.9	55.2	9.1	6.5	5.0	1.2	13.0	3.89	2.05	3.89	2.05	2.95	non-LIQ CLAY	1	0.52	NA	6.21	non-LIQ	non-LIQ	0.624	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.75	-49.6	115.0	115.0	28.2	0.8	3.0	56.8	8.9	6.4	5.0	1.2	13.0	3.90	2.06	3.90	2.06	2.97	non-LIQ CLAY	1	0.51	NA	6.46	non-LIQ	non-LIQ	0.623	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.91	-49.7	115.0	115.0	28.3	0.9	3.1	57.6	9.0	6.4	5.0	1.2	13.0	3.90	2.06	3.90	2.06	2.99	non-LIQ CLAY	1	0.51	NA	6.60	non-LIQ	non-LIQ	0.621	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.08	-49.9	115.0	115.0	27.9	0.8	3.0	57.3	8.8	6.3	5.0	1.2	13.0	3.91	2.07	3.91	2.07	2.98	non-LIQ CLAY	1	0.51	NA	6.55	non-LIQ	non-LIQ	0.620	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.24	-50.0	115.0	115.0	28.2	1.0	3.7	60.7	9.2	6.6	5.0	1.2	13.0	3.92	2.07	3.92	2.07	3.03	non-LIQ CLAY	1	0.51	NA	7.11	non-LIQ	non-LIQ	0.619	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
													σ_v	σ_v'	σ_v	σ_v'														G_{max}	γ	ε_{vol}	ΔS			ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$								(%)	(%)	(in)			(%)	(in)
68.41	-50.2	115.0	115.0	32.1	1.7	5.4	64.1	10.8	7.7	5.0	1.2	14.0	3.93	2.07	3.93	2.07	3.08	non-LIQ CLAY	1	0.51	NA	7.69	non-LIQ	non-LIQ	0.617	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.57	-50.4	115.0	115.0	39.9	2.7	6.7	62.5	13.2	9.4	5.0	1.2	16.0	3.94	2.08	3.94	2.08	3.06	non-LIQ CLAY	1	0.51	NA	7.41	non-LIQ	non-LIQ	0.616	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.73	-50.5	115.0	115.0	75.3	4.4	5.9	45.6	21.3	15.2	5.0	1.2	23.0	3.95	2.08	3.95	2.08	2.79	non-LIQ CLAY	1	0.51	NA	4.72	non-LIQ	non-LIQ	0.615	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.90	-50.7	115.0	115.0	98.4	5.1	5.2	38.6	26.0	18.5	5.0	1.2	27.0	3.96	2.09	3.96	2.09	2.66	non-LIQ CLAY	1	0.51	NA	3.75	non-LIQ	non-LIQ	0.613	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.06	-50.9	115.0	115.0	133.5	4.1	3.1	22.6	29.7	21.1	4.0	1.1	27.0	3.97	2.09	3.97	2.09	2.30	SAND	0.5	0.71	90	1.95	175	non-LIQ	0.612	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.23	-51.0	115.0	115.0	160.0	4.5	2.8	19.5	34.3	24.4	3.5	1.1	30.0	3.98	2.10	3.98	2.10	2.22	SAND	0.5	0.71	107	1.71	183	non-LIQ	0.611	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.39	-51.2	115.0	115.0	131.7	5.3	4.0	26.3	30.6	21.7	4.4	1.1	29.0	3.99	2.10	3.99	2.10	2.40	SAND	0.5	0.71	88	2.30	203	non-LIQ	0.609	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.55	-51.4	115.0	115.0	105.4	5.1	4.8	36.4	27.3	19.3	5.0	1.2	28.0	4.00	2.10	4.00	2.10	2.62	non-LIQ CLAY	1	0.50	NA	3.46	non-LIQ	non-LIQ	0.608	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.72	-51.5	115.0	115.0	154.5	3.3	2.1	17.1	32.1	22.8	3.0	1.1	27.0	4.01	2.11	4.01	2.11	2.14	SAND	0.5	0.71	103	1.53	158	0.450	0.607	0.530	0.490	0.92	NA	NA	NA	NA	NA	0.00	24.00	1.29	0.03
69.88	-51.7	115.0	115.0	197.1	3.9	2.0	14.2	39.5	27.9	2.3	1.0	31.0	4.02	2.11	4.02	2.11	2.05	SAND	0.5	0.71	132	1.37	180	non-LIQ	0.605	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
70.05	-51.9	115.0	115.0	189.4	5.5	2.9	18.3	40.0	28.3	3.3	1.1	34.0	4.03	2.12	4.03	2.12	2.18	SAND	0.5	0.71	127	1.62	205	non-LIQ	0.604	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
70.21	-52.0	115.0	115.0	178.3	5.1	2.9	18.8	37.9	26.8	3.4	1.1	32.0	4.04	2.12	4.04	2.12	2.20	SAND	0.5	0.71	119	1.66	197	non-LIQ	0.603	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

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LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

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Emean (%)	75			Present Ground El.	16.9	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	7.5	=Field Water Table Depth	Acc. max =	0.710	g			Earthq. M=	7.3			
C_E	1.25			Future Ground El.	16.9	C_B	1.00	120	11.9	=Design Water El.	9.4	=Field Water El.						Cm=	1.07			

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	11.9	20	CL	51.0	0.30	0.30	1.70	0.80	1.20	1.00	1	1	0.99	0.30	0.46	41	54	1.00	High N	0.00	LARGE	high N
10	6.9	15	CH	51.0	0.60	0.52	1.41	0.85	1.00	0.67	2	2	0.98	0.44	0.61	15	23	1.00	0.26	0.28	0.45	Fines
15	1.9	7	CL	51.0	0.90	0.67	1.25	0.85	1.20	1.00	1	1	0.97	0.59	0.68	11	18	1.00	0.20	0.21	0.31	Fines
20	-3.1	13	CL	51.0	1.20	0.81	1.14	0.95	1.00	0.67	2	2	0.95	0.73	0.72	12	19	1.00	0.20	0.22	0.30	Fines
25	-8.1	31	CL	81.0	1.50	0.95	1.05	0.95	1.20	1.00	1	1	0.94	0.88	0.74	46	60	1.00	High N	0.00	LARGE	high N
30	-13.1	30	CL	51.0	1.80	1.10	0.98	1.00	1.00	0.67	2	2	0.93	1.02	0.76	24	34	1.00	High N	0.00	LARGE	high N
35	-18.1	16	CL	51.0	2.10	1.24	0.92	1.00	1.20	1.00	1	1	0.89	1.16	0.74	22	31	0.98	High N	0.00	LARGE	high N
40	-23.1	24	CL	51.0	2.40	1.39	0.87	1.00	1.00	0.67	2	2	0.85	1.31	0.72	17	26	0.96	0.31	0.32	0.44	Fines
45	-28.1	22	CL	59.0	2.70	1.53	0.83	1.00	1.20	1.00	1	1	0.81	1.45	0.69	27	38	0.94	High N	0.00	LARGE	high N
50	-33.1	26	CL	89.0	3.00	1.67	0.79	1.00	1.00	0.67	2	2	0.77	1.60	0.67	17	26	0.92	0.30	0.30	0.45	Fines
55	-38.1	20	CL	51.0	3.30	1.82	0.76	1.00	1.20	1.00	1	1	0.73	1.74	0.64	23	32	0.90	High N	0.00	LARGE	high N
60	-43.1	49	SC	15.0	3.60	1.96	0.73	1.00	1.00	0.67	2	2	0.69	1.88	0.60	30	34	0.88	High N	0.00	LARGE	high N
65	-48.1	48	SM	15.0	3.90	2.11	0.70	1.00	1.20	1.00	1	1	0.64	2.03	0.57	51	56	0.88	High N	0.00	LARGE	high N
70	-53.1	100	SM	15.0	4.20	2.25	0.68	1.00	1.00	0.67	2	2	0.60	2.17	0.54	57	62	0.87	High N	0.00	LARGE	high N

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

R-11-035

Emean (%)	75			Present Ground El.	17.3	Borehole Dia. (in)	5	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	8.0	=Field Water Table Depth	Acc. max =	0.710	g			Earthq. M=	7.3			
C_E	1.25			Future Ground El.	17.3	C_B	1.00	120	12.3	=Design Water El.	9.3	=Field Water El.						Cm=	1.07			

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-		-	-	-	-				-	-	-	-	-	-	-	-	-		-	-
5	12.3	21	CH	51.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	24	34	1.00	High N	0.00	LARGE	high N
10	7.3	38	SC	17.0	0.60	0.54	1.39	0.85	1.20	1.00	1	1	0.98	0.44	0.61	68	75	1.00	High N	0.00	LARGE	high N
15	2.3	8	CL	51.0	0.90	0.68	1.24	0.85	1.00	0.67	2	2	0.97	0.59	0.68	7	13	1.00	0.14	0.15	0.23	Fines
20	-2.7	4	CL	73.0	1.20	0.83	1.12	0.95	1.20	1.00	1	1	0.95	0.73	0.72	6	13	1.00	0.14	0.15	0.20	Fines
25	-7.7	56	SC	15.0	1.50	0.97	1.04	0.95	1.00	0.67	2	2	0.94	0.88	0.74	46	51	1.00	High N	0.00	LARGE	high N
30	-12.7	10	CL	51.0	1.80	1.11	0.97	1.00	1.20	1.00	1	1	0.93	1.02	0.76	15	22	1.00	0.25	0.27	0.35	Fines
35	-17.7	32	CL	51.0	2.10	1.26	0.91	1.00	1.00	0.67	2	2	0.89	1.16	0.74	24	34	0.98	High N	0.00	LARGE	high N
40	-22.7	22	CL-ML	51.0	2.40	1.40	0.86	1.00	1.20	1.00	1	1	0.85	1.31	0.72	28	39	0.96	High N	0.00	LARGE	high N
45	-27.7	92	SP-SM	5.0	2.70	1.55	0.82	1.00	1.00	0.67	2	2	0.81	1.45	0.69	63	63	0.94	High N	0.00	LARGE	high N
50	-32.7	40	SP-SM	5.0	3.00	1.69	0.79	1.00	1.20	1.00	1	1	0.77	1.60	0.67	47	47	0.92	High N	0.00	LARGE	high N
55	-37.7	26	CL	51.0	3.30	1.83	0.75	1.00	1.00	0.67	2	2	0.73	1.74	0.64	16	25	0.90	0.28	0.27	0.43	Fines
60	-42.7	23	CL	51.0	3.60	1.98	0.73	1.00	1.20	1.00	1	1	0.69	1.88	0.60	25	35	0.88	High N	0.00	LARGE	high N
65	-47.7	39	CL	51.0	3.90	2.12	0.70	1.00	1.00	0.67	2	2	0.64	2.03	0.57	23	32	0.88	High N	0.00	LARGE	high N
70	-52.7	83	SC	15.0	4.20	2.27	0.68	1.00	1.20	1.00	1	1	0.60	2.17	0.54	85	91	0.87	High N	0.00	LARGE	high N

I-880 Operational and Safety Improvements Project **EMI Project No. 10-133** Version - 12/05

LIQUEFACTION ANALYSIS, M = 7.3 ; ACC. = 0.71 g

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al. (1985), Seed and Harder (1990), updated NCEER (1997), Martin et al. (1999) and Youd et al. (2001)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
[1]C_N = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

The resisting cyclic stress ratio (CRR r) is equal to:
CRR r = $CRR_{7.5}$ x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
$CRR_{7.5}$ = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F_L is:

F_L = CRR r / CSR i

A-11-036

Emean (%)	75		Present Ground El.	18.7	Borehole Dia. (in)	8	Tot. Unit Wt. (pcf)	5.0	=Design Water Table Depth	11.0	=Field Water Table Depth	Acc. max =	0.710 g		Earthq. M=	7.3					
C_E	1.25		Future Ground El.	18.7	C_B	1.15	120	13.7	=Design Water El.	7.7	=Field Water El.				Cm=	1.07					

DEPTH OF SOIL SAMPLE (ft.)	EL. (ft.)	FIELD BLOW COUNT N	SOIL TYPE	EST. PERCENT OF FINES (%)	DESIGN TOTAL OVERBUR. PRESS. (tsf)	PRESENT EFFEC. OVERBUR. PRESS. (tsf)	C_N	C_R	C_S	C_{ST}	SAMPLER TYPE 1=SPT 2=CA.MOD	SAMPLER LINED 1=UNLINED 2=LINED	STRESS REDUC. COEFF. rd	DESIGN EFFEC. OVERBUR. PRESS. (tsf)	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT N160	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr	FACTOR OF SAFETY (F_L)	WILL IT LIQUEFY?
-	-	-		-	-	-	-				-		-	-	-	-	-	-	-		-	-
5	13.7	24	CL	68.0	0.30	0.30	1.70	0.80	1.00	0.67	2	2	0.99	0.30	0.46	31	42	1.00	High N	0.00	LARGE	high N
10	8.7	4	CL	85.0	0.60	0.60	1.32	0.85	1.20	1.00	1	1	0.98	0.44	0.61	8	14	1.00	0.15	0.16	0.27	Fines
15	3.7	11	CL	51.0	0.90	0.78	1.16	0.85	1.00	0.67	2	2	0.97	0.59	0.68	10	17	1.00	0.19	0.20	0.29	Fines
20	-1.3	37	SC	15.0	1.20	0.92	1.07	0.95	1.20	1.00	1	1	0.95	0.73	0.72	65	70	1.00	High N	0.00	LARGE	high N
25	-6.3	34	CL	51.0	1.50	1.06	0.99	0.95	1.00	0.67	2	2	0.94	0.88	0.74	31	42	1.00	High N	0.00	LARGE	high N
30	-11.3	19	CL	51.0	1.80	1.21	0.93	1.00	1.20	1.00	1	1	0.93	1.02	0.76	30	42	1.00	High N	0.00	LARGE	high N

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-040
Project Name: I-880 Operational and Safety Improvement Project
Project Number: 10-133
Location: Oakland
Califomia

Computed by: SP
Checked by:

Date: 03/30/12
Date:

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework,* Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils,* ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking,* ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60}*, ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 19 ft MSL
Design Magnitude, M_w = 7.30
PGA, a_{max} = 0.71 g
Earthquake Scaling Factor, MSF = 1.071 for M_w = 7.3
Design Water Level = 14 ft MSL
Water Level at Investigation = 7.7 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	0.497
Post-liquefaction Settlement (in)	0.898
Total Settlement (in)	**1.395**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ'_{MOIST}	γ'_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.66	18.3	115.0	115.0	71.0	1.1	1.6	6	12	66	0.03	1.00	66	0.038	0.038	0.038	0.038	1.69	SAND	0.5	1.70	114.1	1.03	117.6	0.23	0.998	0.46	0.430	Above Water	0.12	57944	287.9	0.03	0.01	0.001	NA	NA	0.000
0.82	18.2	115.0	115.0	140.7	1.5	1.0	2	23	107	0.00	1.00	107	0.047	0.047	0.047	0.047	1.40	SAND	0.5	1.70	226.0	1.00	226.0	non-LIQ	0.998	0.46	0.430	Above Water	0.13	50868	376.8	0.02	0.00	0.000	NA	NA	0.000
0.98	18.0	115.0	115.0	135.4	1.0	0.7	0	21	91	0.00	1.00	91	0.056	0.056	0.056	0.056	1.29	SAND	0.5	1.70	217.5	1.00	217.5	non-LIQ	0.998	0.46	0.430	Above Water	0.13	45709	390.2	0.02	0.00	0.000	NA	NA	0.000
1.15	17.9	115.0	115.0	164.2	0.9	0.6	0	25	98	0.00	1.00	98	0.066	0.066	0.066	0.066	1.18	SAND	0.5	1.70	263.8	1.00	263.8	non-LIQ	0.997	0.46	0.430	Above Water	0.13	41526	434.1	0.02	0.00	0.000	NA	NA	0.000
1.31	17.7	115.0	115.0	169.0	2.0	1.2	2	28	104	0.00	1.00	104	0.075	0.075	0.075	0.075	1.47	SAND	0.5	1.70	271.5	1.00	271.5	non-LIQ	0.997	0.46	0.430	Above Water	0.13	38404	471.6	0.02	0.00	0.000	NA	NA	0.000
1.48	17.5	115.0	115.0	158.7	2.6	1.7	5	27	96	0.00	1.00	96	0.085	0.085	0.085	0.085	1.62	SAND	0.5	1.70	254.9	1.00	254.9	non-LIQ	0.997	0.46	0.430	Above Water	0.13	35693	488.8	0.02	0.00	0.000	NA	NA	0.000
1.64	17.4	115.0	115.0	113.9	1.9	1.7	6	20	68	0.06	1.01	68	0.094	0.094	0.094	0.094	1.72	SAND	0.5	1.70	183.0	1.05	191.9	non-LIQ	0.996	0.46	0.430	Above Water	0.13	33560	457.8	0.03	0.01	0.000	NA	NA	0.000
1.80	17.2	115.0	115.0	82.3	0.9	1.1	6	14	46	0.01	1.00	46	0.104	0.104	0.104	0.104	1.67	SAND	0.5	1.70	132.2	1.02	134.5	0.31	0.996	0.46	0.430	Above Water	0.13	31737	421.5	0.06	0.02	0.001	NA	NA	0.000
1.97	17.0	115.0	115.0	75.5	1.2	1.6	8	14	42	0.41	1.01	43	0.113	0.113	0.113	0.113	1.82	SAND	0.5	1.70	121.3	1.12	135.6	0.31	0.995	0.46	0.430	Above Water	0.13	30065	429.3	0.06	0.02	0.001	NA	NA	0.000
2.13	16.9	115.0	115.0	73.4	0.7	0.9	5	13	37	0.01	1.00	37	0.122	0.122	0.122	0.122	1.65	SAND	0.5	1.70	118.0	1.00	118.4	0.23	0.995	0.46	0.430	Above Water	0.13	28688	428.3	0.08	0.03	0.001	NA	NA	0.000
2.30	16.7	115.0	115.0	57.8	1.1	2.0	12	11	32	1.72	1.03	35	0.132	0.132	0.132	0.132	1.98	SAND	0.5	1.70	92.8	1.28	118.6	0.23	0.995	0.46	0.430	Above Water	0.13	27397	422.1	0.10	0.05	0.002	NA	NA	0.000
2.46	16.5	115.0	115.0	70.8	0.8	1.1	7	13	35	0.11	1.01	35	0.141	0.141	0.141	0.141	1.74	SAND	0.5	1.70	113.8	1.07	121.4	0.25	0.994	0.46	0.430	Above Water	0.13	26313	448.7	0.09	0.04	0.002	NA	NA	0.000
2.62	16.4	115.0	115.0	87.3	0.8	0.9	5	15	40	0.00	1.00	40	0.151	0.151	0.151	0.151	1.62	SAND	0.5	1.70	140.2	1.00	140.2	0.34	0.994	0.46	0.430	Above Water	0.13	25337	484.3	0.07	0.03	0.001	NA	NA	0.000
2.79	16.2	115.0	115.0	91.6	0.6	0.6	3	15	39	0.00	1.00	39	0.160	0.160	0.160	0.160	1.51	SAND	0.5	1.70	147.2	1.00	147.2	0.38	0.993	0.46	0.430	Above Water	0.13	24399	496.7	0.08	0.03	0.001	NA	NA	0.000
2.95	16.1	115.0	115.0	97.9	0.4	0.4	1	16	39	0.00	1.00	39	0.170	0.170	0.170	0.170	1.39	SAND	0.5	1.70	157.3	1.00	157.3	0.44	0.993	0.46	0.430	Above Water	0.13	23596	510.9	0.08	0.03	0.001	NA	NA	0.000
3.12	15.9	115.0	115.0	81.3	0.4	0.5	3	13	32	0.00	1.00	32	0.179	0.179	0.179	0.179	1.49	SAND	0.5	1.70	130.6	1.00	130.6	0.29	0.993	0.46	0.430	Above Water	0.13	22616	494.3	0.10	0.05	0.002	NA	NA	0.000
3.28	15.7	115.0	115.0	69.7	0.3	0.4	4	12	28	0.00	1.00	28	0.189	0.189	0.189	0.189	1.55	SAND	0.5	1.70	112.0	1.00	112.0	0.21	0.992	0.46	0.430	Above Water	0.13	22142	480.4	0.13	0.08	0.003	NA	NA	0.000
3.44	15.6	115.0	115.0	59.0	0.2	0.4	4	10	23	0.00	1.00	23	0.198	0.198	0.198	0.198	1.58	SAND	0.5	1.70	94.8	1.00	94.8	0.16	0.992	0.46	0.430	Above Water	0.13	21518	463.4	0.17	0.14	0.005	NA	NA	0.000
3.61	15.4	115.0	115.0	50.2	0.2	0.4	5	9	20	0.00	1.00	20	0.208	0.208	0.208	0.208	1.64	SAND	0.5	1.70	80.6	1.00	80.6	0.13	0.992	0.46	0.430	Above Water	0.13	20904	449.0	0.23	0.22	0.009	NA	NA	0.000
3.77	15.2	115.0	115.0	42.9	0.2	0.4	6	8	17	0.06	1.01	17	0.217	0.217	0.217	0.217	1.72	SAND	0.5	1.70	69.0	1.05	72.4	0.12	0.991	0.46	0.430	Above Water	0.13	20367	436.6	0.29	0.34	0.013	NA	NA	0.000
3.94	15.1	115.0	115.0	36.4	0.1	0.3	7	6	14	0.07	1.01	14	0.227	0.227	0.227	0.227	1.72	SAND	0.5	1.70	58.5	1.05	61.6	0.10	0.991	0.46	0.430	Above Water	0.13	19835	419.6	0.42	0.61	0.025	NA	NA	0.000
4.10	14.9	115.0	115.0	31.0	0.1	0.3	9	6	12	0.53	1.02	13	0.236	0.236	0.236	0.236	1.84	SAND	0.5	1.70	49.8	1.13	56.4	0.10	0.990	0.46	0.430	Above Water	0.13	19367	408.4	0.55	0.94	0.036	NA	NA	0.000
4.27	14.7	115.0	115.0	28.2	0.1	0.3	9	5	11	0.58	1.02	12	0.246	0.246	0.246	0.246	1.84	SAND	0.5	1.70	45.3	1.14	51.7	0.09	0.990	0.46	0.430	Above Water	0.13	18901	401.6	0.68	1.35	0.055	NA	NA	0.000
4.43	14.6	115.0	115.0	28.4	0.1	0.4	11	5	11	1.10	1.02	12	0.255	0.255	0.255	0.255	1.91	SAND	0.5	1.70	45.6	1.20	54.8	0.10	0.990	0.46	0.430	Above Water	0.13	18488	410.9	0.67	1.29	0.050	NA	NA	0.000
4.59	14.4	115.0	115.0	26.5	0.1	0.3	11	5	10	1.13	1.03	11	0.264	0.264	0.264	0.264	1.92	SAND	0.5	1.70	42.6	1.20	51.2	0.09	0.989	0.46	0.430	Above Water	0.13	18099	406.4	0.80	1.72	0.066	NA	NA	0.000
4.76	14.2	115.0	115.0	24.1	0.1	0.4	13	5	9	1.84	1.04	11	0.274	0.274	0.274	0.274	2.00	SAND	0.5	1.70	38.7	1.30	50.2	0.09	0.989	0.46	0.430	Above Water	0.13	17708	402.7	0.95	2.25	0.092	NA	NA	0.000
4.92	14.1	115.0	115.0	21.2	0.1	0.4	15	4	8	2.50	1.05	11	0.283	0.283	0.283	0.283	2.07	SAND	0.5	1.70	34.0	1.41	47.9	0.09	0.989	0.46	0.430	Above Water	0.13	17360	393.8	1.22	3.33	0.128	NA	NA	0.000
5.09	13.9	115.0	115.0	17.9	0.1	0.5	18	4	7	3.26	1.07	11	0.293	0.293	0.293	0.290	2.17	SAND	0.5	1.70	28.8	1.61	46.3	0.09	0.988	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	9	2.770	0.057
5.25	13.8	115.0	115.0	17.1	0.1	0.5	19	4	7	3.50	1.08	11	0.302	0.302	0.302	0.297	2.21	SAND	0.5	1.70	27.5	1.69	46.6	0.09	0.988	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	9	2.770	0.053
5.41	13.6	115.0	115.0	16.5	0.1	0.6	20	4	7	3.70	1.08	11	0.311	0.311	0.311	0.306	2.24	SAND	0.5	1.70	26.4	1.78	47.1	0.09	0.987	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	9	2.770	0.053
5.58	13.4	115.0	115.0	16.5	0.1	0.6	21	4	7	3.78	1.09	11	0.321	0.321	0.321	0.316	2.26	SAND	0.5	1.70	26.5	1.82	48.3	0.09	0.987	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	9	2.770	0.057
5.74	13.3	115.0	115.0	16.8	0.1	0.6	21	4	7	3.85	1.09	11	0.330	0.330	0.330	0.325	2.27	SAND	0.5	1.70	26.9	1.86	50.1	0.09	0.987	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	9	2.770	0.053
5.91	13.1	115.0	115.0	16.6	0.1	0.7	22	4	6	3.94	1.09	11	0.340	0.340	0.340	0.335	2.29	SAND	0.5	1.70	26.7	1.91	51.0	0.09	0.986	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	8	2.920	0.060
6.07	12.9	115.0	115.0	15.7	0.1	0.7	23	4	6	4.09	1.10	11	0.349	0.349	0.349	0.344	2.32	SAND	0.5	1.70	25.1	2.01	50.5	0.09	0.986	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	8	2.920	0.056
6.23	12.8	115.0	115.0	13.9	0.1	0.7	25	3	5	4.32	1.12	10	0.358	0.358	0.358	0.353	2.37	SAND	0.5	1.70	22.3	2.21	49.2	0.09	0.985	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	7	3.200	0.061
6.40	12.6	115.0	115.0	12.4	0.1	0.6	27	3	5	4.49	1.13	10	0.368	0.368	0.368	0.363	2.42	SAND	0.5	1.70	19.9	2.39	47.6	0.09	0.985	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	7	3.200	0.065
6.56	12.4	115.0	115.0	11.6	0.1	0.6	29	3	5	4.61	1.14	10	0.377	0.377	0.377	0.372	2.45	SAND	0.5	1.67	18.4	2.54	46.8	0.09	0.985	0.46	0.430	0.21	NA	NA	NA	NA	NA	0.000	7	3.200	0.061
6.73	12.3	115.0	115.0	10.9	0.1	0.7	35	3	5	5.00	1.20	11	0.387	0.387	0.387	0.382	2.60	non-LIQ CLAY	1	1.70	NA	3.33	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
6.89	12.1	115.0	115.0	10.5	0.1	0.7	36	3	4	5.00	1.20	10	0.396	0.396	0.396	0.391	2.62	non-LIQ CLAY	1	1.70	NA	3.45	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.05	12.0	115.0	115.0	10.1	0.1	0.7	38	3	4	5.00	1.20	10	0.405	0.405	0.405	0.400	2.65	non-LIQ CLAY	1	1.70	NA	3.65	non-LIQ	non-LIQ	0.984	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.22	11.8	115.0	115.0	8.8	0.1	0.8	38	2	4	5.00	1.20	9	0.415	0.415	0.415	0.410	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.38	11.6	115.0	115.0	7.1	0.1	0.8	38	2	3	5.00	1.20	9	0.424	0.424	0.424	0.419	2.66	non-LIQ CLAY	1	1.70	NA	3.72	non-LIQ	non-LIQ	0.983	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.55	11.5	115.0	115.0	6.3	0.1	1.3	41	2	3	5.00	1.20	8	0.434	0.434	0.434	0.429	2.71	non-LIQ CLAY	1	1.70	NA	4.10	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.71	11.3	115.0	115.0	6.2	0.2	2.5	51	2	3	5.00	1.20	8	0.443	0.443	0.443	0.438	2.88	non-LIQ CLAY	1	1.70	NA	5.47	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	11.1	115.0	115.0	4.4	0.2	4.5	71	2	2	5.00	1.20	8	0.453	0.453	0.453	0.448	3.17	non-LIQ CLAY	1	1.70	NA	8.67	non-LIQ	non-LIQ	0.982	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.04	11.0	115.0	115.0	9.4	0.2	1.8	38	2	4	5.00	1.20	9	0.462	0.462	0.462	0.457	2.65	non-LIQ CLAY	1	1.70	NA	3.67	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.20	10.8	115.0	115.0	9.4	0.2	2.5	43	3	4	5.00	1.20	10	0.472	0.472	0.472	0.467	2.75	non-LIQ CLAY	1	1.70	NA	4.34	non-LIQ	non-LIQ	0.981	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.37	10.6	115.0	115.0	3.7	0.2	4.4	79	1	2	5.00	1.20	8	0.481	0.481	0.481	0.476	3.28	non-LIQ CLAY	1	1.70	NA	10.36	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.53	10.5	115.0	115.0	3.1	0.2	5.3	90	1	2	5.00	1.20	7	0.490	0.490	0.490	0.485	3.41	non-LIQ CLAY	1	1.70	NA	12.44	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.69	10.3	115.0	115.0	5.7	0.3	4.5	66	2	3	5.00	1.20	8	0.500	0.500	0.500	0.495	3.11	non-LIQ CLAY	1	1.70	NA	8.05	non-LIQ	non-LIQ	0.980	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
8.86	10.1	115.0	115.0	15.9	0.2	1.0	30	4	6	4.71	1.16	11	0.509	0.509	0.509	0.504	2.49	SAND	0.5	1.44	21.7	2.70	58.6	0.10	0.979	0.46	0.430	0.23	NA	NA	NA	NA	NA	0.000	8	2.920	0.060

C-44

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
(ft)	(ft, MSL)	γ'_{MOIST}	γ'_{SAT}	(tsf)	(tsf)	(%)							σ_v (tsf)	σ_v' (tsf)	σ_v (tsf)	σ_v' (tsf)			n	C_Q	q_{c1N}	Kc	$(q_{c1n})_{cs}$								(tsf)	(%)	(%)	(in)		(%)	(in)
9.02	10.0	115.0	115.0	13.5	0.3	1.9	37	4	5	5.00	1.20	11	0.519	0.519	0.519	0.514	2.64	non-LIQ CLAY	1	1.70	NA	3.58	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	9.8	115.0	115.0	16.3	0.2	1.4	38	4	6	5.00	1.20	12	0.528	0.528	0.528	0.523	2.66	non-LIQ CLAY	1	1.70	NA	3.71	non-LIQ	non-LIQ	0.979	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	9.7	115.0	115.0	12.3	0.2	1.8	36	3	4	5.00	1.20	10	0.538	0.538	0.538	0.533	2.61	non-LIQ CLAY	1	1.70	NA	3.36	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	9.5	115.0	115.0	6.7	0.3	4.3	63	2	3	5.00	1.20	9	0.547	0.547	0.547	0.542	3.07	non-LIQ CLAY	1	1.70	NA	7.57	non-LIQ	non-LIQ	0.978	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	9.3	115.0	115.0	8.1	0.3	4.2	58	3	4	5.00	1.20	9	0.557	0.557	0.557	0.551	3.00	non-LIQ CLAY	1	1.70	NA	6.70	non-LIQ	non-LIQ	0.977	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.84	9.2	115.0	115.0	9.6	0.4	4.3	55	3	4	5.00	1.20	10	0.566	0.566	0.566	0.561	2.95	non-LIQ CLAY	1	1.70	NA	6.16	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.01	9.0	115.0	115.0	11.5	0.4	3.7	48	3	5	5.00	1.20	10	0.576	0.576	0.576	0.570	2.84	non-LIQ CLAY	1	1.70	NA	5.14	non-LIQ	non-LIQ	0.977	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	8.8	115.0	115.0	14.4	0.5	3.7	44	4	5	5.00	1.20	11	0.585	0.585	0.585	0.580	2.77	non-LIQ CLAY	1	1.70	NA	4.50	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	8.7	115.0	115.0	19.0	0.6	3.2	37	5	7	5.00	1.20	13	0.594	0.594	0.594	0.589	2.64	non-LIQ CLAY	1	1.70	NA	3.55	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	8.5	115.0	115.0	20.4	0.7	3.3	37	5	7	5.00	1.20	13	0.604	0.604	0.604	0.598	2.63	non-LIQ CLAY	1	1.70	NA	3.49	non-LIQ	non-LIQ	0.976	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.66	8.3	115.0	115.0	20.8	0.9	4.1	40	6	7	5.00	1.20	14	0.613	0.613	0.613	0.608	2.69	non-LIQ CLAY	1	1.70	NA	3.92	non-LIQ	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	8.2	115.0	115.0	25.4	1.1	4.2	37	7	9	5.00	1.20	15	0.623	0.623	0.623	0.617	2.63	non-LIQ CLAY	1	1.70	NA	3.54	non-LIQ	non-LIQ	0.975	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.99	8.0	115.0	115.0	29.6	1.1	3.8	36	8	10	5.00	1.20	17	0.632	0.632	0.632	0.627	2.61	non-LIQ CLAY	1	1.67	NA	3.37	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.15	7.9	115.0	115.0	25.2	0.9	3.4	37	7	8	5.00	1.20	15	0.641	0.641	0.641	0.636	2.63	non-LIQ CLAY	1	1.65	NA	3.54	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	7.7	115.0	115.0	21.5	0.8	3.9	39	6	7	5.00	1.20	14	0.651	0.650	0.651	0.646	2.68	non-LIQ CLAY	1	1.63	NA	3.83	non-LIQ	non-LIQ	0.974	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.48	7.5	115.0	115.0	22.6	0.8	3.5	37	6	7	5.00	1.20	14	0.660	0.654	0.660	0.654	2.64	non-LIQ CLAY	1	1.62	NA	3.56	non-LIQ	non-LIQ	0.973	0.45	0.420	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	7.4	115.0	115.0	22.7	0.8	3.6	38	6	8	5.00	1.20	14	0.670	0.659	0.670	0.659	2.65	non-LIQ CLAY	1	1.61	NA	3.61	non-LIQ	non-LIQ	0.973	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	7.2	115.0	115.0	23.9	0.8	3.2	37	6	8	5.00	1.20	14	0.679	0.663	0.679	0.663	2.64	non-LIQ CLAY	1	1.60	NA	3.56	non-LIQ	non-LIQ	0.972	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	7.0	115.0	115.0	24.3	0.7	3.0	36	6	8	5.00	1.20	14	0.689	0.668	0.689	0.668	2.61	non-LIQ CLAY	1	1.58	NA	3.41	non-LIQ	non-LIQ	0.972	0.46	0.430	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	6.9	115.0	115.0	24.7	0.7	2.9	35	6	8	5.00	1.20	15	0.698	0.672	0.698	0.672	2.60	non-LIQ CLAY	1	1.57	NA	3.34	non-LIQ	non-LIQ	0.972	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	6.7	115.0	115.0	24.1	0.7	3.0	37	6	8	5.00	1.20	14	0.707	0.676	0.707	0.676	2.63	non-LIQ CLAY	1	1.57	NA	3.49	non-LIQ	non-LIQ	0.971	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	6.5	115.0	115.0	23.3	0.7	3.1	35	6	7	5.00	1.20	14	0.717	0.681	0.717	0.681	2.60	non-LIQ CLAY	1	1.55	NA	3.34	non-LIQ	non-LIQ	0.971	0.47	0.440	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	6.4	115.0	115.0	22.3	0.7	3.1	36	6	7	5.00	1.20	14	0.726	0.685	0.726	0.685	2.62	non-LIQ CLAY	1	1.55	NA	3.42	non-LIQ	non-LIQ	0.971	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.80	6.2	115.0	115.0	21.8	0.7	3.0	37	6	7	5.00	1.20	13	0.736	0.689	0.736	0.689	2.63	non-LIQ CLAY	1	1.54	NA	3.49	non-LIQ	non-LIQ	0.970	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	6.0	115.0	115.0	21.4	0.7	3.4	39	6	7	5.00	1.20	13	0.745	0.693	0.745	0.693	2.67	non-LIQ CLAY	1	1.53	NA	3.76	non-LIQ	non-LIQ	0.970	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.12	5.9	115.0	115.0	21.4	0.8	3.5	39	6	7	5.00	1.20	13	0.754	0.698	0.754	0.698	2.66	non-LIQ CLAY	1	1.52	NA	3.83	non-LIQ	non-LIQ	0.969	0.48	0.450	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	5.7	115.0	115.0	20.2	0.8	3.8	42	5	7	5.00	1.20	13	0.764	0.702	0.764	0.702	2.72	non-LIQ CLAY	1	1.51	NA	4.17	non-LIQ	non-LIQ	0.969	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	5.6	115.0	115.0	19.8	0.8	4.0	43	5	7	5.00	1.20	13	0.773	0.706	0.773	0.706	2.75	non-LIQ CLAY	1	1.50	NA	4.34	non-LIQ	non-LIQ	0.969	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	5.4	115.0	115.0	20.0	0.8	4.2	44	6	7	5.00	1.20	13	0.783	0.711	0.783	0.711	2.76	non-LIQ CLAY	1	1.49	NA	4.45	non-LIQ	non-LIQ	0.968	0.49	0.460	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	5.2	115.0	115.0	18.7	0.8	4.5	46	5	6	5.00	1.20	13	0.792	0.715	0.792	0.715	2.80	non-LIQ CLAY	1	1.48	NA	4.81	non-LIQ	non-LIQ	0.968	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.94	5.1	115.0	115.0	17.7	0.7	3.8	45	5	6	5.00	1.20	12	0.802	0.719	0.802	0.719	2.78	non-LIQ CLAY	1	1.47	NA	4.61	non-LIQ	non-LIQ	0.967	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.11	4.9	115.0	115.0	18.5	0.5	2.8	39	5	6	5.00	1.20	12	0.811	0.724	0.811	0.724	2.68	non-LIQ CLAY	1	1.46	NA	3.85	non-LIQ	non-LIQ	0.967	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	4.7	115.0	115.0	22.8	0.9	3.8	40	6	7	5.00	1.20	14	0.821	0.728	0.821	0.728	2.69	non-LIQ CLAY	1	1.45	NA	3.95	non-LIQ	non-LIQ	0.967	0.50	0.470	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	4.6	115.0	115.0	14.8	0.8	5.7	56	5	6	5.00	1.20	12	0.830	0.732	0.830	0.732	2.96	non-LIQ CLAY	1	1.44	NA	6.34	non-LIQ	non-LIQ	0.966	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	4.4	115.0	115.0	19.6	0.6	3.0	40	5	6	5.00	1.20	13	0.839	0.737	0.839	0.737	2.69	non-LIQ CLAY	1	1.44	NA	3.91	non-LIQ	non-LIQ	0.966	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.76	4.2	115.0	115.0	20.2	0.6	2.8	38	5	6	5.00	1.20	13	0.849	0.741	0.849	0.741	2.66	non-LIQ CLAY	1	1.43	NA	3.71	non-LIQ	non-LIQ	0.966	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.93	4.1	115.0	115.0	23.5	0.6	2.5	36	6	7	5.00	1.20	14	0.858	0.745	0.858	0.745	2.61	non-LIQ CLAY	1	1.42	NA	3.38	non-LIQ	non-LIQ	0.965	0.51	0.480	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.09	3.9	115.0	115.0	28.3	0.7	2.3	38	7	9	5.00	1.20	16	0.868	0.749	0.868	0.749	2.65	non-LIQ CLAY	1	1.41	NA	3.65	non-LIQ	non-LIQ	0.965	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.26	3.7	115.0	115.0	25.7	0.8	3.0	37	7	8	5.00	1.20	14	0.877	0.754	0.877	0.754	2.63	non-LIQ CLAY	1	1.40	NA	3.51	non-LIQ	non-LIQ	0.964	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.42	3.6	115.0	115.0	26.7	0.9	3.5	37	7	8	5.00	1.20	15	0.887	0.758	0.887	0.758	2.63	non-LIQ CLAY	1	1.40	NA	3.50	non-LIQ	non-LIQ	0.964	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	3.4	115.0	115.0	29.0	1.6	5.6	43	8	9	5.00	1.20	16	0.896	0.762	0.896	0.762	2.75	non-LIQ CLAY	1	1.39	NA	4.37	non-LIQ	non-LIQ	0.964	0.52	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.75	3.3	115.0	115.0	56.7	3.0	5.3	34	14	17	4.94	1.19	25	0.906	0.767	0.906	0.767	2.58	SAND	0.5	1.17	62.9	3.18	200.3	non-LIQ	0.963	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	3.1	115.0	115.0	101.8	4.3	4.2	24	23	27	4.14	1.11	34	0.915	0.771	0.915	0.771	2.33	SAND	0.5	1.17	112.7	2.05	231.2	non-LIQ	0.963	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	2.9	115.0	115.0	118.9	4.7	3.9	21	26	30	3.83	1.09	37	0.925	0.775	0.925	0.775	2.27	SAND	0.5	1.17	131.2	1.85	242.5	non-LIQ	0.963	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	2.8	115.0	115.0	123.0	5.1	4.2	22	27	32	3.90	1.09	38	0.934	0.780	0.934	0.780	2.28	SAND	0.5	1.16	135.4	1.89	255.4	non-LIQ	0.962	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	2.6	115.0	115.0	107.2	5.3	4.9	25	25	29	4.33	1.12	36	0.943	0.784	0.943	0.784	2.38	SAND	0.5	1.16	117.7	2.22	260.9	non-LIQ	0.962	0.53	0.490	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	2.4	115.0	115.0	92.4	5.6	6.1	30	22	26	4.71	1.16	35	0.953	0.788	0.953	0.788	2.49	SAND	0.5	1.16	101.2	2.70	273.7	non-LIQ	0.961	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	2.3	115.0	115.0	77.5	4.9	6.3	33	19	22	4.88	1.18	31	0.962	0.793	0.962	0.793	2.55	SAND	0.5	1.16	84.6	3.04	257.1	non-LIQ	0.961	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	2.1	115.0	115.0	70.6	4.9	7.0	35	18	21	5.00	1.20	30	0.972	0.797	0.972	0.797	2.60	non-LIQ CLAY	1	1.33	NA	3.30	non-LIQ	non-LIQ	0.961	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.06	1.9	115.0	115.0	77.2	4.7	6.0	32	19	22	4.85	1.17	31	0.981	0.801	0.981	0.801	2.54	SAND	0.5	1.15	83.9	2.96	248.6	non-LIQ	0.960	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.22	1.8	115.0	115.0	62.3	4.4	7.1	36	16	18	5.00	1.20	27	0.990	0.805	0.990	0.805	2.62	non-LIQ CLAY	1	1.31	NA	3.43	non-LIQ	non-LIQ	0.960	0.54	0.500	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.39	1.6	115.0	115.0	69.4	4.0	5.8	33	17	20	4.88	1.18	28	1.000	0.810	1.000	0.810	2.55	SAND	0.5	1.14	75.0	3.04	228.1	non-LIQ	0.959	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	1.5	115.0	115.0	59.9	3.3	5.5	34	15	17	4.95	1.19	26	1.009	0.814	1.009	0.814	2.58	SAND	0.5	1.14	64.6	3.20	206.8	non-LIQ	0.959	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	1.3	115.0	115.0	51.9	3.2	6.2	37	13	15	5.00	1.20	23	1.019	0.819	1.019	0.819	2.63	non-LIQ CLAY	1	1.29	NA	3.50	non-LIQ	non-LIQ	0.959	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	1.1	115.0	115.0	62.5	3.5	5.6	34	16	18	4.94	1.19	26	1.028	0.823	1.028	0.823	2.57	SAND	0.5	1.13	66.9	3.17	212.2	non-LIQ	0.958	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	1.0	115.0	115.0	61.2	3.4	5.5	34	15	18	4.95	1.19	26	1.037	0.827	1.037	0.827	2.58	SAND	0.5	1.13	65.4	3.20	209.1	non-LIQ	0.958	0.55	0.510	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.21	0.8	115.0	115.0	45.7	2.6	5.7	37	12	13	5.00	1.20	21	1.047	0.831	1.047	0.831	2.64	non-LIQ CLAY	1	1.27	NA	3.60	non-LIQ	non-LIQ	0.958	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	0.6	115.0	115.0	43.0	2.0	4.6	36	11	12	5.00	1.20	20	1.056	0.836	1.056	0.836	2.61	non-LIQ CLAY	1	1.27	NA	3.39	non-LIQ	non-LIQ	0.957	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	0.5	115.0	115.0	35.7	1.9	5.2	40	10	11	5.00	1.20	18	1.066	0.840	1.066	0.840	2.69	non-LIQ CLAY	1	1.26	NA	3.93	non-LIQ	non-LIQ	0.957	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	0.3	115.0	115.0	39.6	1.6	3.9	36	10	11	5.00	1.20	19	1.075	0.844	1.075	0.844	2.61	non-LIQ CLAY	1	1.25	NA	3.39	non-LIQ	non-LIQ	0.956	0.56	0.520	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.86	0.1	115.0	115.0	56.2	2.0	3.6	29	14	15	4.67	1.15	22	1.084	0.849	1.084	0.849	2.47	SAND	0.5	1.12	59.3	2.63	156.1	0.43	0.956	0.56	0.520	0.83	NA	NA	NA	NA	NA	0.000	17	1.780	0.034
19.03	0.0	115.0	115.0	43.1	1.8	4.1	35	11	12	5.00	1.20	20	1.094	0.853	1.094	0.853	2.60	non-LIQ CLAY	1	1.24	NA	3.30	non-LIQ	non-LIQ	0.956	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.19	-0.2	115.0	115.0	18.9	1.1	5.8	55	6	6	5.00	1.20	13	1.103	0.857	1.103	0.857	2.94	non-LIQ CLAY	1	1.23	NA	6.14	non-LIQ	non-LIQ	0.955	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	-0.4	115.0	115.0	14.8	0.4	2.8	48	4	5	5.00	1.20	11	1.113	0.862	1.113	0.862	2.83	non-LIQ CLAY	1	1.23	NA	5.07	non-LIQ	non-LIQ	0.955	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	-0.5	115.0	115.0	13.0	0.4	3.1	53	4	4	5.00	1.20	10	1.122	0.866	1.122	0.866	2.91	non-LIQ CLAY	1	1.22	NA	5.82	non-LIQ	non-LIQ	0.954	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	-0.7	115.0	115.0	14.3	0.5	3.6	53	4	5	5.00	1.20	11	1.132	0.870	1.132	0.870	2.92	non-LIQ CLAY	1	1.22	NA	5.91	non-LIQ	non-LIQ	0.954	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	-0.9	115.0	115.0	20.3	0.6	2.9	42	6	6	5.00	1.20	12	1.141	0.875	1.141	0.875	2.73	non-LIQ CLAY	1	1.21	NA	4.24	non-LIQ	non-LIQ	0.954	0.57	0.530	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	-1.0	115.0	115.0	17.3	0.5	2.6	44	5	5	5.00	1.20	11	1.151	0.879	1.151	0.879	2.77	non-LIQ CLAY	1	1.20	NA	4.50	non-LIQ	non-LIQ	0.953	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	-1.2	115.0	115.0	14.7	0.7	4.9	59	5	5	5.00	1.20	11	1.160	0.883	1.160	0.883	3.00	non-LIQ CLAY	1	1.20	NA	6.78	non-LIQ	non-LIQ	0.953	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	-1.3	115.0	115.0	18.5	0.5	2.6	42	5	6	5.00	1.20	12	1.170	0.888	1.170	0.888	2.74	non-LIQ CLAY	1	1.19	NA	4.27	non-LIQ	non-LIQ	0.953	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	-1.5	115.0	115.0	13.4	0.4	3.3	54	4	4	5.00	1.20	10	1.179	0.892	1.179	0.892	2.93	non-LIQ CLAY	1	1.19	NA	6.05	non-LIQ	non-LIQ	0.952	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	-1.7	115.0	115.0	15.7	0.5	3.0	49	5	5	5.00	1.20	11	1.189	0.896	1.189	0.896	2.85	non-LIQ CLAY	1	1.18	NA	5.20	non-LIQ	non-LIQ	0.952	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	-1.8	115.0	115.0	19.2	0.6	3.1	45	5	6	5.00	1.20	12	1.198	0.900	1.198	0.900	2.79	non-LIQ CLAY	1	1.18	NA	4.66	non-LIQ	non-LIQ	0.951	0.58	0.540	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	-2.0	115.0	115.0	20.0	0.6	3.1	44	6	6	5.00	1.20	12	1.208	0.905	1.208	0.905	2.77	non-LIQ CLAY	1	1.17	NA	4.54	non-LIQ	non-LIQ	0.951	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	-2.2	115.0	115.0	20.3	0.6	3.2	44	6	6	5.00	1.20	12	1.217	0.909	1.217	0.909	2.77	non-LIQ CLAY	1	1.16	NA	4.53	non-LIQ	non-LIQ	0.951	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	-2.3	115.0	115.0	20.0	0.7	3.6	47	6	6	5.00	1.20	12	1.226	0.914	1.226	0.914	2.81	non-LIQ CLAY	1	1.16	NA	4.87	non-LIQ	non-LIQ	0.950	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	-2.5	115.0	115.0	19.8	0.7	3.8	48	6	6	5.00	1.20	12	1.236	0.918	1.236	0.918	2.83	non-LIQ CLAY	1	1.15	NA	5.04	non-LIQ	non-LIQ	0.950	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	-2.7	115.0	115.0	18.1	0.8	4.2	52	5	6	5.00	1.20	12	1.245	0.922	1.245	0.922	2.89	non-LIQ CLAY	1	1.15	NA	5.64	non-LIQ	non-LIQ	0.950	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	-2.8	115.0	115.0	15.9	0.6	4.0	54	5	5	5.00	1.20	11	1.255	0.926	1.255	0.926	2.94	non-LIQ CLAY	1	1.14	NA	6.07	non-LIQ	non-LIQ	0.949	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	-3.0	115.0	115.0	14.2	0.5	3.5	55	4	5	5.00	1.20	11	1.264	0.931	1.264	0.931	2.94	non-LIQ CLAY	1	1.14	NA	6.12	non-LIQ	non-LIQ	0.949	0.59	0.550	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	-3.2	115.0	115.0	14.3	0.4	2.7	51	4	5	5.00	1.20	10	1.274	0.935	1.274	0.935	2.88	non-LIQ CLAY	1	1.13	NA	5.50	non-LIQ	non-LIQ	0.948	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	-3.3	115.0	115.0	15.1	0.4	2.8	50	4	5	5.00	1.20	11	1.283	0.939	1.283	0.939	2.87	non-LIQ CLAY	1	1.13	NA	5.40	non-LIQ	non-LIQ	0.948	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	-3.5	115.0	115.0	15.6	0.5	3.3	52	5	5	5.00	1.20	11	1.292	0.944	1.292	0.944	2.90	non-LIQ CLAY	1	1.12	NA	5.66	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.64	-3.6	115.0	115.0	15.9	0.6	3.5	52	5	5	5.00	1.20	11	1.302	0.948	1.302	0.948	2.91	non-LIQ CLAY	1	1.12	NA	5.75	non-LIQ	non-LIQ	0.947	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	-3.8	115.0	115.0	15.2	0.6	4.0	56	5	5	5.00	1.20	11	1.311	0.952	1.311	0.952	2.96	non-LIQ CLAY	1	1.11	NA	6.31	non-LIQ	non-LIQ	0.947	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	-4.0	115.0	115.0	16.4	0.6	3.7	53	5	5	5.00	1.20	11	1.321	0.957	1.321	0.957	2.91	non-LIQ CLAY	1	1.11	NA	5.84	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

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Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
23.13	-4.1	115.0	115.0	17.0	0.7	3.9	53	5	5	5.00	1.20	12	1.330	0.961	1.330	0.961	2.92	non-LIQ CLAY	1	1.10	NA	5.86	non-LIQ	non-LIQ	0.946	0.60	0.560	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.29	-4.3	115.0	115.0	17.0	0.6	3.7	52	5	5	5.00	1.20	11	1.339	0.965	1.339	0.965	2.90	non-LIQ CLAY	1	1.10	NA	5.74	non-LIQ	non-LIQ	0.946	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.46	-4.5	115.0	115.0	16.2	0.6	3.6	53	5	5	5.00	1.20	11	1.349	0.970	1.349	0.970	2.92	non-LIQ CLAY	1	1.09	NA	5.86	non-LIQ	non-LIQ	0.945	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.62	-4.6	115.0	115.0	16.2	0.6	3.4	52	5	5	5.00	1.20	11	1.358	0.974	1.358	0.974	2.91	non-LIQ CLAY	1	1.09	NA	5.75	non-LIQ	non-LIQ	0.945	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.79	-4.8	115.0	115.0	15.7	0.6	3.9	56	5	5	5.00	1.20	11	1.368	0.978	1.368	0.978	2.96	non-LIQ CLAY	1	1.08	NA	6.27	non-LIQ	non-LIQ	0.945	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.95	-5.0	115.0	115.0	15.4	0.6	3.8	55	5	5	5.00	1.20	11	1.377	0.982	1.377	0.982	2.95	non-LIQ CLAY	1	1.08	NA	6.24	non-LIQ	non-LIQ	0.944	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.11	-5.1	115.0	115.0	14.3	0.5	3.6	57	4	5	5.00	1.20	11	1.386	0.987	1.386	0.987	2.98	non-LIQ CLAY	1	1.07	NA	6.47	non-LIQ	non-LIQ	0.944	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.28	-5.3	115.0	115.0	13.0	0.4	3.3	58	4	4	5.00	1.20	10	1.396	0.991	1.396	0.991	2.99	non-LIQ CLAY	1	1.07	NA	6.66	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.44	-5.4	115.0	115.0	12.9	0.4	3.2	58	4	4	5.00	1.20	10	1.405	0.995	1.405	0.995	2.99	non-LIQ CLAY	1	1.06	NA	6.66	non-LIQ	non-LIQ	0.943	0.61	0.570	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.61	-5.6	115.0	115.0	14.1	0.5	3.7	58	4	5	5.00	1.20	11	1.415	1.000	1.415	1.000	2.99	non-LIQ CLAY	1	1.06	NA	6.66	non-LIQ	non-LIQ	0.943	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.77	-5.8	115.0	115.0	16.5	0.7	4.0	56	5	5	5.00	1.20	11	1.424	1.004	1.424	1.004	2.96	non-LIQ CLAY	1	1.05	NA	6.27	non-LIQ	non-LIQ	0.942	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
24.93	-5.9	115.0	115.0	15.9	0.7	4.7	59	5	5	5.00	1.20	11	1.433	1.008	1.433	1.008	3.01	non-LIQ CLAY	1	1.05	NA	6.88	non-LIQ	non-LIQ	0.942	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.10	-6.1	115.0	115.0	14.8	0.7	4.6	61	5	5	5.00	1.20	11	1.443	1.013	1.443	1.013	3.04	non-LIQ CLAY	1	1.04	NA	7.22	non-LIQ	non-LIQ	0.941	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.26	-6.3	115.0	115.0	16.9	0.6	3.6	53	5	5	5.00	1.20	11	1.452	1.017	1.452	1.017	2.92	non-LIQ CLAY	1	1.04	NA	5.93	non-LIQ	non-LIQ	0.941	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.43	-6.4	115.0	115.0	19.0	0.6	3.3	49	6	6	5.00	1.20	12	1.462	1.021	1.462	1.021	2.86	non-LIQ CLAY	1	1.04	NA	5.28	non-LIQ	non-LIQ	0.941	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.59	-6.6	115.0	115.0	19.4	0.8	4.0	52	6	6	5.00	1.20	12	1.471	1.026	1.471	1.026	2.90	non-LIQ CLAY	1	1.03	NA	5.67	non-LIQ	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.75	-6.8	115.0	115.0	17.9	0.7	4.1	54	6	6	5.00	1.20	12	1.481	1.030	1.481	1.030	2.94	non-LIQ CLAY	1	1.03	NA	6.08	non-LIQ	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
25.92	-6.9	115.0	115.0	13.9	0.8	5.5	67	5	5	5.00	1.20	11	1.490	1.034	1.490	1.034	3.12	non-LIQ CLAY	1	1.02	NA	8.20	non-LIQ	non-LIQ	0.940	0.62	0.580	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.08	-7.1	115.0	115.0	16.4	0.8	5.0	61	5	5	5.00	1.20	11	1.500	1.038	1.500	1.038	3.03	non-LIQ CLAY	1	1.02	NA	7.10	non-LIQ	non-LIQ	0.939	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.25	-7.3	115.0	115.0	18.0	0.9	4.8	58	6	6	5.00	1.20	12	1.509	1.043	1.509	1.043	2.99	non-LIQ CLAY	1	1.01	NA	6.62	non-LIQ	non-LIQ	0.939	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.41	-7.4	115.0	115.0	21.4	0.9	4.2	51	6	6	5.00	1.20	13	1.519	1.047	1.519	1.047	2.89	non-LIQ CLAY	1	1.01	NA	5.57	non-LIQ	non-LIQ	0.938	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.57	-7.6	115.0	115.0	23.8	1.0	4.2	49	7	7	5.00	1.20	13	1.528	1.051	1.528	1.051	2.85	non-LIQ CLAY	1	1.01	NA	5.18	non-LIQ	non-LIQ	0.938	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.74	-7.7	115.0	115.0	23.8	1.0	4.2	49	7	7	5.00	1.20	13	1.538	1.056	1.538	1.056	2.85	non-LIQ CLAY	1	1.00	NA	5.20	non-LIQ	non-LIQ	0.938	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
26.90	-7.9	115.0	115.0	22.9	1.0	4.2	50	7	7	5.00	1.20	13	1.547	1.060	1.547	1.060	2.86	non-LIQ CLAY	1	1.00	NA	5.35	non-LIQ	non-LIQ	0.937	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.07	-8.1	115.0	115.0	23.1	1.0	4.3	50	7	7	5.00	1.20	13	1.557	1.065	1.557	1.065	2.87	non-LIQ CLAY	1	0.99	NA	5.39	non-LIQ	non-LIQ	0.937	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.23	-8.2	115.0	115.0	22.6	0.9	3.8	49	7	7	5.00	1.20	13	1.566	1.069	1.566	1.069	2.85	non-LIQ CLAY	1	0.99	NA	5.20	non-LIQ	non-LIQ	0.937	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.40	-8.4	115.0	115.0	19.1	1.2	6.2	62	6	6	5.00	1.20	13	1.576	1.073	1.576	1.073	3.05	non-LIQ CLAY	1	0.99	NA	7.28	non-LIQ	non-LIQ	0.936	0.63	0.590	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.56	-8.6	115.0	115.0	17.0	1.1	6.7	67	6	6	5.00	1.20	12	1.585	1.077	1.585	1.077	3.12	non-LIQ CLAY	1	0.98	NA	8.16	non-LIQ	non-LIQ	0.936	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.72	-8.7	115.0	115.0	21.3	1.0	4.8	55	7	6	5.00	1.20	13	1.594	1.082	1.594	1.082	2.94	non-LIQ CLAY	1	0.98	NA	6.10	non-LIQ	non-LIQ	0.935	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
27.89	-8.9	115.0	115.0	20.6	1.0	4.6	55	6	6	5.00	1.20	13	1.604	1.086	1.604	1.086	2.94	non-LIQ CLAY	1	0.97	NA	6.12	non-LIQ	non-LIQ	0.935	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.05	-9.1	115.0	115.0	20.2	0.9	4.6	55	6	6	5.00	1.20	12	1.613	1.090	1.613	1.090	2.95	non-LIQ CLAY	1	0.97	NA	6.20	non-LIQ	non-LIQ	0.935	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.22	-9.2	115.0	115.0	18.5	0.9	4.7	58	6	6	5.00	1.20	12	1.623	1.095	1.623	1.095	2.99	non-LIQ CLAY	1	0.97	NA	6.66	non-LIQ	non-LIQ	0.934	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.38	-9.4	115.0	115.0	16.7	0.8	4.6	60	5	5	5.00	1.20	11	1.632	1.099	1.632	1.099	3.03	non-LIQ CLAY	1	0.96	NA	7.05	non-LIQ	non-LIQ	0.934	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.54	-9.5	115.0	115.0	16.4	0.7	4.0	58	5	5	5.00	1.20	11	1.641	1.103	1.641	1.103	2.99	non-LIQ CLAY	1	0.96	NA	6.69	non-LIQ	non-LIQ	0.933	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.71	-9.7	115.0	115.0	15.9	0.6	3.5	57	5	5	5.00	1.20	11	1.651	1.108	1.651	1.108	2.98	non-LIQ CLAY	1	0.96	NA	6.47	non-LIQ	non-LIQ	0.933	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
28.87	-9.9	115.0	115.0	16.1	0.5	3.3	55	5	5	5.00	1.20	11	1.660	1.112	1.660	1.112	2.95	non-LIQ CLAY	1	0.95	NA	6.23	non-LIQ	non-LIQ	0.933	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.04	-10.0	115.0	115.0	19.4	0.5	2.5	47	6	5	5.00	1.20	11	1.670	1.116	1.670	1.116	2.81	non-LIQ CLAY	1	0.95	NA	4.88	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.20	-10.2	115.0	115.0	20.0	0.6	2.9	48	6	6	5.00	1.20	12	1.679	1.121	1.679	1.121	2.84	non-LIQ CLAY	1	0.94	NA	5.14	non-LIQ	non-LIQ	0.932	0.64	0.600	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.36	-10.4	115.0	115.0	22.3	0.6	2.8	45	6	6	5.00	1.20	12	1.688	1.125	1.688	1.125	2.78	non-LIQ CLAY	1	0.94	NA	4.64	non-LIQ	non-LIQ	0.932	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.53	-10.5	115.0	115.0	23.3	0.7	2.9	45	7	6	5.00	1.20	13	1.698	1.129	1.698	1.129	2.78	non-LIQ CLAY	1	0.94	NA	4.61	non-LIQ	non-LIQ	0.931	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.69	-10.7	115.0	115.0	24.5	0.8	3.3	46	7	7	5.00	1.20	13	1.707	1.133	1.707	1.133	2.80	non-LIQ CLAY	1	0.93	NA	4.76	non-LIQ	non-LIQ	0.931	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
29.86	-10.9	115.0	115.0	26.5	0.9	3.5	45	7	7	5.00	1.20	14	1.717	1.138	1.717	1.138	2.78	non-LIQ CLAY	1	0.93	NA	4.64	non-LIQ	non-LIQ	0.930	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.02	-11.0	115.0	115.0	27.9	1.0	3.7	45	8	8	5.00	1.20	14	1.726	1.142	1.726	1.142	2.78	non-LIQ CLAY	1	0.93	NA	4.63	non-LIQ	non-LIQ	0.930	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.18	-11.2	115.0	115.0	29.0	1.1	3.7	44	8	8	5.00	1.20	14	1.735	1.146	1.735	1.146	2.77	non-LIQ CLAY	1	0.92	NA	4.55	non-LIQ	non-LIQ	0.928	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.35	-11.4	115.0	115.0	29.7	1.1	3.5	43	8	8	5.00	1.20	14	1.745	1.151	1.745	1.151	2.75	non-LIQ CLAY	1	0.92	NA	4.39	non-LIQ	non-LIQ	0.927	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.51	-11.5	115.0	115.0	30.7	1.2	3.9	44	9	8	5.00	1.20	15	1.754	1.155	1.754	1.155	2.77	non-LIQ CLAY	1	0.92	NA	4.55	non-LIQ	non-LIQ	0.926	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.68	-11.7	115.0	115.0	27.1	1.3	4.7	50	8	8	5.00	1.20	14	1.764	1.159	1.764	1.159	2.87	non-LIQ CLAY	1	0.91	NA	5.39	non-LIQ	non-LIQ	0.924	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
30.84	-11.8	115.0	115.0	32.1	1.3	4.1	44	9	9	5.00	1.20	15	1.773	1.164	1.773	1.164	2.77	non-LIQ CLAY	1	0.91	NA	4.52	non-LIQ	non-LIQ	0.923	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.00	-12.0	115.0	115.0	30.7	1.3	4.3	46	9	8	5.00	1.20	15	1.783	1.168	1.783	1.168	2.80	non-LIQ CLAY	1	0.91	NA	4.78	non-LIQ	non-LIQ	0.922	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.17	-12.2	115.0	115.0	28.6	1.3	4.5	48	8	8	5.00	1.20	14	1.792	1.172	1.792	1.172	2.84	non-LIQ CLAY	1	0.90	NA	5.15	non-LIQ	non-LIQ	0.920	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.33	-12.3	115.0	115.0	26.6	1.3	4.8	51	8	8	5.00	1.20	14	1.801	1.177	1.801	1.177	2.89	non-LIQ CLAY	1	0.90	NA	5.55	non-LIQ	non-LIQ	0.919	0.65	0.610	non-LIQ	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
31.50	-12.5	115.0	115.0	24.7	1.2	4.8	53.1	7.5	7.1	5.0	1.2	14.0	1.81	1.18	1.81	1.18	2.92	non-LIQ CLAY	1	0.90	NA	5.88	non-LIQ	non-LIQ	0.918	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.66	-12.7	115.0	115.0	24.1	1.2	4.9	54.0	7.4	7.0	5.0	1.2	13.0	1.82	1.19	1.82	1.19	2.93	non-LIQ CLAY	1	0.89	NA	6.01	non-LIQ	non-LIQ	0.916	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.82	-12.8	115.0	115.0	23.4	1.1	4.7	54.1	7.2	6.8	5.0	1.2	13.0	1.83	1.19	1.83	1.19	2.93	non-LIQ CLAY	1	0.89	NA	6.04	non-LIQ	non-LIQ	0.915	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
31.99	-13.0	115.0	115.0	23.6	1.1	4.5	53.3	7.2	6.8	5.0	1.2	13.0	1.84	1.19	1.84	1.19	2.92	non-LIQ CLAY	1	0.89	NA	5.91	non-LIQ	non-LIQ	0.914	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.15	-13.2	115.0	115.0	24.1	1.0	4.2	51.8	7.2	6.8	5.0	1.2	13.0	1.85	1.20	1.85	1.20	2.90	non-LIQ CLAY	1	0.88	NA	5.67	non-LIQ	non-LIQ	0.912	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.32	-13.3	115.0	115.0	24.1	1.1	4.5	52.9	7.3	6.8	5.0	1.2	13.0	1.86	1.20	1.86	1.20	2.91	non-LIQ CLAY	1	0.88	NA	5.83	non-LIQ	non-LIQ	0.911	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.48	-13.5	115.0	115.0	23.7	1.0	4.2	52.4	7.1	6.7	5.0	1.2	13.0	1.87	1.21	1.87	1.21	2.91	non-LIQ CLAY	1	0.88	NA	5.76	non-LIQ	non-LIQ	0.910	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.64	-13.6	115.0	115.0	23.0	0.9	4.0	52.3	6.9	6.5	5.0	1.2	13.0	1.88	1.21	1.88	1.21	2.90	non-LIQ CLAY	1	0.87	NA	5.74	non-LIQ	non-LIQ	0.908	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.81	-13.8	115.0	115.0	22.6	0.9	4.0	52.6	6.8	6.4	5.0	1.2	13.0	1.89	1.22	1.89	1.22	2.91	non-LIQ CLAY	1	0.87	NA	5.80	non-LIQ	non-LIQ	0.907	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
32.97	-14.0	115.0	115.0	21.7	0.9	4.3	54.9	6.7	6.3	5.0	1.2	13.0	1.90	1.22	1.90	1.22	2.95	non-LIQ CLAY	1	0.87	NA	6.16	non-LIQ	non-LIQ	0.906	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.14	-14.1	115.0	115.0	21.9	1.0	4.4	55.2	6.8	6.3	5.0	1.2	13.0	1.91	1.22	1.91	1.22	2.95	non-LIQ CLAY	1	0.86	NA	6.20	non-LIQ	non-LIQ	0.904	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.30	-14.3	115.0	115.0	23.5	1.0	4.1	52.2	7.1	6.6	5.0	1.2	13.0	1.91	1.23	1.91	1.23	2.90	non-LIQ CLAY	1	0.86	NA	5.72	non-LIQ	non-LIQ	0.903	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.46	-14.5	115.0	115.0	24.5	1.0	4.1	51.4	7.3	6.8	5.0	1.2	13.0	1.92	1.23	1.92	1.23	2.89	non-LIQ CLAY	1	0.86	NA	5.60	non-LIQ	non-LIQ	0.902	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.63	-14.6	115.0	115.0	26.7	1.1	4.1	49.4	7.8	7.2	5.0	1.2	14.0	1.93	1.24	1.93	1.24	2.86	non-LIQ CLAY	1	0.86	NA	5.30	non-LIQ	non-LIQ	0.900	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.79	-14.8	115.0	115.0	26.1	1.1	4.1	50.1	7.7	7.1	5.0	1.2	14.0	1.94	1.24	1.94	1.24	2.87	non-LIQ CLAY	1	0.85	NA	5.41	non-LIQ	non-LIQ	0.899	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
33.96	-15.0	115.0	115.0	24.6	1.0	4.0	51.3	7.4	6.8	5.0	1.2	13.0	1.95	1.25	1.95	1.25	2.89	non-LIQ CLAY	1	0.85	NA	5.59	non-LIQ	non-LIQ	0.898	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.12	-15.1	115.0	115.0	22.2	0.9	4.0	53.9	6.8	6.3	5.0	1.2	13.0	1.96	1.25	1.96	1.25	2.93	non-LIQ CLAY	1	0.85	NA	6.00	non-LIQ	non-LIQ	0.896	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.28	-15.3	115.0	115.0	19.7	0.8	4.2	57.9	6.3	5.8	5.0	1.2	12.0	1.97	1.25	1.97	1.25	2.99	non-LIQ CLAY	1	0.84	NA	6.65	non-LIQ	non-LIQ	0.895	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.45	-15.5	115.0	115.0	16.7	0.7	4.2	62.9	5.6	5.1	5.0	1.2	11.0	1.98	1.26	1.98	1.26	3.06	non-LIQ CLAY	1	0.84	NA	7.48	non-LIQ	non-LIQ	0.894	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.61	-15.6	115.0	115.0	15.2	0.5	3.6	62.8	5.0	4.6	5.0	1.2	11.0	1.99	1.26	1.99	1.26	3.06	non-LIQ CLAY	1	0.84	NA	7.46	non-LIQ	non-LIQ	0.892	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.78	-15.8	115.0	115.0	14.9	0.5	3.2	61.7	4.9	4.5	5.0	1.2	10.0	2.00	1.27	2.00	1.27	3.05	non-LIQ CLAY	1	0.83	NA	7.28	non-LIQ	non-LIQ	0.891	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
34.94	-15.9	115.0	115.0	14.8	0.4	3.0	60.6	4.8	4.4	5.0	1.2	10.0	2.01	1.27	2.01	1.27	3.03	non-LIQ CLAY	1	0.83	NA	7.09	non-LIQ	non-LIQ	0.890	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.10	-16.1	115.0	115.0	16.7	0.5	3.0	57.0	5.3	4.8	5.0	1.2	11.0	2.02	1.28	2.02	1.28	2.98	non-LIQ CLAY	1	0.83	NA	6.50	non-LIQ	non-LIQ	0.888	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.27	-16.3	115.0	115.0	20.0	0.5	2.5	49.1	5.9	5.3	5.0	1.2	11.0	2.03	1.28	2.03	1.28	2.85	non-LIQ CLAY	1	0.83	NA	5.25	non-LIQ	non-LIQ	0.887	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.43	-16.4	115.0	115.0	19.7	0.6	3.1	53.2	6.0	5.4	5.0	1.2	12.0	2.04	1.28	2.04	1.28	2.92	non-LIQ CLAY	1	0.82	NA	5.89	non-LIQ	non-LIQ	0.886	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.60	-16.6	115.0	115.0	20.7	0.8	3.7	55.0	6.4	5.8	5.0	1.2	12.0	2.05	1.29	2.05	1.29	2.95	non-LIQ CLAY	1	0.82	NA	6.18	non-LIQ	non-LIQ	0.884	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.76	-16.8	115.0	115.0	21.9	0.8	3.8	54.1	6.7	6.1	5.0	1.2	12.0	2.06	1.29	2.06	1.29	2.93	non-LIQ CLAY	1	0.82	NA	6.03	non-LIQ	non-LIQ	0.883	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
35.93	-16.9	115.0	115.0	19.6	0.8	3.9	57.9	6.2	5.6	5.0	1.2	12.0	2.07	1.30	2.07	1.30	2.99	non-LIQ CLAY	1	0.82	NA	6.64	non-LIQ	non-LIQ	0.882	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.09	-17.1	115.0	115.0	19.4	0.7	3.6	56.5	6.1	5.5	5.0	1.2	12.0	2.08	1.30	2.08	1.30	2.97	non-LIQ CLAY	1	0.81	NA	6.41	non-LIQ	non-LIQ	0.880	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.25	-17.3	115.0	115.0	20.2	0.7	3.3	54.4	6.2	5.6	5.0	1.2	12.0	2.08	1.31	2.08	1.31	2.94	non-LIQ CLAY	1	0.81	NA	6.07	non-LIQ	non-LIQ	0.879	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.42	-17.4	115.0	115.0	19.9	0.7	3.6	56.2	6.2	5.6	5.0	1.2	12.0	2.09	1.31	2.09	1.31	2.97	non-LIQ CLAY	1	0.81	NA	6.37	non-LIQ	non-LIQ	0.878	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.58	-17.6	115.0	115.0	19.5	0.8	3.9	58.3	6.2	5.6	5.0	1.2	12.0	2.10	1.31	2.10	1.31	3.00	non-LIQ CLAY	1	0.80	NA	6.71	non-LIQ	non-LIQ	0.876	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.75	-17.8	115.0	115.0	19.4	0.8	3.9	58.6	6.2	5.6	5.0	1.2	12.0	2.11	1.32	2.11	1.32	3.00	non-LIQ CLAY	1	0.80	NA	6.76	non-LIQ	non-LIQ	0.875	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
36.91	-17.9	115.0	115.0	19.4	0.7	3.9	58.5	6.2	5.5	5.0	1.2	12.0	2.12	1.32	2.12	1.32	3.00	non-LIQ CLAY	1	0.80	NA	6.74	non-LIQ	non-LIQ	0.874	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.07	-18.1	115.0	115.0	18.8	0.7	3.8	59.0	6.0	5.4	5.0	1.2	11.0	2.13	1.33	2.13	1.33	3.01	non-LIQ CLAY	1	0.80	NA	6.83	non-LIQ	non-LIQ	0.872	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.24	-18.2	115.0	115.0	18.2	0.7	4.0	61.2	6.0	5.3	5.0	1.2	11.0	2.14	1.33	2.14	1.33	3.04	non-LIQ CLAY	1	0.79	NA	7.19	non-LIQ	non-LIQ	0.871	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.40	-18.4	115.0	115.0	18.2	0.6	3.6	59.1	5.8	5.2	5.0	1.2	11.0	2.15	1.34	2.15	1.34	3.01	non-LIQ CLAY	1	0.79	NA	6.84	non-LIQ	non-LIQ	0.870	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.57	-18.6	115.0	115.0	18.2	0.6	3.2	57.0	5.7	5.1	5.0	1.2	11.0	2.16	1.34	2.16	1.34	2.98	non-LIQ CLAY	1	0.79	NA	6.50	non-LIQ	non-LIQ	0.868	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

C-4b

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	$(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60CS}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
37.73	-18.7	115.0	115.0	18.9	0.6	3.0	55.2	5.9	5.2	5.0	1.2	11.0	2.17	1.34	2.17	1.34	2.95	non-LIQ CLAY	1	0.79	NA	6.21	non-LIQ	non-LIQ	0.867	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
37.89	-18.9	115.0	115.0	20.4	0.7	3.2	54.6	6.3	5.6	5.0	1.2	12.0	2.18	1.35	2.18	1.35	2.94	non-LIQ CLAY	1	0.78	NA	6.11	non-LIQ	non-LIQ	0.866	0.650	0.610	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.06	-19.1	115.0	115.0	20.3	0.7	3.7	56.8	6.4	5.7	5.0	1.2	12.0	2.19	1.35	2.19	1.35	2.98	non-LIQ CLAY	1	0.78	NA	6.47	non-LIQ	non-LIQ	0.864	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.22	-19.2	115.0	115.0	20.3	0.8	3.9	57.8	6.5	5.7	5.0	1.2	12.0	2.20	1.36	2.20	1.36	2.99	non-LIQ CLAY	1	0.78	NA	6.63	non-LIQ	non-LIQ	0.863	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.39	-19.4	115.0	115.0	20.2	0.8	3.7	57.4	6.4	5.6	5.0	1.2	12.0	2.21	1.36	2.21	1.36	2.98	non-LIQ CLAY	1	0.78	NA	6.57	non-LIQ	non-LIQ	0.862	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.55	-19.6	115.0	115.0	20.0	0.8	3.8	58.4	6.4	5.6	5.0	1.2	12.0	2.22	1.37	2.22	1.37	3.00	non-LIQ CLAY	1	0.77	NA	6.73	non-LIQ	non-LIQ	0.860	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.71	-19.7	115.0	115.0	20.7	0.6	3.0	53.3	6.3	5.5	5.0	1.2	12.0	2.23	1.37	2.23	1.37	2.92	non-LIQ CLAY	1	0.77	NA	5.90	non-LIQ	non-LIQ	0.859	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
38.88	-19.9	115.0	115.0	19.7	0.6	2.9	54.2	6.0	5.3	5.0	1.2	11.0	2.24	1.38	2.24	1.38	2.93	non-LIQ CLAY	1	0.77	NA	6.05	non-LIQ	non-LIQ	0.858	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.04	-20.0	115.0	115.0	19.3	0.6	2.9	54.9	6.0	5.2	5.0	1.2	11.0	2.24	1.38	2.24	1.38	2.95	non-LIQ CLAY	1	0.77	NA	6.16	non-LIQ	non-LIQ	0.856	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.21	-20.2	115.0	115.0	20.3	0.7	3.3	55.8	6.3	5.5	5.0	1.2	12.0	2.25	1.38	2.25	1.38	2.96	non-LIQ CLAY	1	0.76	NA	6.31	non-LIQ	non-LIQ	0.855	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.37	-20.4	115.0	115.0	22.5	0.8	3.5	54.1	6.9	6.0	5.0	1.2	12.0	2.26	1.39	2.26	1.39	2.93	non-LIQ CLAY	1	0.76	NA	6.03	non-LIQ	non-LIQ	0.854	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.53	-20.5	115.0	115.0	27.1	0.9	3.2	47.9	7.9	6.8	5.0	1.2	13.0	2.27	1.39	2.27	1.39	2.83	non-LIQ CLAY	1	0.76	NA	5.07	non-LIQ	non-LIQ	0.852	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.70	-20.7	115.0	115.0	30.6	0.9	3.1	44.6	8.6	7.5	5.0	1.2	14.0	2.28	1.40	2.28	1.40	2.78	non-LIQ CLAY	1	0.76	NA	4.58	non-LIQ	non-LIQ	0.851	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
39.86	-20.9	115.0	115.0	28.3	1.1	3.8	50.0	8.4	7.3	5.0	1.2	14.0	2.29	1.40	2.29	1.40	2.87	non-LIQ CLAY	1	0.76	NA	5.39	non-LIQ	non-LIQ	0.850	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.03	-21.0	115.0	115.0	27.4	1.3	4.6	54.0	8.4	7.3	5.0	1.2	14.0	2.30	1.41	2.30	1.41	2.93	non-LIQ CLAY	1	0.75	NA	6.01	non-LIQ	non-LIQ	0.848	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.19	-21.2	115.0	115.0	35.8	1.0	2.7	39.5	9.5	8.3	5.0	1.2	15.0	2.31	1.41	2.31	1.41	2.68	non-LIQ CLAY	1	0.75	NA	3.87	non-LIQ	non-LIQ	0.847	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.35	-21.4	115.0	115.0	29.4	0.7	2.2	41.1	8.0	6.9	5.0	1.2	13.0	2.32	1.41	2.32	1.41	2.71	non-LIQ CLAY	1	0.75	NA	4.09	non-LIQ	non-LIQ	0.846	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.52	-21.5	115.0	115.0	20.3	0.6	3.2	55.8	6.3	5.5	5.0	1.2	12.0	2.33	1.42	2.33	1.42	2.96	non-LIQ CLAY	1	0.75	NA	6.30	non-LIQ	non-LIQ	0.844	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.68	-21.7	115.0	115.0	21.0	0.6	3.0	54.0	6.4	5.6	5.0	1.2	12.0	2.34	1.42	2.34	1.42	2.93	non-LIQ CLAY	1	0.74	NA	6.02	non-LIQ	non-LIQ	0.843	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
40.85	-21.9	115.0	115.0	23.8	0.8	3.6	53.7	7.3	6.3	5.0	1.2	13.0	2.35	1.43	2.35	1.43	2.93	non-LIQ CLAY	1	0.74	NA	5.97	non-LIQ	non-LIQ	0.842	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.01	-22.0	115.0	115.0	26.6	0.7	2.5	45.6	7.5	6.5	5.0	1.2	13.0	2.36	1.43	2.36	1.43	2.79	non-LIQ CLAY	1	0.74	NA	4.72	non-LIQ	non-LIQ	0.840	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.17	-22.2	115.0	115.0	22.6	0.8	3.4	54.5	6.9	6.0	5.0	1.2	12.0	2.37	1.44	2.37	1.44	2.94	non-LIQ CLAY	1	0.74	NA	6.10	non-LIQ	non-LIQ	0.839	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.34	-22.3	115.0	115.0	28.4	1.2	4.1	52.1	8.5	7.3	5.0	1.2	14.0	2.38	1.44	2.38	1.44	2.90	non-LIQ CLAY	1	0.73	NA	5.71	non-LIQ	non-LIQ	0.838	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.50	-22.5	115.0	115.0	40.1	1.1	2.8	38.4	10.6	9.1	5.0	1.2	16.0	2.39	1.44	2.39	1.44	2.66	non-LIQ CLAY	1	0.73	NA	3.71	non-LIQ	non-LIQ	0.836	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.67	-22.7	115.0	115.0	31.5	0.7	2.2	39.8	8.4	7.2	5.0	1.2	14.0	2.40	1.45	2.40	1.45	2.69	non-LIQ CLAY	1	0.73	NA	3.90	non-LIQ	non-LIQ	0.835	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.83	-22.8	115.0	115.0	23.0	0.7	3.0	52.2	6.9	5.9	5.0	1.2	12.0	2.41	1.45	2.41	1.45	2.90	non-LIQ CLAY	1	0.73	NA	5.73	non-LIQ	non-LIQ	0.834	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
41.99	-23.0	115.0	115.0	22.7	1.1	5.0	61.5	7.5	6.4	5.0	1.2	13.0	2.41	1.46	2.41	1.46	3.04	non-LIQ CLAY	1	0.73	NA	7.25	non-LIQ	non-LIQ	0.832	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.16	-23.2	115.0	115.0	57.4	1.3	2.2	27.0	13.4	11.4	4.5	1.1	17.0	2.42	1.46	2.42	1.46	2.41	SAND	0.5	0.85	46	2.37	110	0.202	0.831	0.640	0.600	0.34	NA	NA	NA	NA	NA	0.00	13.00	2.15	0.04
42.32	-23.3	115.0	115.0	90.0	1.1	1.2	15.6	18.4	15.6	2.7	1.1	19.0	2.43	1.47	2.43	1.47	2.09	SAND	0.5	0.85	72	1.44	104	0.186	0.830	0.640	0.600	0.31	NA	NA	NA	NA	NA	0.00	17.00	1.78	0.03
42.49	-23.5	115.0	115.0	48.0	1.2	2.4	35.8	12.3	10.5	5.0	1.2	18.0	2.44	1.47	2.44	1.47	2.61	non-LIQ CLAY	1	0.72	NA	3.39	non-LIQ	non-LIQ	0.828	0.640	0.600	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.65	-23.7	115.0	115.0	29.6	1.1	3.7	49.8	8.7	7.4	5.0	1.2	14.0	2.45	1.47	2.45	1.47	2.86	non-LIQ CLAY	1	0.72	NA	5.36	non-LIQ	non-LIQ	0.827	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.81	-23.8	115.0	115.0	33.6	1.0	2.9	42.9	9.3	7.8	5.0	1.2	14.0	2.46	1.48	2.46	1.48	2.75	non-LIQ CLAY	1	0.72	NA	4.34	non-LIQ	non-LIQ	0.826	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
42.98	-24.0	115.0	115.0	29.2	0.9	3.0	46.6	8.3	7.0	5.0	1.2	13.0	2.47	1.48	2.47	1.48	2.81	non-LIQ CLAY	1	0.71	NA	4.87	non-LIQ	non-LIQ	0.824	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.14	-24.1	115.0	115.0	24.0	0.6	2.6	49.4	7.1	5.9	5.0	1.2	12.0	2.48	1.49	2.48	1.49	2.86	non-LIQ CLAY	1	0.71	NA	5.30	non-LIQ	non-LIQ	0.823	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.31	-24.3	115.0	115.0	22.6	0.6	2.6	50.7	6.7	5.7	5.0	1.2	12.0	2.49	1.49	2.49	1.49	2.88	non-LIQ CLAY	1	0.71	NA	5.50	non-LIQ	non-LIQ	0.822	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.47	-24.5	115.0	115.0	23.8	0.6	2.6	49.5	7.0	5.9	5.0	1.2	12.0	2.50	1.50	2.50	1.50	2.86	non-LIQ CLAY	1	0.71	NA	5.31	non-LIQ	non-LIQ	0.820	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.64	-24.6	115.0	115.0	24.7	0.7	3.0	51.2	7.4	6.2	5.0	1.2	12.0	2.51	1.50	2.51	1.50	2.89	non-LIQ CLAY	1	0.71	NA	5.57	non-LIQ	non-LIQ	0.819	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.80	-24.8	115.0	115.0	24.5	0.9	3.6	54.6	7.6	6.3	5.0	1.2	13.0	2.52	1.50	2.52	1.50	2.94	non-LIQ CLAY	1	0.70	NA	6.11	non-LIQ	non-LIQ	0.818	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
43.96	-25.0	115.0	115.0	25.0	1.0	3.8	54.9	7.7	6.5	5.0	1.2	13.0	2.53	1.51	2.53	1.51	2.95	non-LIQ CLAY	1	0.70	NA	6.17	non-LIQ	non-LIQ	0.816	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.13	-25.1	115.0	115.0	23.5	0.9	3.9	57.1	7.4	6.2	5.0	1.2	12.0	2.54	1.51	2.54	1.51	2.98	non-LIQ CLAY	1	0.70	NA	6.52	non-LIQ	non-LIQ	0.815	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.29	-25.3	115.0	115.0	24.2	0.8	3.4	54.3	7.4	6.2	5.0	1.2	12.0	2.55	1.52	2.55	1.52	2.94	non-LIQ CLAY	1	0.70	NA	6.06	non-LIQ	non-LIQ	0.814	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.46	-25.5	115.0	115.0	24.7	0.8	3.2	52.6	7.5	6.2	5.0	1.2	12.0	2.56	1.52	2.56	1.52	2.91	non-LIQ CLAY	1	0.70	NA	5.79	non-LIQ	non-LIQ	0.812	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.62	-25.6	115.0	115.0	32.7	1.0	3.0	44.8	9.2	7.7	5.0	1.2	14.0	2.57	1.53	2.57	1.53	2.78	non-LIQ CLAY	1	0.69	NA	4.61	non-LIQ	non-LIQ	0.811	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.78	-25.8	115.0	115.0	37.3	1.1	3.0	42.2	10.2	8.5	5.0	1.2	15.0	2.57	1.53	2.57	1.53	2.73	non-LIQ CLAY	1	0.69	NA	4.24	non-LIQ	non-LIQ	0.810	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
44.95	-26.0	115.0	115.0	29.3	0.9	3.2	48.7	8.5	7.1	5.0	1.2	14.0	2.58	1.53	2.58	1.53	2.85	non-LIQ CLAY	1	0.69	NA	5.19	non-LIQ	non-LIQ	0.808	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.11	-26.1	115.0	115.0	21.6	0.7	3.0	55.6	6.7	5.6	5.0	1.2	12.0	2.59	1.54	2.59	1.54	2.96	non-LIQ CLAY	1	0.69	NA	6.28	non-LIQ	non-LIQ	0.807	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.28	-26.3	115.0	115.0	21.7	0.5	2.2	50.5	6.4	5.3	5.0	1.2	11.0	2.60	1.54	2.60	1.54	2.88	non-LIQ CLAY	1	0.69	NA	5.47	non-LIQ	non-LIQ	0.806	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.44	-26.4	115.0	115.0	20.3	0.4	2.2	52.2	6.1	5.1	5.0	1.2	11.0	2.61	1.55	2.61	1.55	2.90	non-LIQ CLAY	1	0.68	NA	5.74	non-LIQ	non-LIQ	0.804	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.60	-26.6	115.0	115.0	21.0	0.4	1.9	49.6	6.2	5.1	5.0	1.2	11.0	2.62	1.55	2.62	1.55	2.86	non-LIQ CLAY	1	0.68	NA	5.33	non-LIQ	non-LIQ	0.803	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.77	-26.8	115.0	115.0	20.8	0.5	2.4	53.4	6.3	5.2	5.0	1.2	11.0	2.63	1.56	2.63	1.56	2.92	non-LIQ CLAY	1	0.68	NA	5.92	non-LIQ	non-LIQ	0.802	0.630	0.590	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
45.93	-26.9	115.0	115.0	24.7	0.6	2.5	49.2	7.2	6.0	5.0	1.2	12.0	2.64	1.56	2.64	1.56	2.85	non-LIQ CLAY	1	0.68	NA	5.26	non-LIQ	non-LIQ	0.800	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.10	-27.1	115.0	115.0	27.2	0.7	2.5	47.2	7.8	6.4	5.0	1.2	13.0	2.65	1.56	2.65	1.56	2.82	non-LIQ CLAY	1	0.68	NA	4.97	non-LIQ	non-LIQ	0.799	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.26	-27.3	115.0	115.0	25.2	0.6	2.5	48.9	7.4	6.0	5.0	1.2	12.0	2.66	1.57	2.66	1.57	2.85	non-LIQ CLAY	1	0.67	NA	5.22	non-LIQ	non-LIQ	0.798	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.42	-27.4	115.0	115.0	24.5	0.7	2.8	51.3	7.3	6.0	5.0	1.2	12.0	2.67	1.57	2.67	1.57	2.89	non-LIQ CLAY	1	0.67	NA	5.60	non-LIQ	non-LIQ	0.796	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.59	-27.6	115.0	115.0	28.6	0.7	2.5	45.9	8.1	6.6	5.0	1.2	13.0	2.68	1.58	2.68	1.58	2.80	non-LIQ CLAY	1	0.67	NA	4.78	non-LIQ	non-LIQ	0.795	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.75	-27.8	115.0	115.0	30.5	0.8	2.7	45.7	8.6	7.1	5.0	1.2	13.0	2.69	1.58	2.69	1.58	2.80	non-LIQ CLAY	1	0.67	NA	4.75	non-LIQ	non-LIQ	0.794	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
46.92	-27.9	115.0	115.0	29.3	2.2	7.4	65.1	9.9	8.1	5.0	1.2	15.0	2.70	1.59	2.70	1.59	3.09	non-LIQ CLAY	1	0.67	NA	7.65	non-LIQ	non-LIQ	0.792	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.08	-28.1	115.0	115.0	79.1	2.9	3.7	29.6	19.1	15.5	4.7	1.2	23.0	2.71	1.59	2.71	1.59	2.48	SAND	0.5	0.82	61	2.65	162	non-LIQ	0.791	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.24	-28.2	115.0	115.0	85.3	4.3	5.0	36.0	22.0	17.9	5.0	1.2	26.0	2.72	1.59	2.72	1.59	2.61	non-LIQ CLAY	1	0.66	NA	3.41	non-LIQ	non-LIQ	0.790	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.41	-28.4	115.0	115.0	88.8	5.8	6.5	39.7	23.7	19.3	5.0	1.2	28.0	2.73	1.60	2.73	1.60	2.69	non-LIQ CLAY	1	0.66	NA	3.89	non-LIQ	non-LIQ	0.788	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.57	-28.6	115.0	115.0	84.0	6.0	7.2	42.4	23.0	18.7	5.0	1.2	27.0	2.74	1.60	2.74	1.60	2.74	non-LIQ CLAY	1	0.66	NA	4.26	non-LIQ	non-LIQ	0.787	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.74	-28.7	115.0	115.0	79.2	5.3	6.7	42.3	21.7	17.6	5.0	1.2	26.0	2.75	1.61	2.75	1.61	2.73	non-LIQ CLAY	1	0.66	NA	4.25	non-LIQ	non-LIQ	0.785	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
47.90	-28.9	115.0	115.0	65.8	3.5	5.4	41.6	17.9	14.5	5.0	1.2	22.0	2.75	1.61	2.75	1.61	2.72	non-LIQ CLAY	1	0.66	NA	4.15	non-LIQ	non-LIQ	0.784	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.06	-29.1	115.0	115.0	46.3	2.2	4.7	45.9	13.2	10.6	5.0	1.2	18.0	2.76	1.62	2.76	1.62	2.80	non-LIQ CLAY	1	0.65	NA	4.78	non-LIQ	non-LIQ	0.783	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.23	-29.2	115.0	115.0	46.2	2.2	4.7	46.1	13.1	10.6	5.0	1.2	18.0	2.77	1.62	2.77	1.62	2.80	non-LIQ CLAY	1	0.65	NA	4.80	non-LIQ	non-LIQ	0.781	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.39	-29.4	115.0	115.0	55.8	3.0	5.5	45.0	15.7	12.7	5.0	1.2	20.0	2.78	1.63	2.78	1.63	2.78	non-LIQ CLAY	1	0.65	NA	4.64	non-LIQ	non-LIQ	0.780	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.56	-29.6	115.0	115.0	61.9	2.6	4.3	39.1	16.4	13.2	5.0	1.2	21.0	2.79	1.63	2.79	1.63	2.67	non-LIQ CLAY	1	0.65	NA	3.81	non-LIQ	non-LIQ	0.779	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.72	-29.7	115.0	115.0	43.7	1.7	3.8	43.9	12.2	9.8	5.0	1.2	17.0	2.80	1.63	2.80	1.63	2.76	non-LIQ CLAY	1	0.65	NA	4.49	non-LIQ	non-LIQ	0.778	0.620	0.580	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
48.88	-29.9	115.0	115.0	42.4	1.4	3.2	42.0	11.6	9.3	5.0	1.2	16.0	2.81	1.64	2.81	1.64	2.73	non-LIQ CLAY	1	0.65	NA	4.21	non-LIQ	non-LIQ	0.776	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.05	-30.1	115.0	115.0	53.4	2.8	5.2	45.2	15.1	12.1	5.0	1.2	19.0	2.82	1.64	2.82	1.64	2.79	non-LIQ CLAY	1	0.64	NA	4.66	non-LIQ	non-LIQ	0.775	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.21	-30.2	115.0	115.0	72.6	3.7	5.1	39.4	19.4	15.5	5.0	1.2	24.0	2.83	1.65	2.83	1.65	2.68	non-LIQ CLAY	1	0.64	NA	3.86	non-LIQ	non-LIQ	0.774	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.38	-30.4	115.0	115.0	85.8	4.9	5.8	38.7	22.7	18.2	5.0	1.2	27.0	2.84	1.65	2.84	1.65	2.67	non-LIQ CLAY	1	0.64	NA	3.76	non-LIQ	non-LIQ	0.772	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.54	-30.5	115.0	115.0	110.3	6.3	5.7	32.0	27.2	21.8	4.8	1.2	30.0	2.85	1.66	2.85	1.66	2.53	SAND	0.5	0.80	83	2.92	243	non-LIQ	0.771	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.70	-30.7	115.0	115.0	88.5	4.2	4.8	32.1	21.9	17.5	4.8	1.2	25.0	2.86	1.66	2.86	1.66	2.53	SAND	0.5	0.80	67	2.93	196	non-LIQ	0.770	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
49.87	-30.9	115.0	115.0	51.3	2.5	4.9	45.3	14.5	11.5	5.0	1.2	19.0	2.87	1.66	2.87	1.66	2.79	non-LIQ CLAY	1	0.64	NA	4.68	non-LIQ	non-LIQ	0.768	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.03	-31.0	115.0	115.0	43.1	1.5	3.4	42.8	11.9	9.4	5.0	1.2	16.0	2.88	1.67	2.88	1.67	2.74	non-LIQ CLAY	1	0.63	NA	4.33	non-LIQ	non-LIQ	0.767	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.20	-31.2	115.0	115.0	43.3	1.4	3.3	42.2	11.8	9.4	5.0	1.2	16.0	2.89	1.67	2.89	1.67	2.73	non-LIQ CLAY	1	0.63	NA	4.24	non-LIQ	non-LIQ	0.765	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.36	-31.4	115.0	115.0	44.0	2.1	4.7	48.0	12.8	10.1	5.0	1.2	17.0	2.90	1.68	2.90	1.68	2.83	non-LIQ CLAY	1	0.63	NA	5.08	non-LIQ	non-LIQ	0.764	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.52	-31.5	115.0	115.0	55.6	1.8	3.3	37.4	14.5	11.5	5.0	1.2	19.0	2.90	1.68	2.90	1.68	2.64	non-LIQ CLAY	1	0.63	NA	3.59	non-LIQ	non-LIQ	0.763	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.69	-31.7	115.0	115.0	48.8	2.0	4.0	43.3	13.5	10.7	5.0	1.2	18.0	2.91	1.69	2.91	1.69	2.75	non-LIQ CLAY	1	0.63	NA	4.40	non-LIQ	non-LIQ	0.761	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
50.85	-31.9	115.0	115.0	56.7	2.1	3.6	38.8	15.0	11.9	5.0	1.2	19.0	2.92	1.69	2.92	1.69	2.67	non-LIQ CLAY	1	0.63	NA	3.77	non-LIQ	non-LIQ	0.760	0.610	0.570	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.02	-32.0	115.0	115.0	75.1	2.6	3.5	30.1	18.2	14.4	4.7	1.2	21.0	2.93	1.69	2.93	1.69	2.49	SAND	0.5	0.79	56	2.70	151	0.402	0.759	0.610	0.570	0.71	NA	NA	NA	NA	NA	0.00	16.00	1.87	0.04
51.18	-32.2	115.0	115.0	87.5	2.6	3.0	25.9	20.2	16.0	4.4	1.1	22.0	2.94	1.70	2.94	1.70	2.39	SAND	0.5	0.79	65	2.26	148	0.379	0.757	0.610	0.570	0.67	NA	NA	NA	NA	NA	0.00	18.00	1.71	0.03
51.35	-32.4	115.0	115.0	73.7	2.3	3.1	28.7	17.6	13.9	4.6	1.1	20.0	2.95	1.70	2.95	1.70	2.45	SAND	0.5	0.79	55	2.55	140	0.335	0.756	0.600	0.560	0.60	NA	NA	NA	NA	NA	0.00	16.00	1.87	0.04
51.51	-32.5	115.0	115.0	63.3	1.9	3.0	35.8	16.3	12.8	5.0	1.2	20.0	2.96	1.71	2.96	1.71	2.61	non-LIQ CLAY	1	0.62	NA	3.39	non-LIQ	non-LIQ	0.755	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.67	-32.7	115.0	115.0	60.2	1.8	3.0	35.8	15.5	12.2	5.0	1.2	20.0	2.97	1.71	2.97	1.71	2.61	non-LIQ CLAY	1	0.62	NA	3.39	non-LIQ	non-LIQ	0.754	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
51.84	-32.8	115.0	115.0	62.2	1.5	2.5	28.7	14.8	11.6	4.6	1.1	18.0	2.98	1.72	2.98	1.72	2.45	SAND	0.5	0.79	46	2.55	117	0.231	0.752	0.600	0.560	0.41	NA	NA	NA	NA	NA	0.00	14.00	2.00	0.04
52.00	-33.0	115.0	115.0	56.2	1.6	2.9	36.1	14.5	11.4	5.0	1.2	19.0	2.99	1.72	2.99	1.72	2.61	non-LIQ CLAY	1	0.62	NA	3.42	non-LIQ	non-LIQ	0.751	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.17	-33.2	115.0	115.0	52.9	1.9	3.6	40.4	14.2	11.1	5.0	1.2	18.0	3.00	1.72	3.00	1.72	2.70	non-LIQ CLAY	1	0.61	NA	3.98	non-LIQ	non-LIQ	0.749	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

C-47

Liquefaction Analysis with Cone Penetration Test (CPT) Data

C-48

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60CS}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	Normalization of Tip Resistance C_Q	Normalization of Tip Resistance q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1n})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
52.33	-33.3	115.0	115.0	49.9	1.7	3.3	40.4	13.4	10.5	5.0	1.2	18.0	3.01	1.73	3.01	1.73	2.70	non-LIQ CLAY	1	0.61	NA	3.99	non-LIQ	non-LIQ	0.748	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.49	-33.5	115.0	115.0	53.8	1.5	2.9	36.8	14.0	10.9	5.0	1.2	18.0	3.02	1.73	3.02	1.73	2.63	non-LIQ CLAY	1	0.61	NA	3.51	non-LIQ	non-LIQ	0.747	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.66	-33.7	115.0	115.0	61.2	1.7	2.7	35.8	15.7	12.3	5.0	1.2	20.0	3.03	1.74	3.03	1.74	2.61	non-LIQ CLAY	1	0.61	NA	3.39	non-LIQ	non-LIQ	0.745	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.82	-33.8	115.0	115.0	62.4	3.8	6.1	46.1	17.7	13.8	5.0	1.2	22.0	3.04	1.74	3.04	1.74	2.80	non-LIQ CLAY	1	0.61	NA	4.80	non-LIQ	non-LIQ	0.744	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
52.99	-34.0	115.0	115.0	105.5	3.8	3.6	26.4	24.5	19.1	4.4	1.1	26.0	3.05	1.75	3.05	1.75	2.40	SAND	0.5	0.78	78	2.31	179	non-LIQ	0.743	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.15	-34.2	115.0	115.0	60.7	3.3	5.4	44.6	17.0	13.2	5.0	1.2	21.0	3.06	1.75	3.06	1.75	2.78	non-LIQ CLAY	1	0.60	NA	4.58	non-LIQ	non-LIQ	0.741	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.31	-34.3	115.0	115.0	48.9	2.0	4.2	44.7	13.7	10.6	5.0	1.2	18.0	3.07	1.75	3.07	1.75	2.78	non-LIQ CLAY	1	0.60	NA	4.59	non-LIQ	non-LIQ	0.740	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.48	-34.5	115.0	115.0	42.9	1.7	3.9	46.1	12.2	9.5	5.0	1.2	16.0	3.08	1.76	3.08	1.76	2.80	non-LIQ CLAY	1	0.60	NA	4.80	non-LIQ	non-LIQ	0.739	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.64	-34.6	115.0	115.0	38.1	1.5	3.8	48.7	11.1	8.6	5.0	1.2	15.0	3.08	1.76	3.08	1.76	2.85	non-LIQ CLAY	1	0.60	NA	5.19	non-LIQ	non-LIQ	0.737	0.600	0.560	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.81	-34.8	115.0	115.0	36.9	1.2	3.3	47.0	10.6	8.2	5.0	1.2	15.0	3.09	1.77	3.09	1.77	2.82	non-LIQ CLAY	1	0.60	NA	4.93	non-LIQ	non-LIQ	0.736	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
53.97	-35.0	115.0	115.0	35.3	1.2	3.4	48.7	10.3	8.0	5.0	1.2	15.0	3.10	1.77	3.10	1.77	2.85	non-LIQ CLAY	1	0.60	NA	5.19	non-LIQ	non-LIQ	0.735	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.13	-35.1	115.0	115.0	34.3	1.2	3.4	49.2	10.1	7.8	5.0	1.2	14.0	3.11	1.78	3.11	1.78	2.85	non-LIQ CLAY	1	0.60	NA	5.27	non-LIQ	non-LIQ	0.733	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.30	-35.3	115.0	115.0	32.1	1.1	3.6	51.9	9.6	7.4	5.0	1.2	14.0	3.12	1.78	3.12	1.78	2.90	non-LIQ CLAY	1	0.59	NA	5.68	non-LIQ	non-LIQ	0.732	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.46	-35.5	115.0	115.0	31.3	1.0	3.3	51.5	9.4	7.2	5.0	1.2	14.0	3.13	1.78	3.13	1.78	2.89	non-LIQ CLAY	1	0.59	NA	5.62	non-LIQ	non-LIQ	0.731	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.63	-35.6	115.0	115.0	30.7	1.0	3.3	51.8	9.2	7.1	5.0	1.2	14.0	3.14	1.79	3.14	1.79	2.90	non-LIQ CLAY	1	0.59	NA	5.67	non-LIQ	non-LIQ	0.729	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.79	-35.8	115.0	115.0	30.9	1.0	3.1	50.7	9.2	7.1	5.0	1.2	13.0	3.15	1.79	3.15	1.79	2.88	non-LIQ CLAY	1	0.59	NA	5.50	non-LIQ	non-LIQ	0.728	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
54.95	-36.0	115.0	115.0	31.1	0.8	2.4	46.8	8.9	6.8	5.0	1.2	13.0	3.16	1.80	3.16	1.80	2.81	non-LIQ CLAY	1	0.59	NA	4.90	non-LIQ	non-LIQ	0.727	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.12	-36.1	115.0	115.0	31.0	0.9	2.8	49.3	9.1	7.0	5.0	1.2	13.0	3.17	1.80	3.17	1.80	2.86	non-LIQ CLAY	1	0.59	NA	5.28	non-LIQ	non-LIQ	0.725	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.28	-36.3	115.0	115.0	28.1	1.0	3.4	55.0	8.7	6.7	5.0	1.2	13.0	3.18	1.81	3.18	1.81	2.95	non-LIQ CLAY	1	0.59	NA	6.17	non-LIQ	non-LIQ	0.724	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.45	-36.5	115.0	115.0	32.7	1.1	3.3	50.4	9.7	7.4	5.0	1.2	14.0	3.19	1.81	3.19	1.81	2.87	non-LIQ CLAY	1	0.58	NA	5.45	non-LIQ	non-LIQ	0.723	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.61	-36.6	115.0	115.0	35.0	1.2	3.3	48.9	10.2	7.8	5.0	1.2	14.0	3.20	1.82	3.20	1.82	2.85	non-LIQ CLAY	1	0.58	NA	5.22	non-LIQ	non-LIQ	0.721	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.77	-36.8	115.0	115.0	36.6	1.3	3.5	48.8	10.7	8.1	5.0	1.2	15.0	3.21	1.82	3.21	1.82	2.85	non-LIQ CLAY	1	0.58	NA	5.21	non-LIQ	non-LIQ	0.720	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
55.94	-36.9	115.0	115.0	37.9	1.4	3.7	49.0	11.1	8.4	5.0	1.2	15.0	3.22	1.82	3.22	1.82	2.85	non-LIQ CLAY	1	0.58	NA	5.23	non-LIQ	non-LIQ	0.719	0.590	0.550	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.10	-37.1	115.0	115.0	38.4	1.5	4.0	50.0	11.3	8.6	5.0	1.2	15.0	3.23	1.83	3.23	1.83	2.87	non-LIQ CLAY	1	0.58	NA	5.39	non-LIQ	non-LIQ	0.717	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.27	-37.3	115.0	115.0	39.0	1.6	4.0	49.8	11.5	8.7	5.0	1.2	15.0	3.24	1.83	3.24	1.83	2.86	non-LIQ CLAY	1	0.58	NA	5.35	non-LIQ	non-LIQ	0.716	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.43	-37.4	115.0	115.0	40.0	1.8	4.4	51.1	11.9	9.1	5.0	1.2	16.0	3.24	1.84	3.24	1.84	2.88	non-LIQ CLAY	1	0.58	NA	5.55	non-LIQ	non-LIQ	0.715	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.59	-37.6	115.0	115.0	40.4	1.8	4.5	51.1	12.1	9.1	5.0	1.2	16.0	3.25	1.84	3.25	1.84	2.88	non-LIQ CLAY	1	0.57	NA	5.55	non-LIQ	non-LIQ	0.713	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.76	-37.8	115.0	115.0	40.6	1.8	4.3	50.4	12.0	9.1	5.0	1.2	16.0	3.26	1.85	3.26	1.85	2.87	non-LIQ CLAY	1	0.57	NA	5.45	non-LIQ	non-LIQ	0.712	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
56.92	-37.9	115.0	115.0	39.5	1.6	4.0	49.9	11.6	8.8	5.0	1.2	16.0	3.27	1.85	3.27	1.85	2.87	non-LIQ CLAY	1	0.57	NA	5.37	non-LIQ	non-LIQ	0.711	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.09	-38.1	115.0	115.0	39.1	1.5	3.9	49.8	11.5	8.7	5.0	1.2	15.0	3.28	1.85	3.28	1.85	2.86	non-LIQ CLAY	1	0.57	NA	5.36	non-LIQ	non-LIQ	0.709	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.25	-38.3	115.0	115.0	40.2	1.6	3.9	49.2	11.8	8.9	5.0	1.2	16.0	3.29	1.86	3.29	1.86	2.85	non-LIQ CLAY	1	0.57	NA	5.26	non-LIQ	non-LIQ	0.708	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.41	-38.4	115.0	115.0	39.9	1.6	3.9	49.5	11.7	8.8	5.0	1.2	16.0	3.30	1.86	3.30	1.86	2.86	non-LIQ CLAY	1	0.57	NA	5.30	non-LIQ	non-LIQ	0.707	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.58	-38.6	115.0	115.0	38.7	1.5	3.8	49.6	11.4	8.6	5.0	1.2	15.0	3.31	1.87	3.31	1.87	2.86	non-LIQ CLAY	1	0.57	NA	5.32	non-LIQ	non-LIQ	0.705	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.74	-38.7	115.0	115.0	37.6	1.4	3.7	49.8	11.1	8.3	5.0	1.2	15.0	3.32	1.87	3.32	1.87	2.86	non-LIQ CLAY	1	0.57	NA	5.35	non-LIQ	non-LIQ	0.704	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
57.91	-38.9	115.0	115.0	37.0	1.3	3.5	49.7	10.9	8.2	5.0	1.2	15.0	3.33	1.88	3.33	1.88	2.86	non-LIQ CLAY	1	0.56	NA	5.33	non-LIQ	non-LIQ	0.703	0.580	0.540	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.07	-39.1	115.0	115.0	37.1	1.2	3.4	48.8	10.8	8.1	5.0	1.2	15.0	3.34	1.88	3.34	1.88	2.85	non-LIQ CLAY	1	0.56	NA	5.20	non-LIQ	non-LIQ	0.701	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.23	-39.2	115.0	115.0	39.1	1.2	3.0	45.8	11.1	8.3	5.0	1.2	15.0	3.35	1.88	3.35	1.88	2.80	non-LIQ CLAY	1	0.56	NA	4.75	non-LIQ	non-LIQ	0.700	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.40	-39.4	115.0	115.0	41.7	1.2	2.9	43.7	11.6	8.7	5.0	1.2	15.0	3.36	1.89	3.36	1.89	2.76	non-LIQ CLAY	1	0.56	NA	4.45	non-LIQ	non-LIQ	0.699	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.56	-39.6	115.0	115.0	43.8	1.3	3.0	43.3	12.1	9.1	5.0	1.2	16.0	3.37	1.89	3.37	1.89	2.75	non-LIQ CLAY	1	0.56	NA	4.39	non-LIQ	non-LIQ	0.697	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.73	-39.7	115.0	115.0	44.4	1.5	3.4	45.1	12.5	9.3	5.0	1.2	16.0	3.38	1.90	3.38	1.90	2.78	non-LIQ CLAY	1	0.56	NA	4.66	non-LIQ	non-LIQ	0.696	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
58.89	-39.9	115.0	115.0	43.5	1.5	3.4	45.5	12.3	9.2	5.0	1.2	16.0	3.39	1.90	3.39	1.90	2.79	non-LIQ CLAY	1	0.56	NA	4.71	non-LIQ	non-LIQ	0.695	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.06	-40.1	115.0	115.0	41.3	1.5	3.7	48.0	11.9	8.9	5.0	1.2	16.0	3.40	1.91	3.40	1.91	2.83	non-LIQ CLAY	1	0.56	NA	5.08	non-LIQ	non-LIQ	0.693	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.22	-40.2	115.0	115.0	39.9	1.4	3.6	48.4	11.6	8.6	5.0	1.2	15.0	3.41	1.91	3.41	1.91	2.84	non-LIQ CLAY	1	0.55	NA	5.14	non-LIQ	non-LIQ	0.692	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.38	-40.4	115.0	115.0	37.0	1.4	3.7	50.8	11.0	8.2	5.0	1.2	15.0	3.41	1.91	3.41	1.91	2.88	non-LIQ CLAY	1	0.55	NA	5.52	non-LIQ	non-LIQ	0.691	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.55	-40.6	115.0	115.0	34.4	1.4	3.9	53.9	10.5	7.8	5.0	1.2	14.0	3.42	1.92	3.42	1.92	2.93	non-LIQ CLAY	1	0.55	NA	6.00	non-LIQ	non-LIQ	0.689	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.71	-40.7	115.0	115.0	35.9	1.4	4.0	53.2	10.9	8.1	5.0	1.2	15.0	3.43	1.92	3.43	1.92	2.92	non-LIQ CLAY	1	0.55	NA	5.89	non-LIQ	non-LIQ	0.688	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
59.88	-40.9	115.0	115.0	38.1	1.5	3.9	51.1	11.4	8.4	5.0	1.2	15.0	3.44	1.93	3.44	1.93	2.89	non-LIQ CLAY	1	0.55	NA	5.56	non-LIQ	non-LIQ	0.687	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.04	-41.0	115.0	115.0	39.8	1.3	3.3	47.7	11.5	8.5	5.0	1.2	15.0	3.45	1.93	3.45	1.93	2.83	non-LIQ CLAY	1	0.55	NA	5.03	non-LIQ	non-LIQ	0.685	0.570	0.530	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.20	-41.2	115.0	115.0	37.4	1.2	3.2	48.3	10.9	8.0	5.0	1.2	15.0	3.46	1.94	3.46	1.94	2.84	non-LIQ CLAY	1	0.55	NA	5.13	non-LIQ	non-LIQ	0.684	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.37	-41.4	115.0	115.0	33.4	1.1	3.3	52.0	10.0	7.4	5.0	1.2	14.0	3.47	1.94	3.47	1.94	2.90	non-LIQ CLAY	1	0.55	NA	5.70	non-LIQ	non-LIQ	0.683	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.53	-41.5	115.0	115.0	27.5	1.1	3.9	60.2	8.9	6.6	5.0	1.2	13.0	3.48	1.94	3.48	1.94	3.02	non-LIQ CLAY	1	0.54	NA	7.02	non-LIQ	non-LIQ	0.681	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.70	-41.7	115.0	115.0	25.3	1.0	4.0	63.5	8.5	6.2	5.0	1.2	12.0	3.49	1.95	3.49	1.95	3.07	non-LIQ CLAY	1	0.54	NA	7.59	non-LIQ	non-LIQ	0.680	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
60.86	-41.9	115.0	115.0	28.4	1.0	3.5	57.6	9.0	6.6	5.0	1.2	13.0	3.50	1.95	3.50	1.95	2.99	non-LIQ CLAY	1	0.54	NA	6.60	non-LIQ	non-LIQ	0.679	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.02	-42.0	115.0	115.0	36.8	1.1	2.9	47.7	10.6	7.8	5.0	1.2	14.0	3.51	1.96	3.51	1.96	2.83	non-LIQ CLAY	1	0.54	NA	5.04	non-LIQ	non-LIQ	0.677	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.19	-42.2	115.0	115.0	37.0	1.1	2.9	47.7	10.7	7.8	5.0	1.2	14.0	3.52	1.96	3.52	1.96	2.83	non-LIQ CLAY	1	0.54	NA	5.04	non-LIQ	non-LIQ	0.676	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.35	-42.4	115.0	115.0	36.9	1.1	3.1	48.5	10.7	7.9	5.0	1.2	14.0	3.53	1.97	3.53	1.97	2.84	non-LIQ CLAY	1	0.54	NA	5.15	non-LIQ	non-LIQ	0.675	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.52	-42.5	115.0	115.0	36.1	1.1	3.2	49.5	10.6	7.8	5.0	1.2	14.0	3.54	1.97	3.54	1.97	2.86	non-LIQ CLAY	1	0.54	NA	5.32	non-LIQ	non-LIQ	0.673	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.68	-42.7	115.0	115.0	35.4	1.1	3.1	49.7	10.4	7.6	5.0	1.2	14.0	3.55	1.97	3.55	1.97	2.86	non-LIQ CLAY	1	0.54	NA	5.34	non-LIQ	non-LIQ	0.672	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
61.84	-42.8	115.0	115.0	36.7	1.1	2.9	48.0	10.6	7.8	5.0	1.2	14.0	3.56	1.98	3.56	1.98	2.83	non-LIQ CLAY	1	0.53	NA	5.09	non-LIQ	non-LIQ	0.671	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.01	-43.0	115.0	115.0	38.6	1.2	3.2	48.2	11.2	8.2	5.0	1.2	15.0	3.57	1.98	3.57	1.98	2.84	non-LIQ CLAY	1	0.53	NA	5.12	non-LIQ	non-LIQ	0.669	0.560	0.520	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.17	-43.2	115.0	115.0	43.5	1.8	4.2	50.3	12.9	9.4	5.0	1.2	16.0	3.57	1.99	3.57	1.99	2.87	non-LIQ CLAY	1	0.53	NA	5.43	non-LIQ	non-LIQ	0.668	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.34	-43.3	115.0	115.0	48.4	2.2	4.5	49.0	14.2	10.3	5.0	1.2	17.0	3.58	1.99	3.58	1.99	2.85	non-LIQ CLAY	1	0.53	NA	5.24	non-LIQ	non-LIQ	0.667	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.50	-43.5	115.0	115.0	47.7	1.7	3.5	44.9	13.4	9.8	5.0	1.2	17.0	3.59	2.00	3.59	2.00	2.78	non-LIQ CLAY	1	0.53	NA	4.62	non-LIQ	non-LIQ	0.665	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.66	-43.7	115.0	115.0	49.7	2.7	5.3	51.5	14.9	10.8	5.0	1.2	18.0	3.60	2.00	3.60	2.00	2.89	non-LIQ CLAY	1	0.53	NA	5.61	non-LIQ	non-LIQ	0.664	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.83	-43.8	115.0	115.0	41.7	3.5	8.3	64.8	14.1	10.3	5.0	1.2	17.0	3.61	2.00	3.61	2.00	3.09	non-LIQ CLAY	1	0.53	NA	7.82	non-LIQ	non-LIQ	0.663	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
62.99	-44.0	115.0	115.0	76.1	4.8	6.3	45.7	21.6	15.6	5.0	1.2	24.0	3.62	2.01	3.62	2.01	2.80	non-LIQ CLAY	1	0.53	NA	4.75	non-LIQ	non-LIQ	0.661	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.16	-44.2	115.0	115.0	85.5	5.4	6.3	43.8	23.8	17.2	5.0	1.2	26.0	3.63	2.01	3.63	2.01	2.76	non-LIQ CLAY	1	0.53	NA	4.46	non-LIQ	non-LIQ	0.660	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.32	-44.3	115.0	115.0	80.1	5.9	7.3	47.8	23.2	16.8	5.0	1.2	25.0	3.64	2.02	3.64	2.02	2.83	non-LIQ CLAY	1	0.52	NA	5.05	non-LIQ	non-LIQ	0.659	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.48	-44.5	115.0	115.0	63.9	4.8	7.5	52.8	19.4	14.0	5.0	1.2	22.0	3.65	2.02	3.65	2.02	2.91	non-LIQ CLAY	1	0.52	NA	5.83	non-LIQ	non-LIQ	0.657	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.65	-44.7	115.0	115.0	43.1	3.0	7.1	60.7	14.1	10.2	5.0	1.2	17.0	3.66	2.03	3.66	2.03	3.03	non-LIQ CLAY	1	0.52	NA	7.12	non-LIQ	non-LIQ	0.656	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.81	-44.8	115.0	115.0	34.6	1.8	5.1	59.9	11.2	8.1	5.0	1.2	15.0	3.67	2.03	3.67	2.03	3.02	non-LIQ CLAY	1	0.52	NA	6.97	non-LIQ	non-LIQ	0.655	0.550	0.510	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
63.98	-45.0	115.0	115.0	34.2	1.8	5.2	60.9	11.2	8.1	5.0	1.2	15.0	3.68	2.04	3.68	2.04	3.04	non-LIQ CLAY	1	0.52	NA	7.15	non-LIQ	non-LIQ	0.653	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.14	-45.1	115.0	115.0	29.3	1.6	5.3	65.9	10.0	7.2	5.0	1.2	14.0	3.69	2.04	3.69	2.04	3.11	non-LIQ CLAY	1	0.52	NA	8.00	non-LIQ	non-LIQ	0.652	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.30	-45.3	115.0	115.0	31.2	1.4	4.4	60.1	10.1	7.3	5.0	1.2	14.0	3.70	2.04	3.70	2.04	3.02	non-LIQ CLAY	1	0.52	NA	7.02	non-LIQ	non-LIQ	0.651	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.47	-45.5	115.0	115.0	31.6	1.3	4.0	58.2	10.1	7.2	5.0	1.2	14.0	3.71	2.05	3.71	2.05	3.00	non-LIQ CLAY	1	0.52	NA	6.69	non-LIQ	non-LIQ	0.649	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.63	-45.6	115.0	115.0	33.2	1.3	4.1	57.1	10.5	7.5	5.0	1.2	14.0	3.72	2.05	3.72	2.05	2.98	non-LIQ CLAY	1	0.52	NA	6.52	non-LIQ	non-LIQ	0.648	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.80	-45.8	115.0	115.0	36.5	1.5	4.0	54.4	11.2	8.1	5.0	1.2	15.0	3.73	2.06	3.73	2.06	2.94	non-LIQ CLAY	1	0.51	NA	6.08	non-LIQ	non-LIQ	0.647	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
64.96	-46.0	115.0	115.0	40.0	1.6	4.1	52.4	12.1	8.6	5.0	1.2	15.0	3.74	2.06	3.74	2.06	2.91	non-LIQ CLAY	1	0.51	NA	5.76	non-LIQ	non-LIQ	0.645	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.19	-46.2	115.0	115.0	45.6	1.9	4.2	50.1	13.5	9.6	5.0	1.2	17.0	3.75	2.07	3.75	2.07	2.87	non-LIQ CLAY	1	0.51	NA	5.41	non-LIQ	non-LIQ	0.643	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.29	-46.3	115.0	115.0	54.5	2.1	3.9	44.6	15.3	10.9	5.0	1.2	18.0	3.75	2.07	3.75	2.07	2.78	non-LIQ CLAY	1	0.51	NA	4.58	non-LIQ	non-LIQ	0.643	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.45	-46.5	115.0	115.0	52.5	2.1	4.0	46.2	14.9	10.7	5.0	1.2	18.0	3.76	2.07	3.76	2.07	2.80	non-LIQ CLAY	1	0.51	NA	4.81	non-LIQ	non-LIQ	0.641	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.62	-46.6	115.0	115.0	52.3	2.0	3.9	45.7	14.8	10.6	5.0	1.2	18.0	3.77	2.08	3.77	2.08	2.79	non-LIQ CLAY	1	0.51	NA	4.74	non-LIQ	non-LIQ	0.640	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.78	-46.8	115.0	115.0	50.7	2.0	4.0	46.8	14.5	10.3	5.0	1.2	17.0	3.78	2.08	3.78	2.08	2.81	non-LIQ CLAY	1	0.51	NA	4.90	non-LIQ	non-LIQ	0.639	0.540	0.500	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
65.94	-46.9	115.0	115.0	49.8	2.0	4.0	47.4	14.3	10.2	5.0	1.2	17.0	3.79	2.09	3.79	2.09	2.82	non-LIQ CLAY	1	0.51	NA	5.00	non-LIQ	non-LIQ	0.637	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.11	-47.1	115.0	115.0	48.8	1.9	4.0	47.8	14.1	10.0	5.0	1.2	17.0	3.80	2.09	3.80	2.09	2.83	non-LIQ CLAY	1	0.51	NA	5.05	non-LIQ	non-LIQ	0.636	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.27	-47.3	115.0	115.0	48.8	1.9	3.9	47.6	14.1	10.0	5.0	1.2	17.0	3.81	2.10	3.81	2.10	2.83	non-LIQ CLAY	1	0.50	NA	5.02	non-LIQ	non-LIQ	0.635	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.44	-47.4	115.0	115.0	50.6	1.9	3.8	46.4	14.4	10.2	5.0	1.2	17.0	3.82	2.10	3.82	2.10	2.81	non-LIQ CLAY	1	0.50	NA	4.84	non-LIQ	non-LIQ	0.633	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.60	-47.6	115.0	115.0	52.3	1.9	3.6	44.9	14.7	10.4	5.0	1.2	18.0	3.83	2.10	3.83	2.10	2.78	non-LIQ CLAY	1	0.50	NA	4.62	non-LIQ	non-LIQ	0.632	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
66.77	-47.8	115.0	115.0	49.6	1.7	3.5	45.6	14.0	9.9	5.0	1.2	17.0	3.84	2.11	3.84	2.11	2.79	non-LIQ CLAY	1	0.50	NA	4.72	non-LIQ	non-LIQ	0.631	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

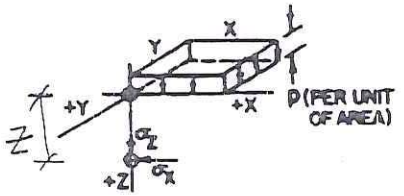
Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_{td}	$CSR_{7.5}$	FS	a	b	Max Shear Modulus	Cyclic Shear Strain	Norm. Vol. Strain	Dry Settle.	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain	Layer Post-Liq. Settle.
		γ'_{MOIST}	γ'_{SAT}										σ_v	σ_v'	σ_v	σ_v'			n	C_Q	q_{c1Ncs}	Kc	$(q_{c1n})_{cs}$							G_{max}	γ	ε_{vc}	ΔS		ε	ΔS
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
66.93	-47.9	115.0	115.0	47.2	1.6	3.4	46.1	13.4	9.5	5.0	1.2	16.0	3.85	2.11	3.85	2.11	2.80	non-LIQ CLAY	1	0.50	NA	4.80	non-LIQ	non-LIQ	0.629	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.09	-48.1	115.0	115.0	46.9	1.6	3.5	46.7	13.4	9.5	5.0	1.2	16.0	3.86	2.12	3.86	2.12	2.81	non-LIQ CLAY	1	0.50	NA	4.88	non-LIQ	non-LIQ	0.628	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.26	-48.3	115.0	115.0	42.8	1.6	3.8	50.2	12.7	8.9	5.0	1.2	16.0	3.87	2.12	3.87	2.12	2.87	non-LIQ CLAY	1	0.50	NA	5.41	non-LIQ	non-LIQ	0.627	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.42	-48.4	115.0	115.0	42.7	1.4	3.3	48.0	12.4	8.7	5.0	1.2	15.0	3.88	2.13	3.88	2.13	2.83	non-LIQ CLAY	1	0.50	NA	5.09	non-LIQ	non-LIQ	0.625	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.59	-48.6	115.0	115.0	40.9	1.4	3.4	49.6	12.0	8.5	5.0	1.2	15.0	3.89	2.13	3.89	2.13	2.86	non-LIQ CLAY	1	0.50	NA	5.32	non-LIQ	non-LIQ	0.624	0.530	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.75	-48.8	115.0	115.0	41.6	1.4	3.3	49.0	12.2	8.6	5.0	1.2	15.0	3.90	2.13	3.90	2.13	2.85	non-LIQ CLAY	1	0.50	NA	5.23	non-LIQ	non-LIQ	0.623	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
67.91	-48.9	115.0	115.0	43.0	1.5	3.6	49.3	12.6	8.9	5.0	1.2	16.0	3.90	2.14	3.90	2.14	2.86	non-LIQ CLAY	1	0.49	NA	5.28	non-LIQ	non-LIQ	0.621	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.08	-49.1	115.0	115.0	42.5	1.6	3.7	50.2	12.6	8.8	5.0	1.2	16.0	3.91	2.14	3.91	2.14	2.87	non-LIQ CLAY	1	0.49	NA	5.42	non-LIQ	non-LIQ	0.620	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.24	-49.2	115.0	115.0	42.4	1.5	3.6	50.2	12.5	8.8	5.0	1.2	16.0	3.92	2.15	3.92	2.15	2.87	non-LIQ CLAY	1	0.49	NA	5.41	non-LIQ	non-LIQ	0.619	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.41	-49.4	115.0	115.0	45.5	1.5	3.4	47.4	13.1	9.2	5.0	1.2	16.0	3.93	2.15	3.93	2.15	2.82	non-LIQ CLAY	1	0.49	NA	4.99	non-LIQ	non-LIQ	0.617	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.57	-49.6	115.0	115.0	45.4	1.5	3.4	47.5	13.1	9.2	5.0	1.2	16.0	3.94	2.16	3.94	2.16	2.83	non-LIQ CLAY	1	0.49	NA	5.02	non-LIQ	non-LIQ	0.616	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.73	-49.7	115.0	115.0	42.2	1.4	3.4	49.2	12.4	8.7	5.0	1.2	15.0	3.95	2.16	3.95	2.16	2.85	non-LIQ CLAY	1	0.49	NA	5.27	non-LIQ	non-LIQ	0.615	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
68.90	-49.9	115.0	115.0	40.9	1.4	3.4	49.9	12.1	8.4	5.0	1.2	15.0	3.96	2.16	3.96	2.16	2.87	non-LIQ CLAY	1	0.49	NA	5.37	non-LIQ	non-LIQ	0.613	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.06	-50.1	115.0	115.0	40.0	1.4	3.5	51.2	11.9	8.3	5.0	1.2	15.0	3.97	2.17	3.97	2.17	2.89	non-LIQ CLAY	1	0.49	NA	5.58	non-LIQ	non-LIQ	0.612	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.23	-50.2	115.0	115.0	36.6	1.4	3.7	54.5	11.3	7.9	5.0	1.2	14.0	3.98	2.17	3.98	2.17	2.94	non-LIQ CLAY	1	0.49	NA	6.10	non-LIQ	non-LIQ	0.611	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.39	-50.4	115.0	115.0	32.8	1.2	3.8	58.0	10.4	7.3	5.0	1.2	14.0	3.99	2.18	3.99	2.18	2.99	non-LIQ CLAY	1	0.49	NA	6.66	non-LIQ	non-LIQ	0.609	0.520	0.490	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.55	-50.6	115.0	115.0	31.1	1.2	4.0	60.6	10.1	7.1	5.0	1.2	13.0	4.00	2.18	4.00	2.18	3.03	non-LIQ CLAY	1	0.48	NA	7.10	non-LIQ	non-LIQ	0.608	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.72	-50.7	115.0	115.0	30.4	1.2	3.9	60.8	9.9	6.9	5.0	1.2	13.0	4.01	2.19	4.01	2.19	3.03	non-LIQ CLAY	1	0.48	NA	7.12	non-LIQ	non-LIQ	0.607	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
69.88	-50.9	115.0	115.0	30.8	1.2	3.9	60.4	10.0	7.0	5.0	1.2	13.0	4.02	2.19	4.02	2.19	3.03	non-LIQ CLAY	1	0.48	NA	7.07	non-LIQ	non-LIQ	0.605	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00
70.05	-51.1	115.0	115.0	30.3	1.1	3.8	60.4	9.9	6.9	5.0	1.2	13.0	4.03	2.19	4.03	2.19	3.03	non-LIQ CLAY	1	0.48	NA	7.06	non-LIQ	non-LIQ	0.604	0.510	0.480	non-LIQ	NA	NA	NA	NA	NA	0.00	NA	NA	0.00

A SCHEMATIC DIAGRAM SHOWING STRESS INCREASES

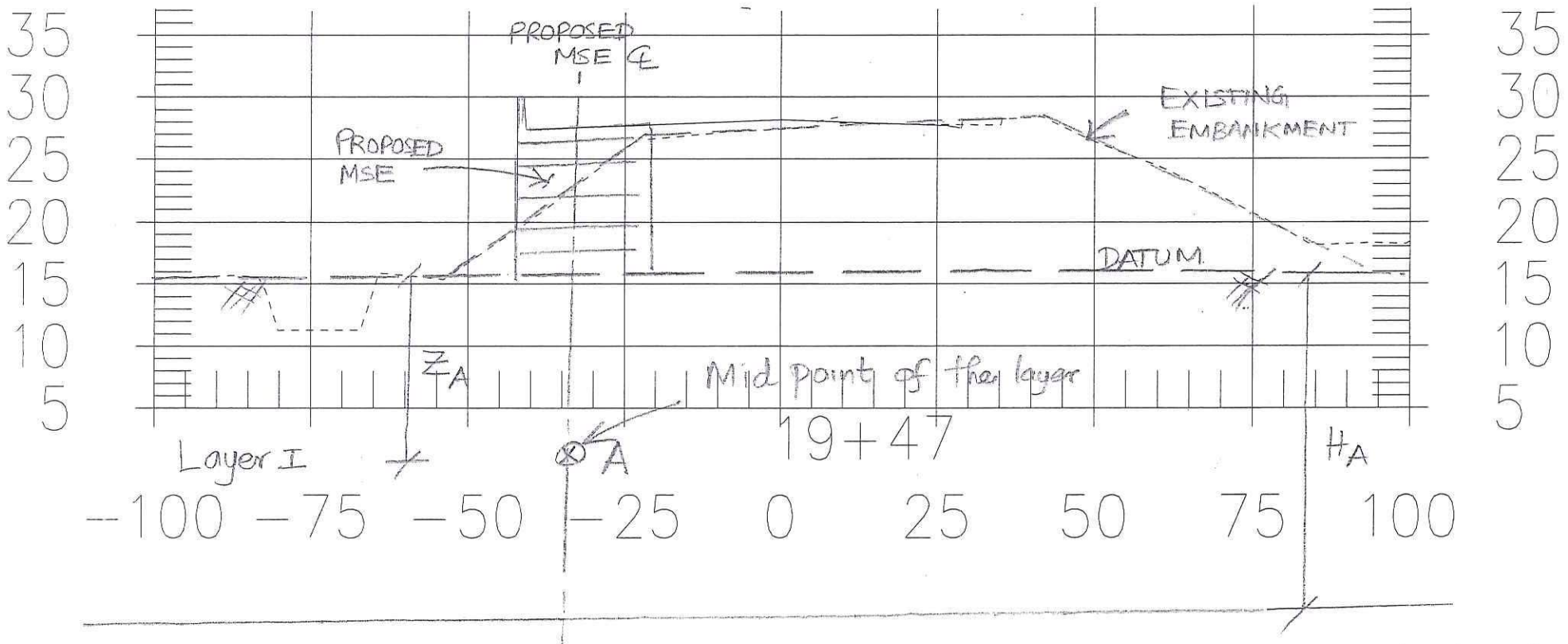
UNIFORMLY LOADED RECTANGULAR AREA

(From NAVFAC DM 7.01)



VERTICAL (BENEATH CORNER OF RECTANGLE)

$$\sigma_z = \frac{p}{4\pi}\left[\frac{2XYZ(X^2+Y^2+Z^2)^{1/2}}{Z^2(X^2+Y^2+Z^2)+X^2Y^2}\cdot\frac{X^2+Y^2+2Z^2}{X^2+Y^2+Z^2} + \tan^{-1}\frac{2XYZ(X^2+Y^2+Z^2)^{1/2}}{Z^2(X^2+Y^2+Z^2)-X^2Y^2}\right]$$



@ Point 'A',

Vertical overburden Stress $\sigma_o' = Z_A \times \gamma$

$\Delta\sigma_1$ = Stress increase due to existing embankment

$\Delta\sigma_2$ = Stress increase due to proposed MSE

$\Delta\sigma_1 - \Delta\sigma_2$ = Net stress increase

Embankment Fill along 29th Avenue NB Off-Ramp

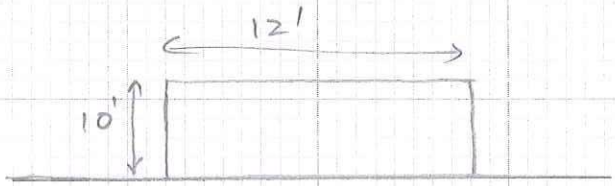
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project I-880 Operational & Safety Improvements **Project No.** 10-133

By SP **Date** 6/21/12 **Checked By** _____ **Date** _____ **Sheet** ____ **of** ____

Embankfill at station 225+00 near RW 224



+22.5'

CL $C_{r\varepsilon} = 0.02$

+18

CL $C_{r\varepsilon} = 0.02$

+15'

+14

CL $C_{r\varepsilon} = 0.015$

0'

settlement

Total settlement = 1.5"

with 2' of overexcavation
total settlement = 1.2"

I-880 Operational & Safety Improvement Project
Embankment Fill at Station 225+00
Consolidation Settlement

Calculated By: SP Date: 6/21/2012

Checked By: LCC Date: 6/21/2012

Ground Surface El. = 22.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	22.5	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-15	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	2.5	4.5	0.300	**1.170**	0.300	1.470	0.75
CL 2	16	6.5	4	0.780	**0.950**	0.780	1.730	0.33
CL 3	7	15.5	14	1.361	**0.539**	1.361	1.900	0.37
CL 4	-1.5	24	3	1.850	**0.367**	1.850	2.217	0.04
							Total Settlement (in):	**1.49**

After 2-feet of overexcavation = $\frac{2}{4.5} \times 0.75 = 0.33$

Remaining settlement = 1.2"

Retaining Wall 224

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

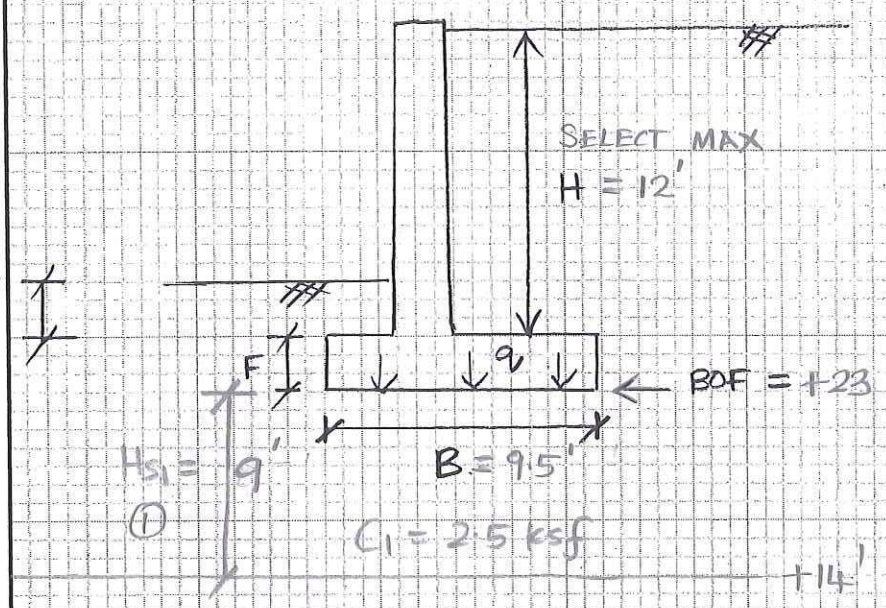
17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 8/14/11 Checked By Lino Date 8/23/11 Sheet 1 of 1

Bearing Capacity Calculations - RW 224

Caltrans Standard Type 1 wall



* H varies from 6' to 12'

* B, F, and toe pressure were obtained from Std. plans. (2010),

B = 9.5'
F = 1.33'

Service q_o' = 2.8 ksf; Strength q_o' = 3.8 ksf; Extreme q_o' = 6.6 ksf } Per Designas

D = 1.5' + F
= 2.83'.

Bearing Capacity Equation (10.6.3.1.2a-1)

$$q_u = c N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \quad (\because \phi = 0)$$

$$N_{cm} = N_c s_c i_c ; \quad N_{qm} = N_q s_q i_q d_q ; \quad N_{\gamma m} = N_\gamma s_\gamma i_\gamma$$

load inclination factors $i_c = i_q = i_\gamma = 1$
shape factors $s_c = s_q = s_\gamma = 1$ ($\phi = 0$ & $L \gg B$)
depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

$\therefore q_u = c N_{cm} + \gamma D$

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering
17800 Newhope Street, Suite B, Fountain Valley, CA 92708
(714) 751-3826, Fax (714) 751-3928

Project RBF/ I-880 Operational & Safety Improvements Project No. 10-133

By Ranjan Date 7/5/11 Checked By Lino Date ____ Sheet 2 of ____

Bearing Capacity Equation (10.6.3.1.2a-1)

$$q_u = c N_{cm} + \gamma D N_{qm} + \frac{1}{2}\gamma B N_{\gamma m} \quad (\because \phi = 0)$$

$N_{cm} = N_c s_c i_c$; $N_{qm} = N_q s_q i_q d_q$; $N_{\gamma m} = N_\gamma s_\gamma i_\gamma \gamma$

load inclination factors $i_c = i_q = i_\gamma = 1$

shape factors $s_c = s_q = s_\gamma = 1$ ($\phi = 0$, $L \gg B$)

depth factor $d_q = 1$

For $\phi = 0 \Rightarrow N_{\gamma m} = 0$ & $N_{qm} = 1$

$q_u = c N_{cm} + \gamma D$

for stronger layer overlies weaker layer,

$N_{cm} = \left(\frac{L}{B_m} + k N_c\right) \leq N_c = 5.14$ ($\because s_c = 1$)

$B_m = \frac{BL}{2(B+L)H_{s1}} = 0.51$ ($\because L \geq 100'$)

$k = c_2/c_1 = 2/2.5 = 0.8$

$N_{cm} = 6.1$

$\Rightarrow$ USE $N_{cm} = 5.14$

$\therefore q_u = (2.5 \times 5.14) + (0.12 \times 2.83)$

$= 13.1$ ksf //

Service Limit

$q_{all} = \frac{q_u}{FoS} = \frac{13.1}{3} = 4.3$ ksf > Bearing stress $q_o' = 2.8$ ksf //

Strength Limit

$q_{all} = 0.45 q_u = 5.8$ ksf > Bearing stress $q_o' = 3.8$ ksf //

Extreme Limit

$q_{all} = 1 \times q_u = 13.1$ ksf > Bearing stress $q_o' = 6.6$ ksf //

I-880 Operational & Safety Improvement Project

RW 224 - Type 1 Wall (H=6')

Consolidation Settlement

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.002**	**1.439**	**1.44**	0.482	1.919	0.72
CL 2	16	8	4	0.960	**0.024**	**1.087**	**1.06**	0.984	2.047	0.31
CL 3	7	17	14	1.666	**0.129**	**0.570**	**0.44**	1.794	2.236	0.24
CL 4	-1.5	25.5	3	2.155	**0.209**	**0.372**	**0.16**	2.365	2.527	0.00
							Total Settlement (in):			1.27

After 2' overex $\Rightarrow \delta = 1''$

1.3"

C-57

I-880 Operational & Safety Improvement Project — Calculated By: Raja — Date: 6/18/2012

RW 224 - Type 1 Wall (H=8') — Checked By: Lino — Date: 6/21/2012

Consolidation Settlement

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.002**	**1.677**	**1.67**	0.482	2.157	0.78
CL 2	16	8	4	0.960	**0.024**	**1.138**	**1.11**	0.984	2.098	0.32
CL 3	7	17	14	1.666	**0.129**	**0.673**	**0.54**	1.794	2.339	0.29
CL 4	-1.5	25.5	3	2.155	**0.209**	**0.490**	**0.28**	2.365	2.646	0.00
							Total Settlement (in):			**1.39**

1.4"

After 2.5' overex $\Rightarrow \delta = 1"$

I-880 Operational & Safety Improvement Project

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 224 - Type 1 Wall (H=10')

Consolidation Settlement

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.022**	**2.667**	**2.65**	0.502	3.147	0.96
CL 2	16	8	4	0.960	**0.163**	**1.998**	**1.84**	1.123	2.958	0.40
CL 3	7	17	14	1.666	**0.269**	**1.068**	**0.80**	1.935	2.734	0.38
CL 4	-1.5	25.5	3	2.155	**0.330**	**0.714**	**0.38**	2.485	2.869	0.00
									Total Settlement (in):	**1.74**

1.8"

After 3.5' overex ⇒ $\delta = 1"$

C-54

I-880 Operational & Safety Improvement Project

Calculated By: Raja Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 224 - Type 1 Wall (H=12')

Consolidation Settlement

Ground Surface El. = 24 ft

Groundwater El. = 13 ft

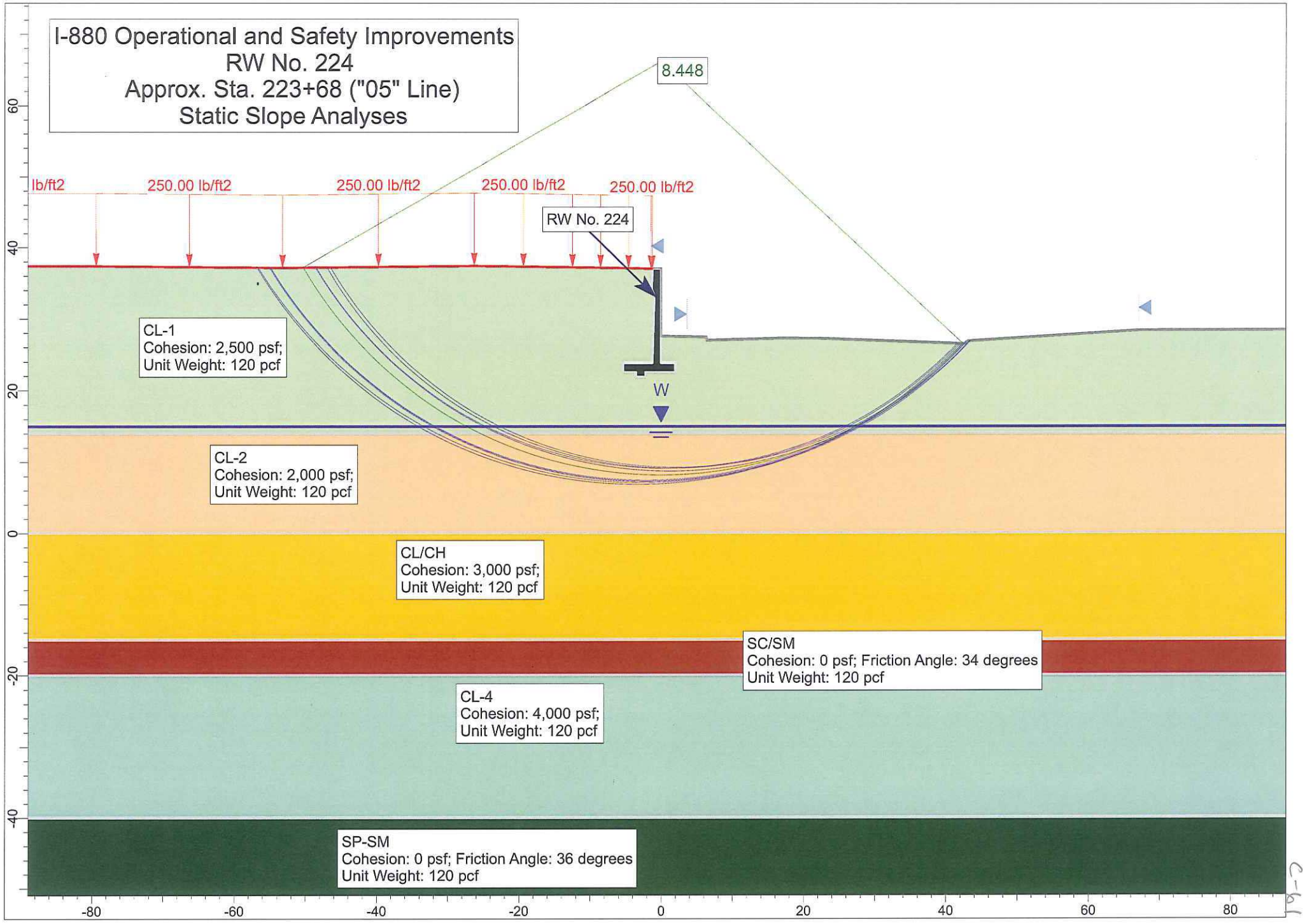
Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	23	18	0.02	0.12	4.00
CL 2	18	14	0.02	0.12	4.00
CL 3	14	0	0.015	0.12	5.00
CL 4	0	-3	0.015	0.12	6.00

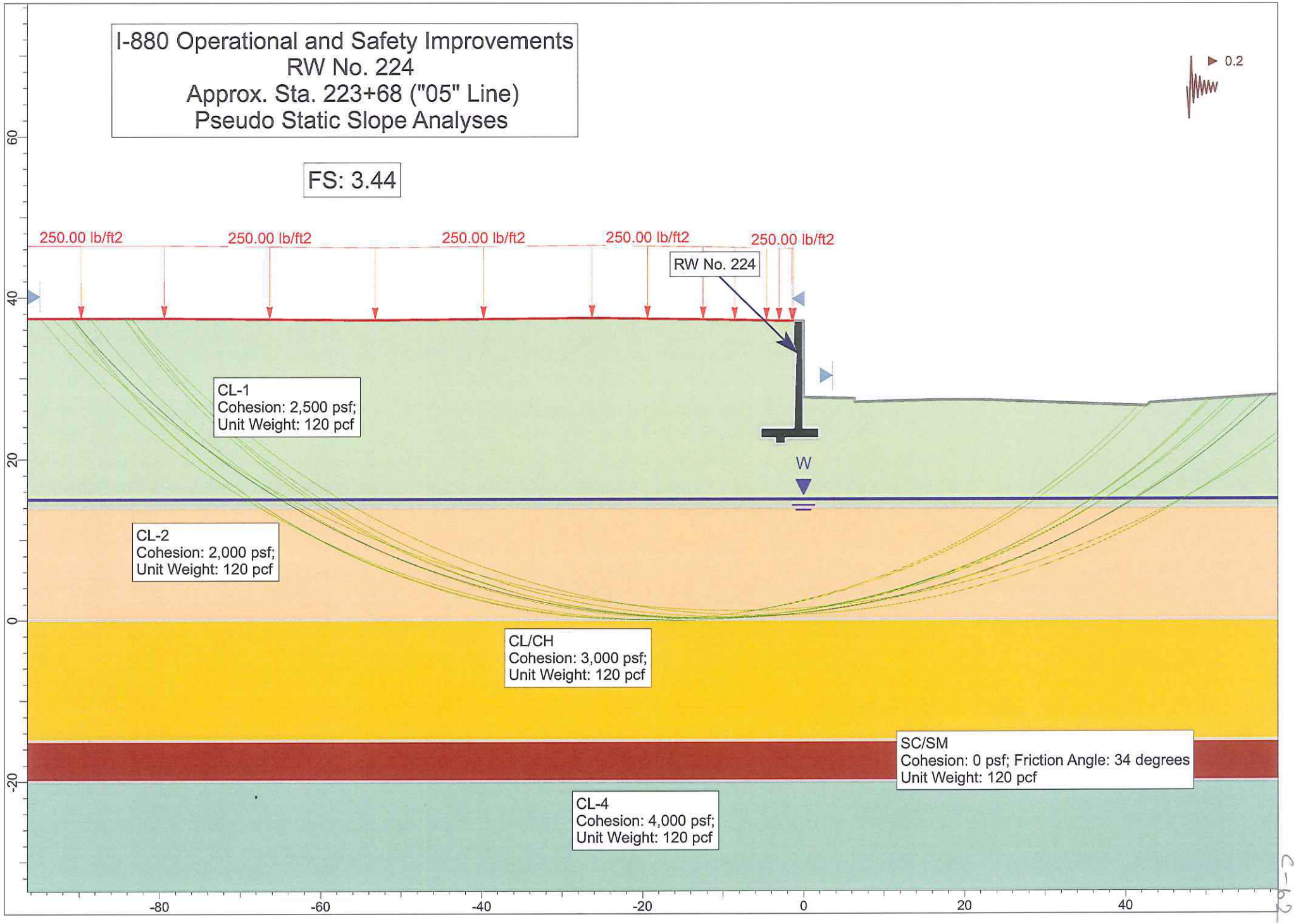
Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	4	5	0.480	**0.022**	**2.667**	**2.65**	0.502	3.147	0.96
CL 2	16	8	4	0.960	**0.163**	**1.998**	**1.84**	1.123	2.958	0.40
CL 3	7	17	14	1.666	**0.269**	**1.068**	**0.80**	1.935	2.734	0.38
CL 4	-1.5	25.5	3	2.155	**0.330**	**0.714**	**0.38**	2.485	2.869	0.00
									Total Settlement (in):	**1.74**

1.8"

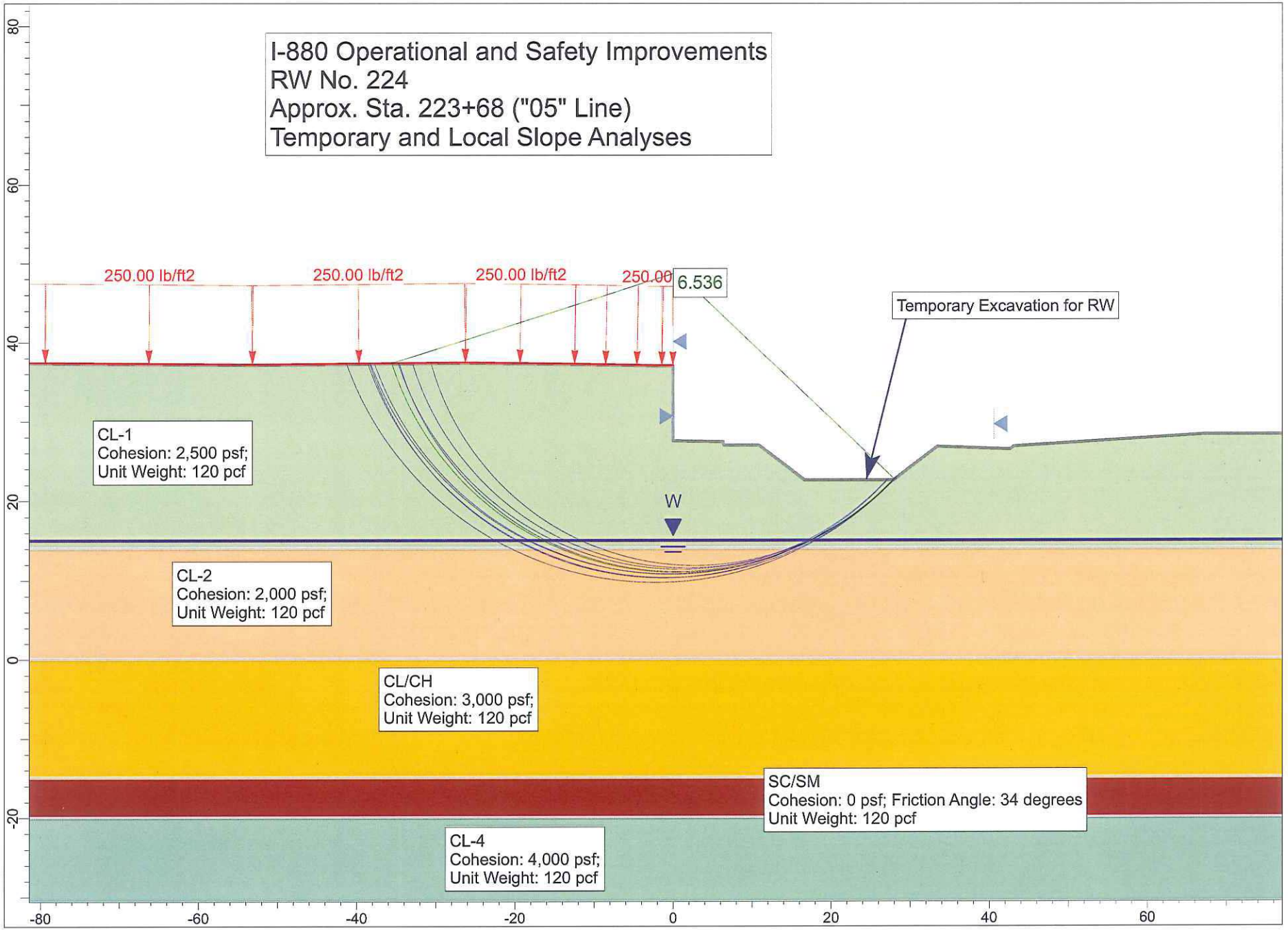
After 3.5' overex $\Rightarrow$ $\delta = 1"$

C-60


I-880 Operational and Safety Improvements
RW No. 224
Approx. Sta. 223+68 ("05" Line)
Static Slope Analyses
8.448
lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 224
W
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
SP-SM
Cohesion: 0 psf; Friction Angle: 36 degrees
Unit Weight: 120 pcf
60
40
20
0
-20
-40
-80
-60
-40
-20
0
20
40
60
80


I-880 Operational and Safety Improvements
RW No. 224
Approx. Sta. 223+68 ("05" Line)
Pseudo Static Slope Analyses
FS: 3.44
0.2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 224
W
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
60
40
20
0
-20
-80
-60
-40
-20
0
20
40

C-62


I-880 Operational and Safety Improvements
RW No. 224
Approx. Sta. 223+68 ("05" Line)
Temporary and Local Slope Analyses
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00
6.536
Temporary Excavation for RW
W
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-80
-60
-40
-20
0
20
40
60

C-63

RETAINING WALL 17

I-880 Operational & Safety Improvement Project

RW 17 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Initail stress (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.420	**0.481**	0.901	**1.851**	2.753	1.09
CL 2	7.5	10	5	1.044	**0.501**	1.545	**1.175**	2.720	0.37
CL 3A	0	17.5	10	1.476	**0.534**	2.010	**0.899**	2.909	0.48
CL 3B	-10	27.5	10	2.052	**0.567**	2.619	**0.622**	3.241	0.28
CL 4	-22.5	40	15	2.772	**0.601**	3.373	**0.346**	3.720	0.19
CL 5	-45	62.5	30	4.068	**0.605**	4.673	**0.218**	4.891	0.18
								Total Settlement (in):	**2.59**

2.6"

After 3' overex $\Rightarrow$ $\delta = 2.2"$

C-159

I-880 Operational & Safety Improvement Project

RW 17 (H = 12.5 and 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Initail stress (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.420	**0.481**	0.901	**2.213**	3.115	1.21
CL 2	7.5	10	5	1.044	**0.501**	1.545	**1.373**	2.919	0.41
CL 3A	0	17.5	10	1.476	**0.534**	2.010	**1.044**	3.054	0.55
CL 3B	-10	27.5	10	2.052	**0.567**	2.619	**0.716**	3.335	0.31
CL 4	-22.5	40	15	2.772	**0.601**	3.373	**0.387**	3.760	0.21
CL 5	-45	62.5	30	4.068	**0.605**	4.673	**0.238**	4.910	0.19
								Total Settlement (in):	**2.89**

2.9"

After 3' overex ⇒ $\delta = 2.5"$

I-880 Operational & Safety Improvement Project

RW 17 (H = 17.5 and 20 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 13 ft

Groundwater El. = 10 ft

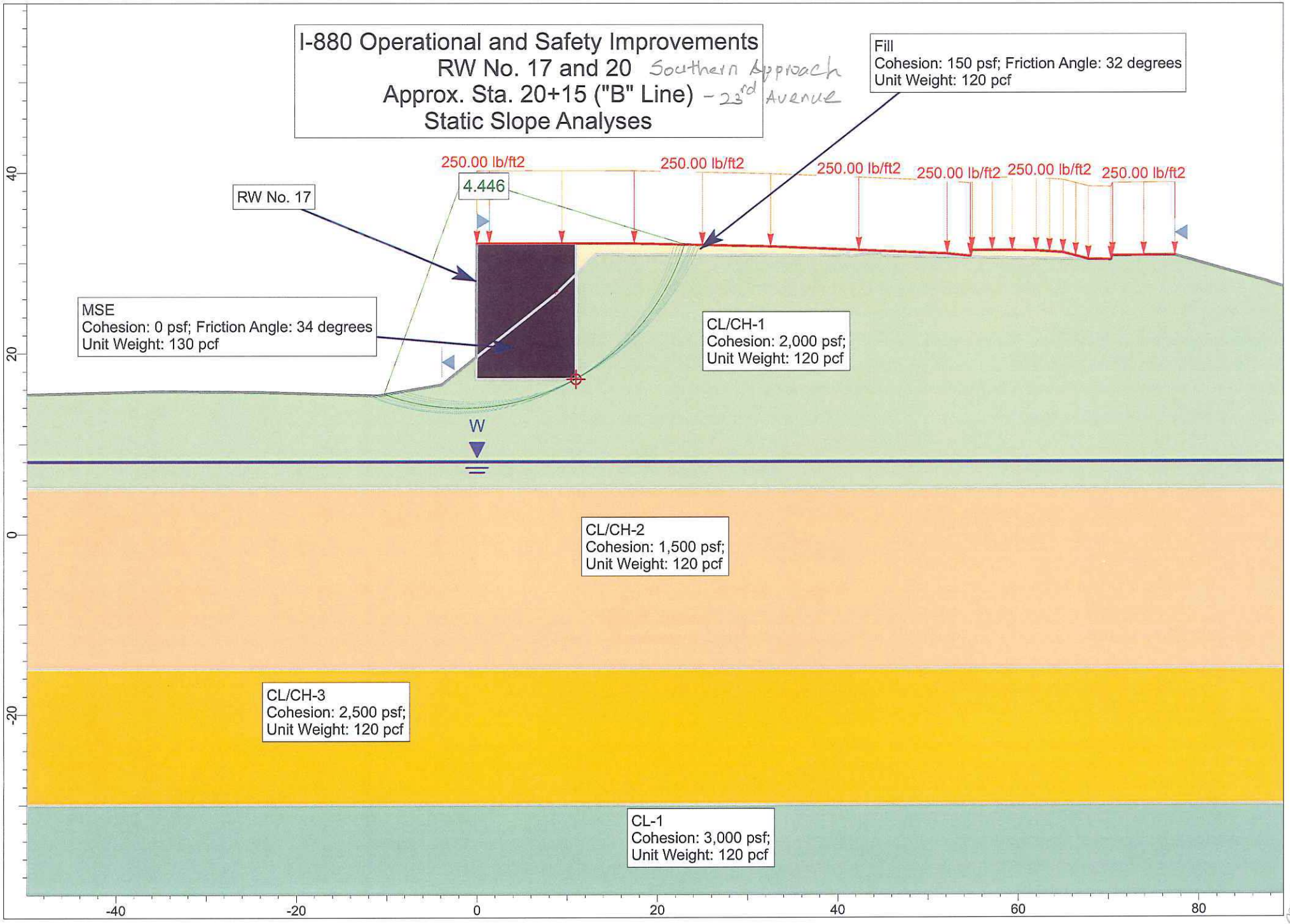
Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	13	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

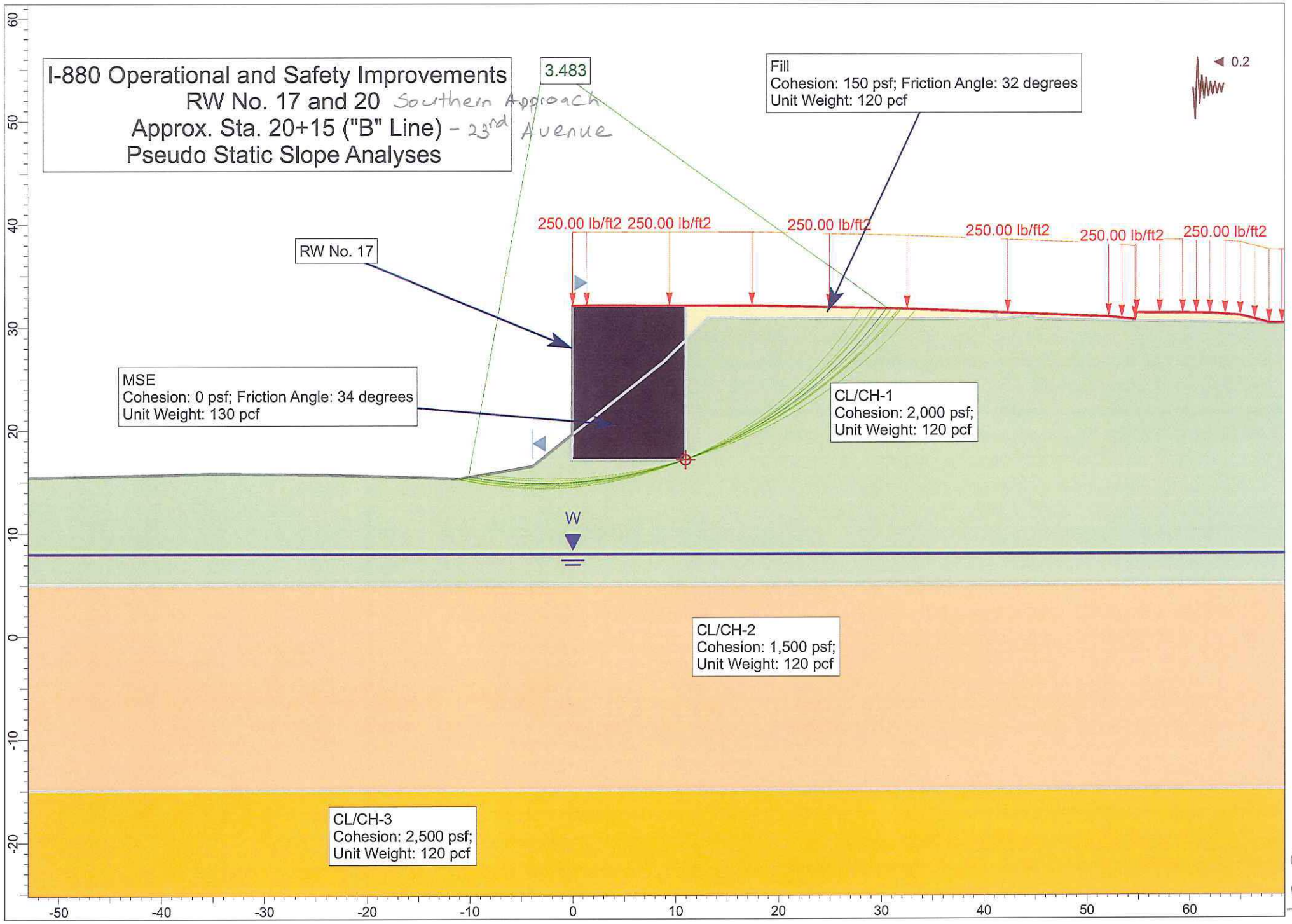
Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Initail stress (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11.5	1.5	3	0.180	**0.424**	0.604	**3.393**	3.997	0.74
CL 2	7.5	5.5	5	0.504	**0.464**	0.968	**2.699**	3.667	0.87
CL 3A	0	13	10	0.936	**0.516**	1.452	**1.871**	3.323	1.08
CL 3B	-10	23	10	1.512	**0.572**	2.084	**1.089**	3.173	0.55
CL 4	-22.5	35.5	15	2.232	**0.595**	2.827	**0.436**	3.262	0.28
CL 5	-45	58	30	3.528	**0.595**	4.123	**0.233**	4.356	0.21
								Total Settlement (in):	**3.73**

3.8"

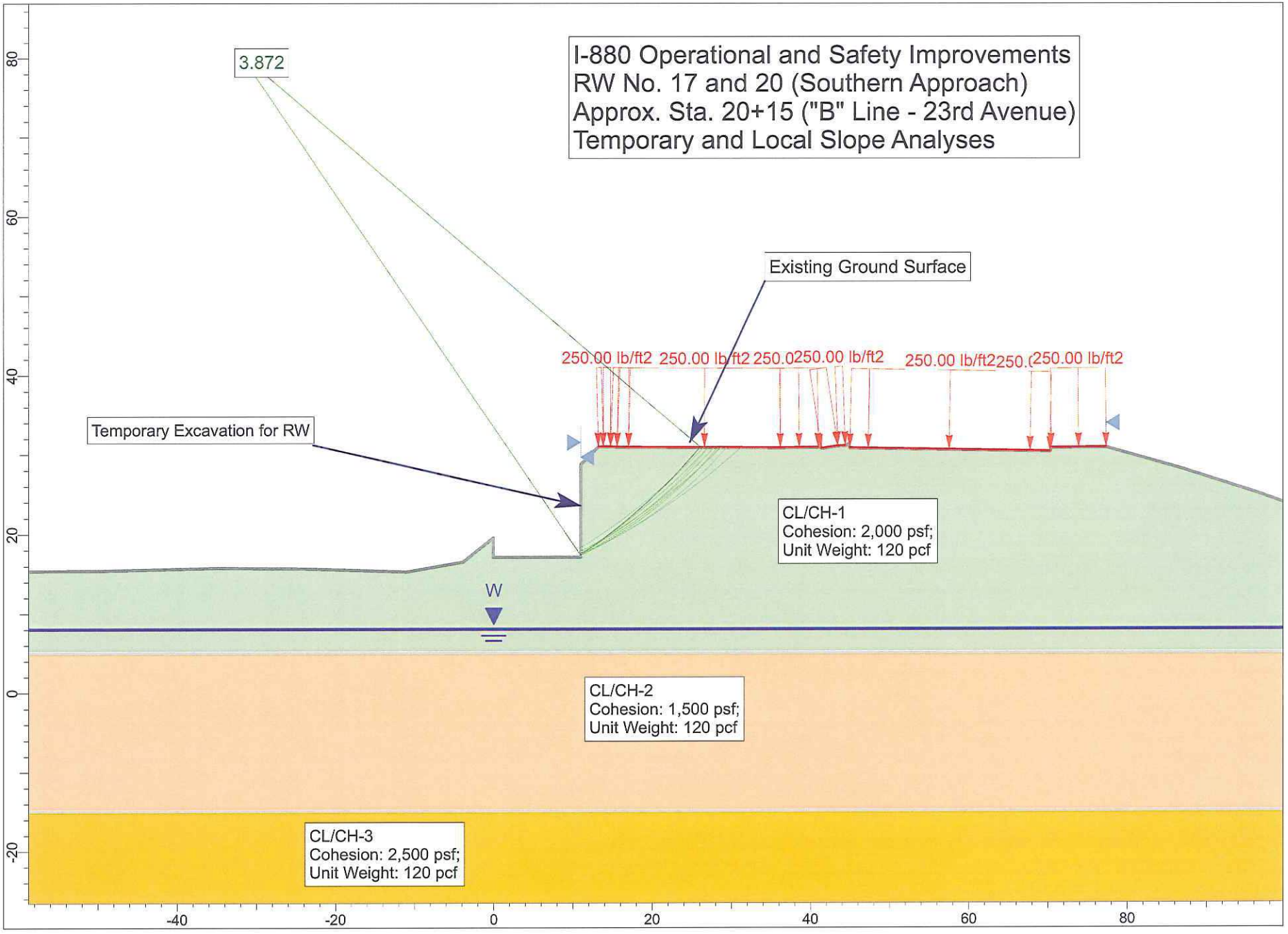
After 3' overex ⇒ $\delta = 3"$

C-67


I-880 Operational and Safety Improvements
RW No. 17 and 20 Southern Approach
Approx. Sta. 20+15 ("B" Line) - 23rd Avenue
Static Slope Analyses
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
4.446
RW No. 17
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-2
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL/CH-3
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
40
20
0
-20
-40
-20
0
20
40
60
80


I-880 Operational and Safety Improvements
RW No. 17 and 20 Southern Approach
Approx. Sta. 20+15 ("B" Line) - 23rd Avenue
Pseudo Static Slope Analyses
3.483
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
0.2
250.00 lb/ft2
RW No. 17
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-2
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL/CH-3
Cohesion: 2,500 psf;
Unit Weight: 120 pcf

C-69


I-880 Operational and Safety Improvements
RW No. 17 and 20 (Southern Approach)
Approx. Sta. 20+15 ("B" Line - 23rd Avenue)
Temporary and Local Slope Analyses
3.872
Existing Ground Surface
250.00 lb/ft2
Temporary Excavation for RW
W
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH-2
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL/CH-3
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-40
-20
0
20
40
60
80

RETAINING WALLS 18 & 19

I-880 Operational & Safety Improvement Project

RW 18 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 14 ft

Groundwater El. = 12 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	14	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12	2	4	0.240	**0.570**	**1.708**	**1.14**	0.810	1.948	0.46
CL 2	6	8	7.5	0.586	**0.552**	**1.537**	**0.98**	1.138	2.122	0.61
CL 3A	-2.5	16.5	10	1.075	**0.463**	**1.274**	**0.81**	1.538	2.349	0.55
CL 3B	-13	27	12.5	1.680	**0.382**	**0.874**	**0.49**	2.062	2.554	0.35
CL 4	-36	50	32.5	3.005	**0.307**	**0.542**	**0.23**	3.312	3.546	0.29
							Total Settlement (in):			**2.26**

2.3"

After 3' overex $\Rightarrow \delta = 2"$

C-72

I-880 Operational & Safety Improvement Project

RW 19 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 14 ft

Groundwater El. = 12 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	14	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12	2	4	0.240	**0.570**	**1.708**	**1.14**	0.810	1.948	0.46
CL 2	6	8	7.5	0.586	**0.552**	**1.537**	**0.98**	1.138	2.122	0.61
CL 3A	-2.5	16.5	10	1.075	**0.463**	**1.278**	**0.82**	1.538	2.353	0.55
CL 3B	-13	27	12.5	1.680	**0.382**	**0.885**	**0.50**	2.062	2.565	0.36
CL 4	-36	50	32.5	3.005	**0.307**	**0.542**	**0.23**	3.312	3.546	0.29
									Total Settlement (in):	**2.27**

2.3"

After 3' overex $\Rightarrow \delta = 2"$

C-73

I-880 Operational & Safety Improvement Project

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 18 (H = 10 and 12.5 ft)

Consolidation Settlement

Ground Surface El. = 15 ft

Groundwater El. = 12.5 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.837**	**2.294**	**1.46**	1.137	2.594	0.54
CL 2	6	9	7.5	0.674	**0.781**	**2.126**	**1.34**	1.456	2.800	0.64
CL 3A	-2.5	17.5	10	1.164	**0.653**	**1.726**	**1.07**	1.817	2.890	0.60
CL 3B	-13	28	12.5	1.769	**0.536**	**1.206**	**0.67**	2.305	2.975	0.42
CL 4	-36	51	32.5	3.094	**0.413**	**0.746**	**0.33**	3.507	3.840	0.38
									Total Settlement (in):	**2.58**

2.6"

After 3' overex ⇒ $\delta = 2.3$"

C-14

I-880 Operational & Safety Improvement Project

RW 19 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	10.5	0.358	**0.837**	**2.285**	**1.45**	1.195	2.643	1.09
CL 2	6	11.5	7.5	0.818	**0.781**	**2.007**	**1.23**	1.599	2.826	0.56
CL 3A	-2.5	20	10	1.308	**0.647**	**1.671**	**1.02**	1.955	2.979	0.55
CL 3B	-13	30.5	12.5	1.913	**0.527**	**1.140**	**0.61**	2.440	3.053	0.37
CL 4	-36	53.5	32.5	3.238	**0.401**	**0.711**	**0.31**	3.638	3.948	0.35
									Total Settlement (in):	**2.90**

2.9"

After 3' overex ⇒ $\delta = 2.6"$

I-880 Operational & Safety Improvement Project

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

RW 18 (H = 15 ft)

Consolidation Settlement

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.837**	**2.782**	**1.95**	1.195	3.140	0.94
CL 2	6	11.5	7.5	0.818	**0.781**	**2.443**	**1.66**	1.599	3.262	0.70
CL 3A	-2.5	20	10	1.308	**0.654**	**1.856**	**1.20**	1.962	3.164	0.62
CL 3B	-13	30.5	12.5	1.913	**0.527**	**1.230**	**0.70**	2.440	3.143	0.41
CL 4	-36	53.5	32.5	3.238	**0.401**	**0.897**	**0.50**	3.638	4.135	0.54
									Total Settlement (in):	**3.22**

3.3"

After 3' overex ⇒ $\delta = 3"$

I-880 Operational & Safety Improvement Project

RW 19 (H = 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 20.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	20.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	15	5.5	10.5	0.660	**0.830**	**2.738**	**1.91**	1.490	3.398	1.13
CL 2	6	14.5	7.5	1.178	**0.744**	**2.255**	**1.51**	1.922	3.434	0.57
CL 3A	-2.5	23	10	1.668	**0.617**	**1.729**	**1.11**	2.285	3.397	0.52
CL 3B	-13	33.5	12.5	2.273	**0.487**	**1.319**	**0.83**	2.760	3.592	0.43
CL 4	-36	56.5	32.5	3.598	**0.359**	**0.851**	**0.49**	3.957	4.449	0.50
							Total Settlement (in):			**3.14**

3.2"

After 3' overex ⇒ $\delta = 2.9$"

I-880 Operational & Safety Improvement Project

RW 18 & 19 (H = 17.5 to 22.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.000**	**3.278**	**3.28**	0.358	3.636	2.27
CL 2	6	11.5	7.5	0.818	**0.005**	**2.861**	**2.86**	0.823	3.679	1.46
CL 3A	-2.5	20	10	1.308	**0.027**	**2.015**	**1.99**	1.335	3.323	1.19
CL 3B	-13	30.5	12.5	1.913	**0.040**	**1.357**	**1.32**	1.953	3.270	0.84
CL 4	-36	53.5	32.5	3.238	**0.087**	**0.876**	**0.79**	3.325	4.113	0.90
							Total Settlement (in):			**6.66**

6.7"

After 3' overex ⇒ $\delta = 5.8$"
After 5' overex ⇒ $\delta = 5.2$"
After 7' overex ⇒ $\delta = 4.6$"

RW 18 and 19 - Sta 22+00

⇒ SELECT 3' OVEREX DUE TO POTENTIAL OF GROUNDWATER //

I-880 Operational & Safety Improvement Project

RW 18 & 19 (H = 17.5 to 22.5 ft)

Consolidation Settlement

5-ft Surcharge

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

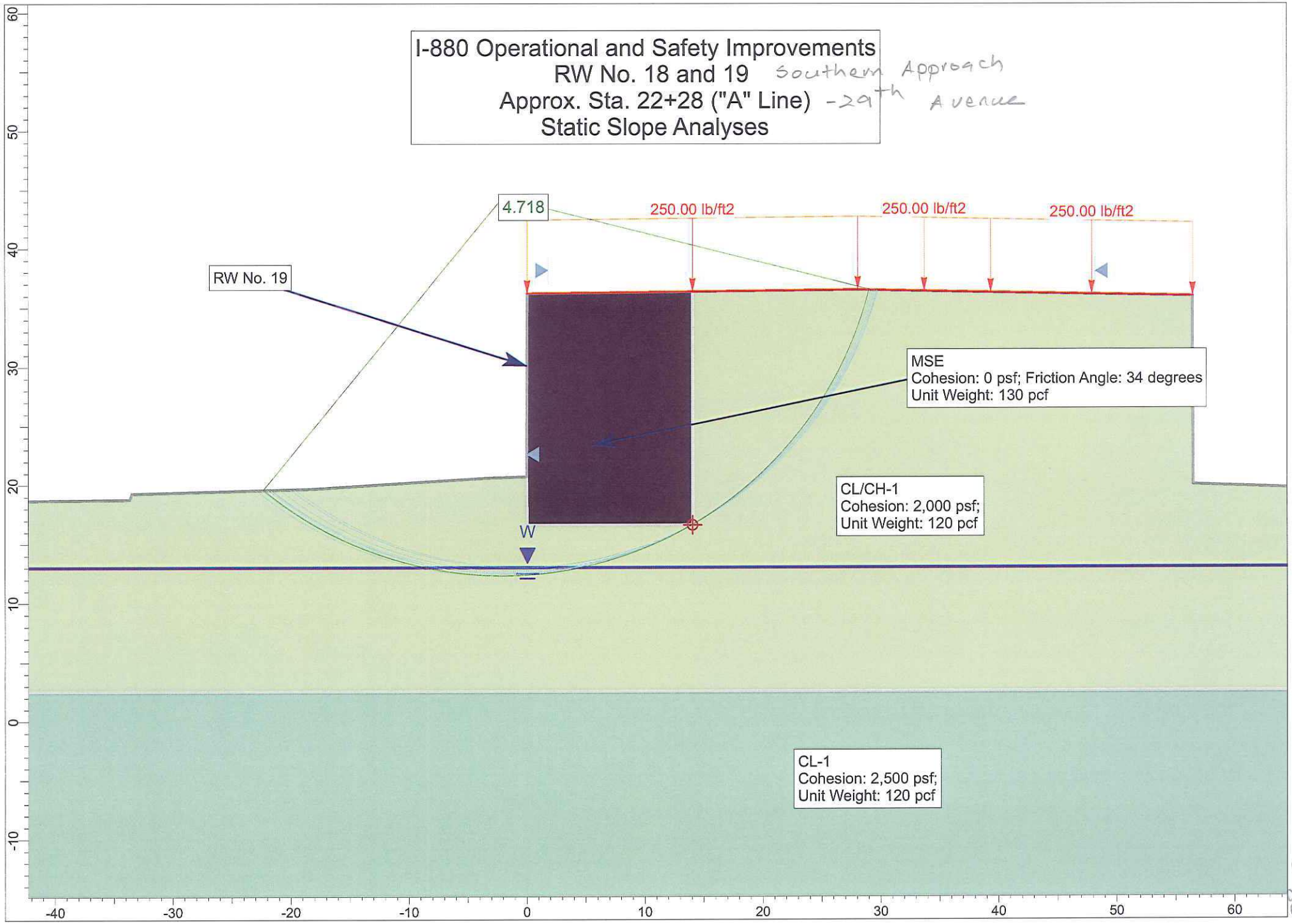
Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

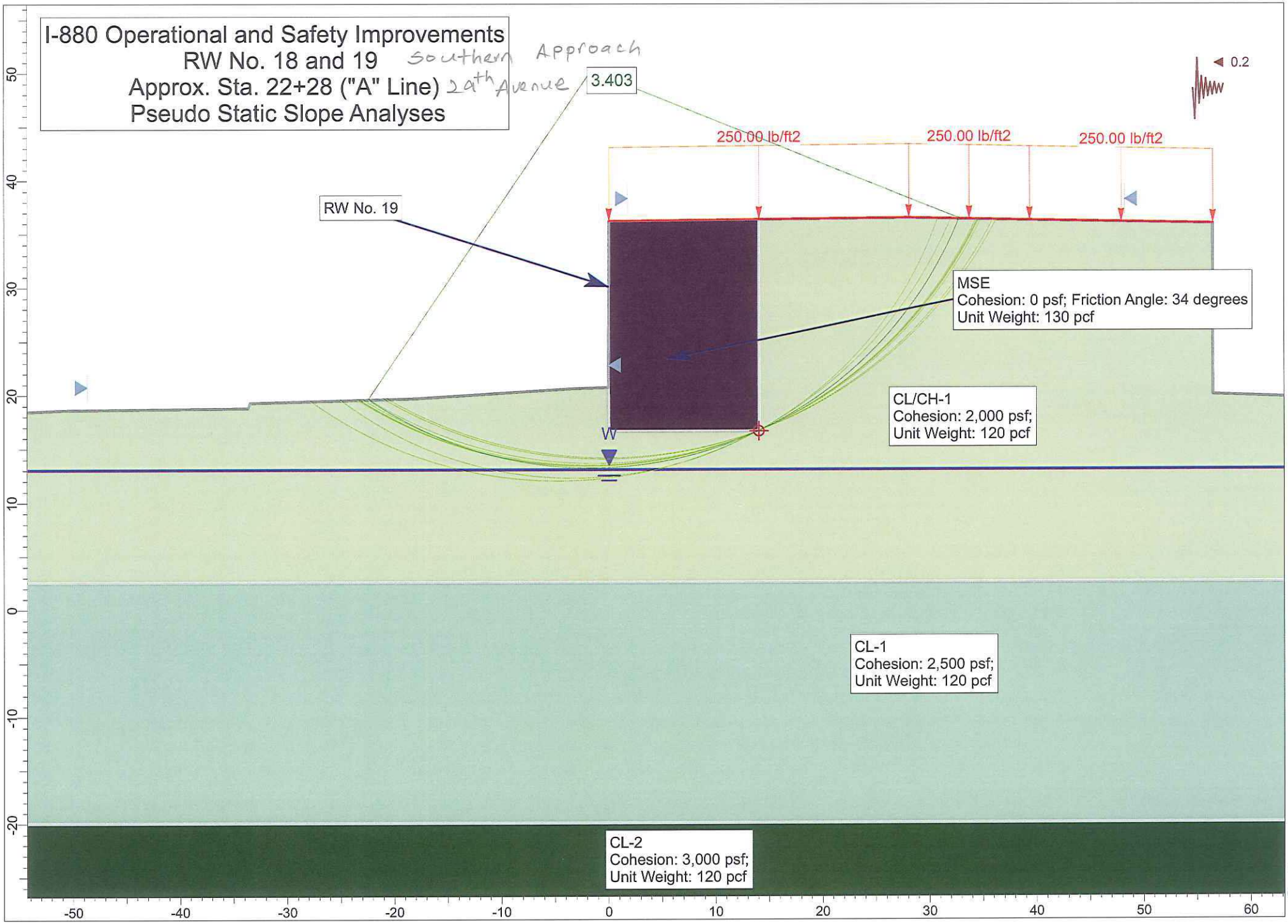
Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initail stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	0.000	3.775	3.77	0.358	4.133	2.52
CL 2	6	11.5	7.5	0.818	0.005	3.294	3.29	0.823	4.113	1.57
CL 3A	-2.5	20	10	1.308	0.027	2.473	2.45	1.335	3.781	1.36
CL 3B	-13	30.5	12.5	1.913	0.040	1.773	1.73	1.953	3.686	1.03
CL 4	-36	53.5	32.5	3.238	0.087	1.012	0.92	3.325	4.250	1.04
							Total Settlement (in):			7.53

7.5"

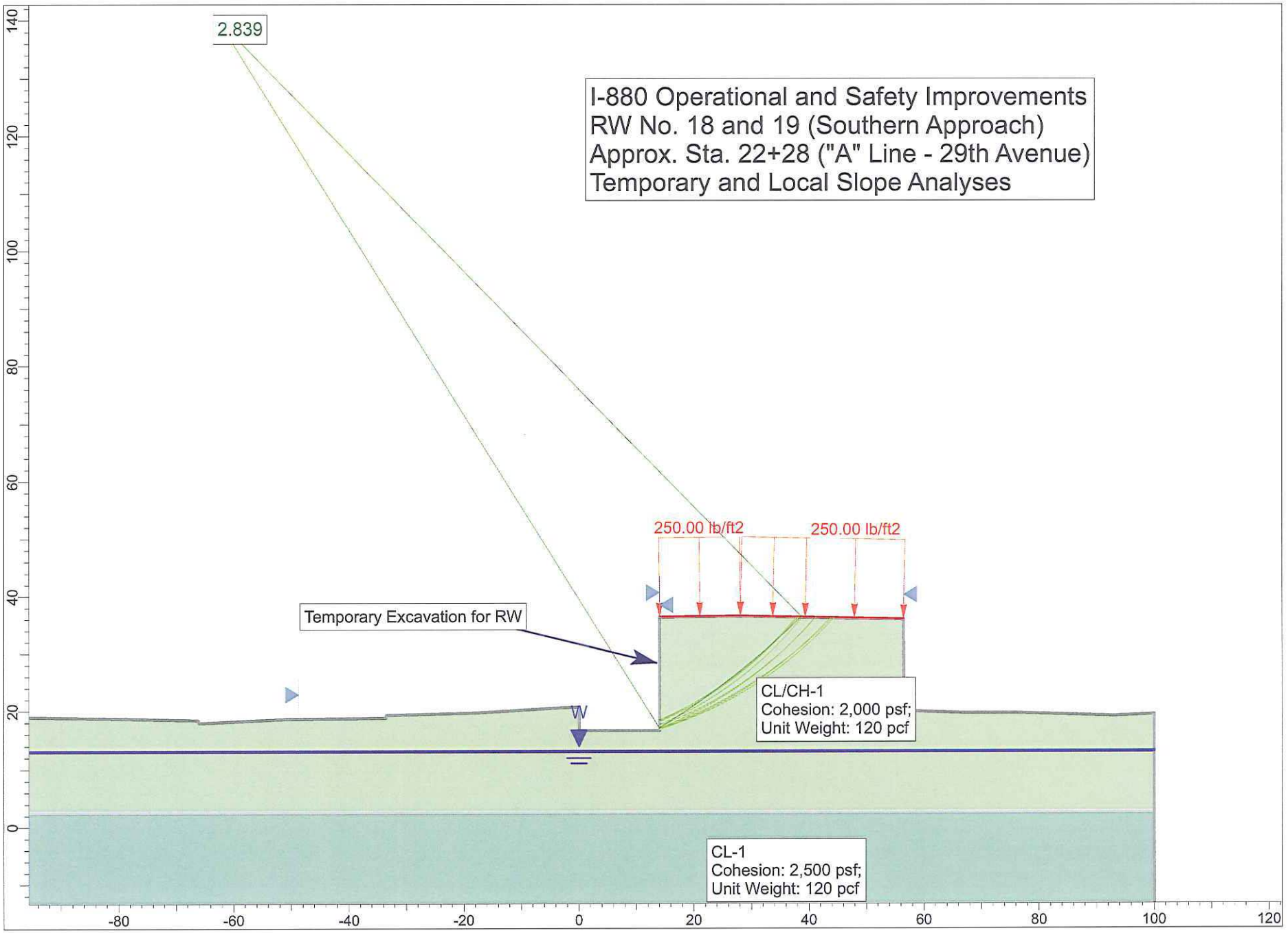
After 3' overex ⇒ δ = 6.5"

I-880 Operational and Safety Improvements
RW No. 18 and 19 Southern Approach
Approx. Sta. 22+28 ("A" Line) - 29th Avenue
Static Slope Analyses




I-880 Operational and Safety Improvements
RW No. 18 and 19 Southern Approach
Approx. Sta. 22+28 ("A" Line) 29th Avenue
Pseudo Static Slope Analyses
3.403
0.2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 19
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
50
40
30
20
10
0
-10
-20
-50
-40
-30
-20
-10
0
10
20
30
40
50
60

C-81


I-880 Operational and Safety Improvements
RW No. 18 and 19 (Southern Approach)
Approx. Sta. 22+28 ("A" Line - 29th Avenue)
Temporary and Local Slope Analyses
2.839
250.00 lb/ft2
250.00 lb/ft2
Temporary Excavation for RW
CL/CH-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
140
120
100
80
60
40
20
0
-80
-60
-40
-20
0
20
40
60
80
100
120

RETAINING WALL 26

I-880 Operational & Safety Improvement Project

RW 26 (H = 12.5 and 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 18 ft

Groundwater El. = 10 ft

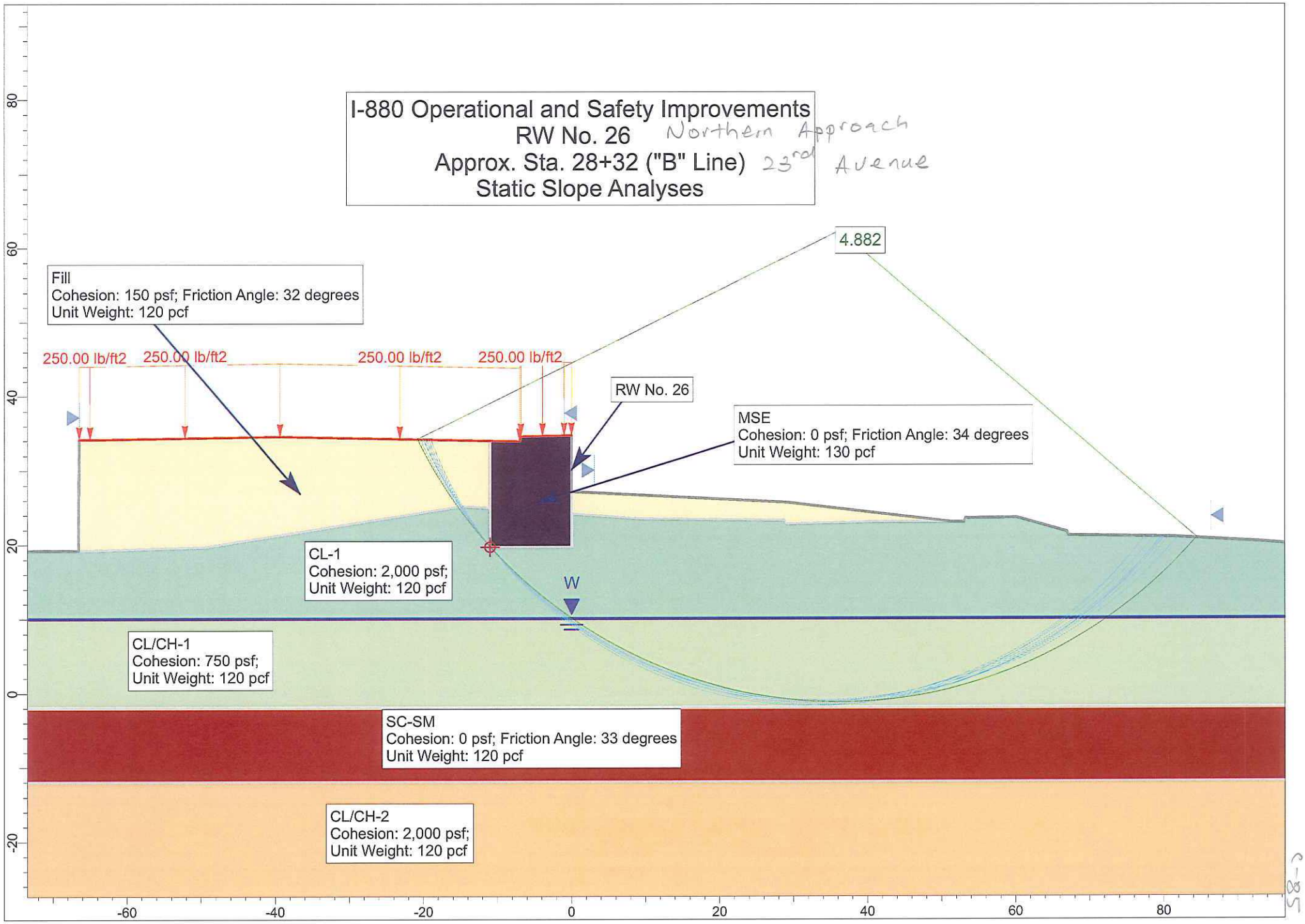
Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	18	14	0.025	0.13	4.00
CL 2	14	10	0.025	0.13	4.00
CL 3	10	-2	0.025	0.13	5.00
CL 4	-2	-12	0.025	0.13	6.00
CL 5	-12	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initial stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	16	2	4	0.240	**0.593**	**2.199**	**1.61**	0.833	2.439	0.56
CL 2	12	6	4	0.720	**0.522**	**2.166**	**1.64**	1.242	2.886	0.44
CL 3	4	14	12	1.306	**0.395**	**1.935**	**1.54**	1.701	3.240	1.01
CL 4	-7	25	10	1.939	**0.306**	**1.501**	**1.20**	2.245	3.441	0.56
CL 5	-26	44	28	3.034	**0.235**	**0.968**	**0.73**	3.269	4.002	0.74
									Total Settlement (in):	**3.30**

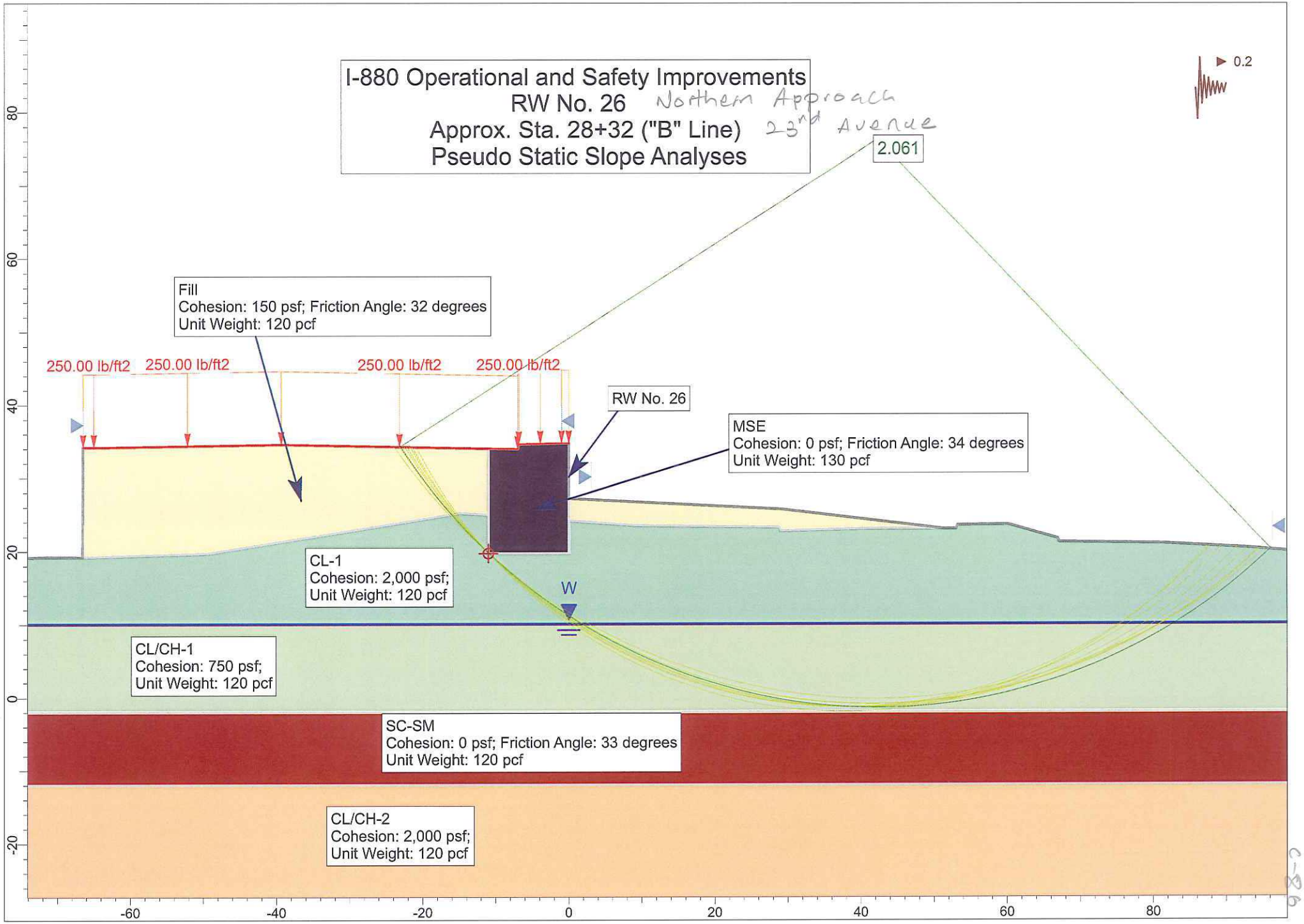
3.3"

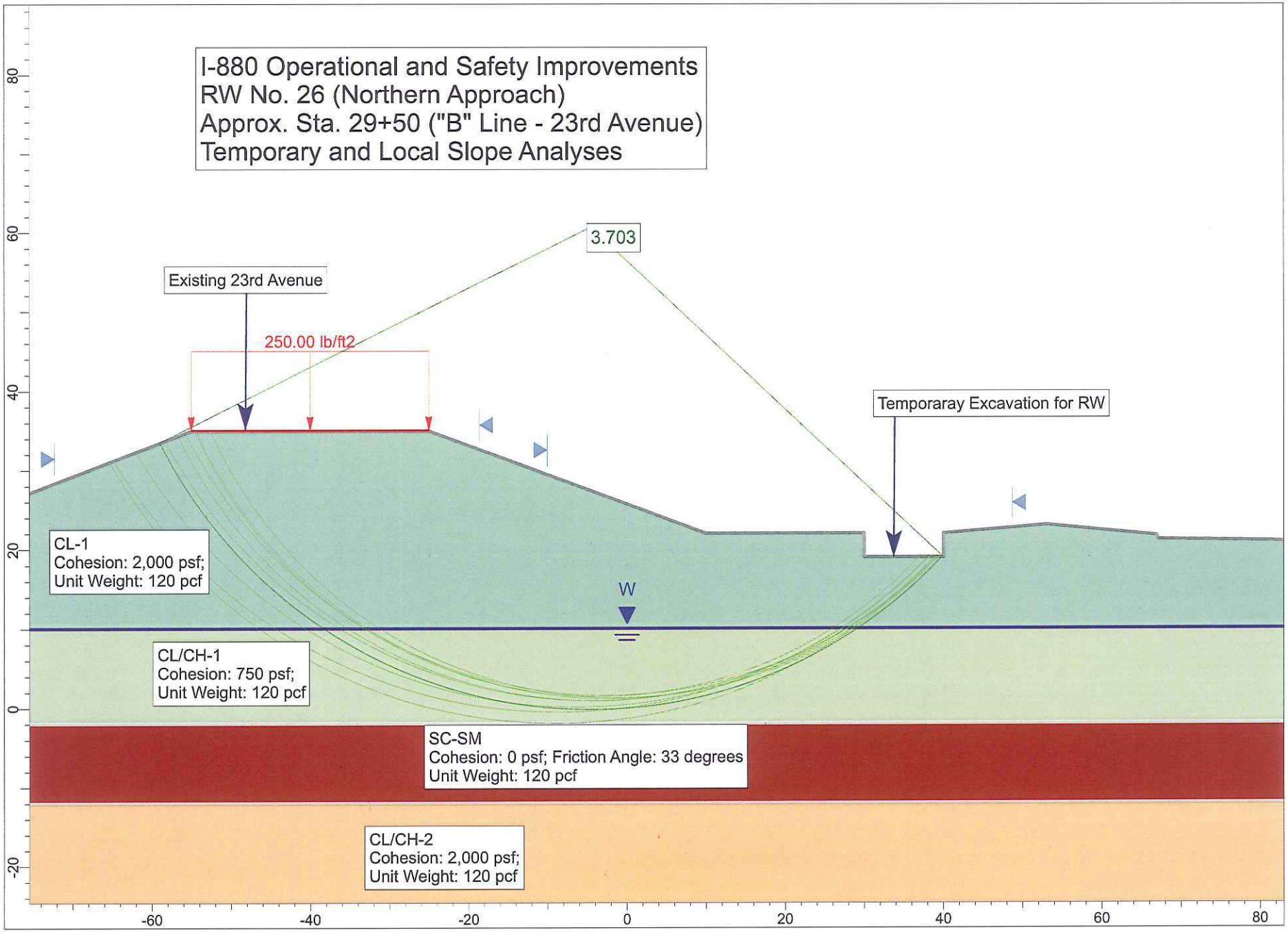
After 3' overex ⇒ $\delta = 2.9$"

C-84


I-880 Operational and Safety Improvements
RW No. 26 Northern Approach
Approx. Sta. 28+32 ("B" Line) 23rd Avenue
Static Slope Analyses
4.882
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 26
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-1
Cohesion: 750 psf;
Unit Weight: 120 pcf
SC-SM
Cohesion: 0 psf; Friction Angle: 33 degrees
Unit Weight: 120 pcf
CL/CH-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80

C-85


I-880 Operational and Safety Improvements
RW No. 26 Northern Approach
Approx. Sta. 28+32 ("B" Line) 23rd Avenue
Pseudo Static Slope Analyses
0.2
2.061
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
RW No. 26
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL/CH-1
Cohesion: 750 psf;
Unit Weight: 120 pcf
SC-SM
Cohesion: 0 psf; Friction Angle: 33 degrees
Unit Weight: 120 pcf
CL/CH-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80


I-880 Operational and Safety Improvements
RW No. 26 (Northern Approach)
Approx. Sta. 29+50 ("B" Line - 23rd Avenue)
Temporary and Local Slope Analyses
3.703
Existing 23rd Avenue
250.00 lb/ft2
Temporaray Excavation for RW
W
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH-1
Cohesion: 750 psf;
Unit Weight: 120 pcf
SC-SM
Cohesion: 0 psf; Friction Angle: 33 degrees
Unit Weight: 120 pcf
CL/CH-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80

RETAINING WALLS 28 & 29

I-880 Operational & Safety Improvement Project

RW 28 & 29 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/20/2012

Checked By: Lino Date: 6/23/2012

Ground Surface El. = 24 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	24	19	0.025	0.13	4.00
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	21.5	2.5	5	0.300	0.263	1.796	1.53	0.563	2.096	0.86
CL 2	16	8	6	0.835	0.204	1.703	1.50	1.039	2.538	0.70
CL 3A	9	15	8	1.238	0.177	1.392	1.22	1.415	2.630	0.65
CL 3B	0	24	10	1.757	0.151	1.030	0.88	1.908	2.787	0.49
CL 4A	-10	34	10	2.333	0.134	0.827	0.69	2.467	3.160	0.32
CL 4B	-21	45	12	2.966	0.112	0.629	0.52	3.078	3.595	0.24
CL 5	-38	62	23	3.946	0.100	0.421	0.32	4.046	4.366	0.23
							Total Settlement (in):			3.49

3.5"

After 3' overex ⇒ $\delta = 3"$

I-880 Operational & Safety Improvement Project

RW 28 & 29 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/20/2012

Checked By: Lino Date: 6/23/2012

Ground Surface El. = 25 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	25	19	0.025	0.13	4.00
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	22	3	6	0.360	**0.449**	**2.293**	**1.84**	0.809	2.653	0.93
CL 2	16	9	6	0.955	**0.435**	**2.154**	**1.72**	1.390	3.109	0.63
CL 3A	9	16	8	1.358	**0.382**	**1.749**	**1.37**	1.740	3.107	0.60
CL 3B	0	25	10	1.877	**0.330**	**1.345**	**1.02**	2.207	3.222	0.49
CL 4A	-10	35	10	2.453	**0.288**	**1.092**	**0.80**	2.741	3.545	0.34
CL 4B	-21	46	12	3.086	**0.244**	**0.840**	**0.60**	3.330	3.926	0.26
CL 5	-38	63	23	4.066	**0.202**	**0.587**	**0.39**	4.267	4.652	0.26
							Total Settlement (in):			**3.51**

3.5"

After 3' overex ⇒ $\delta = 3"$

RW 28 and 29 - Sta. 29+50

C-90

I-880 Operational & Safety Improvement Project

RW 28 & 29 (H = 12.5 ft and 15 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/20/2012

Checked By: Lino Date: 6/23/2012

Ground Surface El. = 25 ft

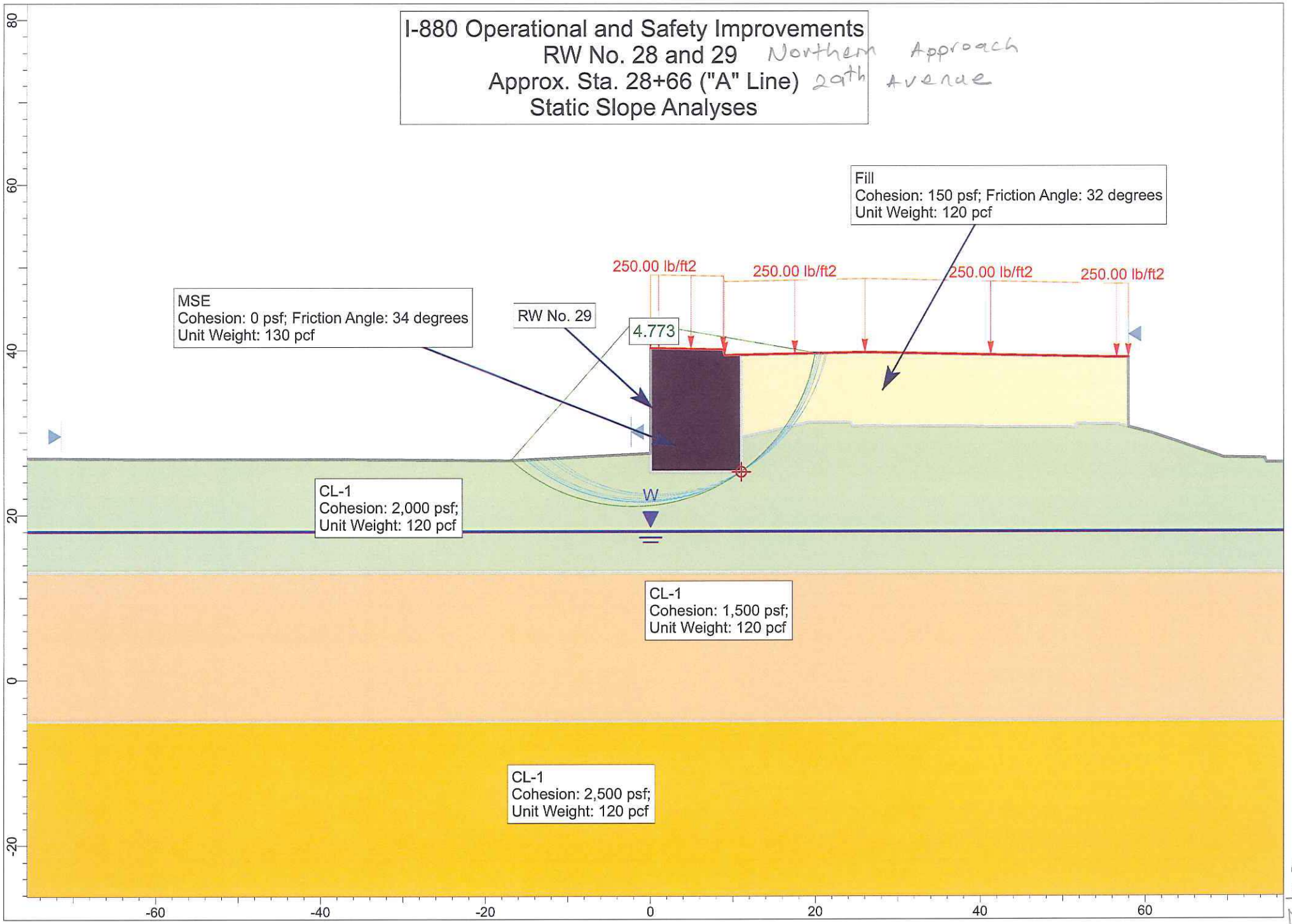
Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	25	19	0.025	0.13	4.00
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

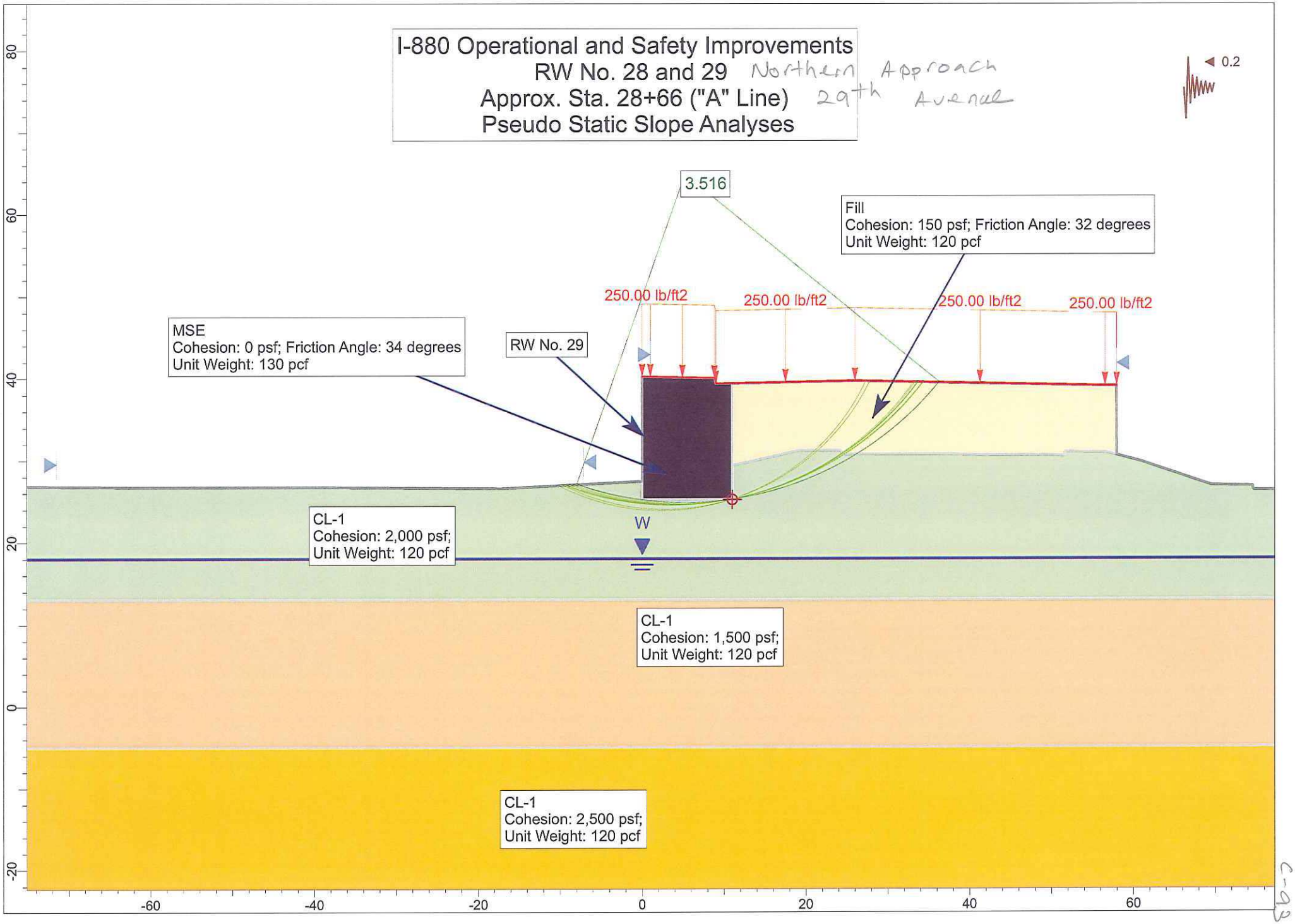
Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C4) (ksf)	Stress Increase 2 (See Sheet # C4) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	22	3	6	0.360	**0.689**	**2.591**	**1.90**	1.049	2.951	0.81
CL 2	16	9	6	0.955	**0.662**	**2.423**	**1.76**	1.617	3.379	0.58
CL 3A	9	16	8	1.358	**0.558**	**1.967**	**1.41**	1.916	3.325	0.57
CL 3B	0	25	10	1.877	**0.452**	**1.531**	**1.08**	2.329	3.408	0.50
CL 4A	-10	35	10	2.453	**0.377**	**1.152**	**0.78**	2.830	3.605	0.32
CL 4B	-21	46	12	3.086	**0.302**	**0.845**	**0.54**	3.388	3.931	0.23
CL 5	-38	63	23	4.066	**0.227**	**0.552**	**0.33**	4.292	4.618	0.22
									Total Settlement (in):	**3.22**

3.3"

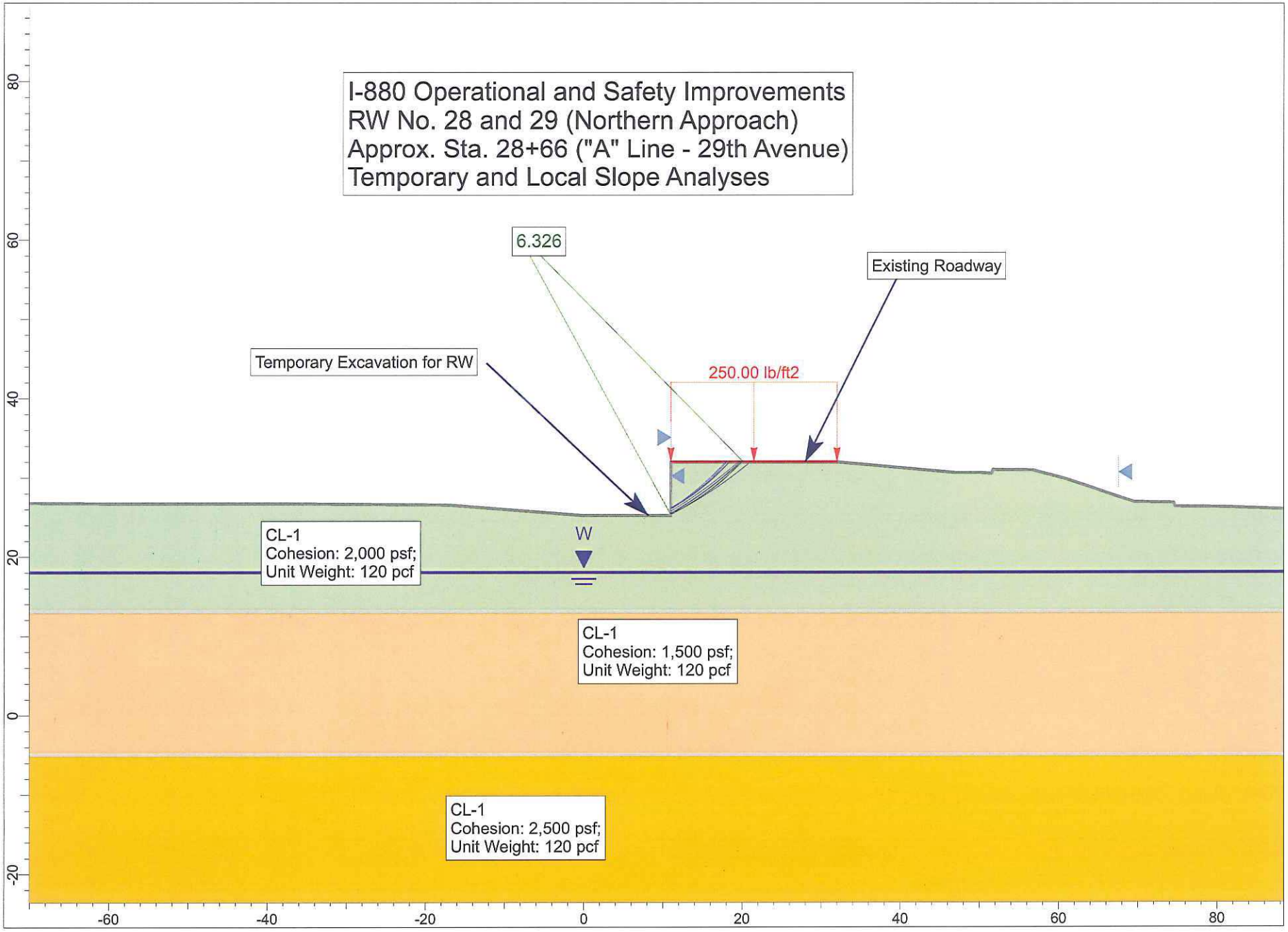
After 3' overex ⇒ $\delta = 2.9$"


I-880 Operational and Safety Improvements
RW No. 28 and 29 Northern Approach
Approx. Sta. 28+66 ("A" Line) 29th Avenue
Static Slope Analyses
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 29
4.773
W
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60

e-42


I-880 Operational and Safety Improvements
RW No. 28 and 29 Northern Approach
Approx. Sta. 28+66 ("A" Line) 29th Avenue
Pseudo Static Slope Analyses
0.2
3.516
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 29
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
W
CL-1
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60

C-93


I-880 Operational and Safety Improvements
RW No. 28 and 29 (Northern Approach)
Approx. Sta. 28+66 ("A" Line - 29th Avenue)
Temporary and Local Slope Analyses
6.326
Existing Roadway
Temporary Excavation for RW
250.00 lb/ft2
W
CL-1
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 1,500 psf;
Unit Weight: 120 pcf
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
80
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80

RETAINING WALLS 228 & 230

I-880 Operational & Safety Improvement Project

RW 228 & 230 (H = 7.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	22	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	2	4	0.240	**1.781**	0.240	2.021	1.11
CL 2	16	6	4	0.720	**1.531**	0.720	2.251	0.59
CL 3	7	15	14	1.301	**0.957**	1.301	2.258	1.01
CL 4	-7	29	15	2.107	**0.535**	2.107	2.643	0.44
CL 5	-30	52	20	3.432	**0.340**	3.432	3.772	0.25
							Total Settlement (in):	**3.40**

3.4"

After 3' overex ⇒ $\delta = 2.6$"

C-96

I-880 Operational & Safety Improvement Project

RW 228 & 230 (H = 10 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	22	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	2	4	0.240	**2.177**	0.240	2.417	1.20
CL 2	16	6	4	0.720	**1.870**	0.720	2.590	0.67
CL 3	7	15	14	1.301	**1.164**	1.301	2.464	1.17
CL 4	-7	29	15	2.107	**0.643**	2.107	2.751	0.52
CL 5	-30	52	20	3.432	**0.405**	3.432	3.837	0.29
							Total Settlement (in):	**3.85**

3.9"

After 3' overex $\Rightarrow \delta = 3"$

I-880 Operational & Safety Improvement Project

RW 228 & 230 (H = 12.5 to 17.5 ft)

Consolidation Settlement

Calculated By: Ranjan Date: 6/18/2012

Checked By: Lino Date: 6/21/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

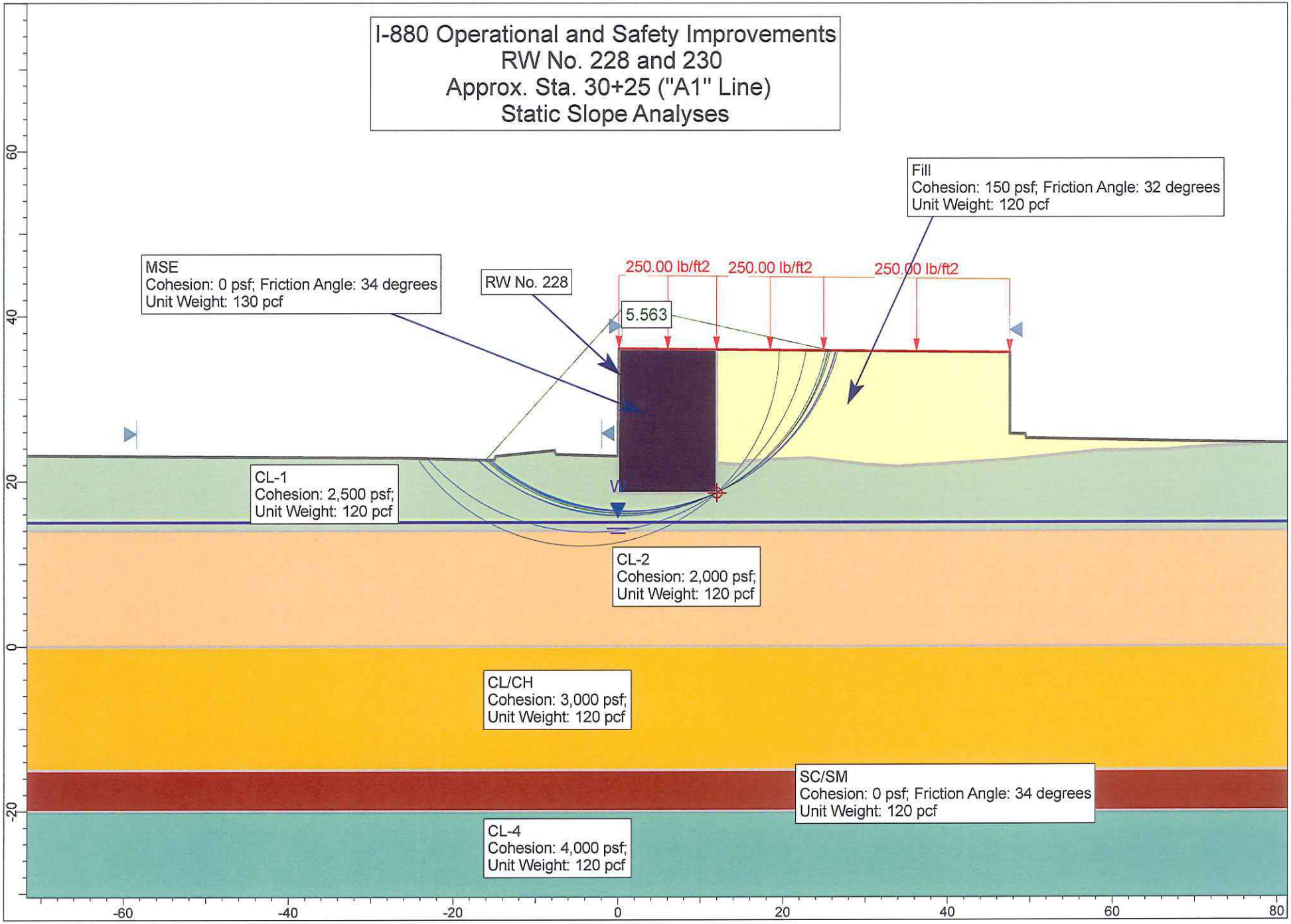
Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	22	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

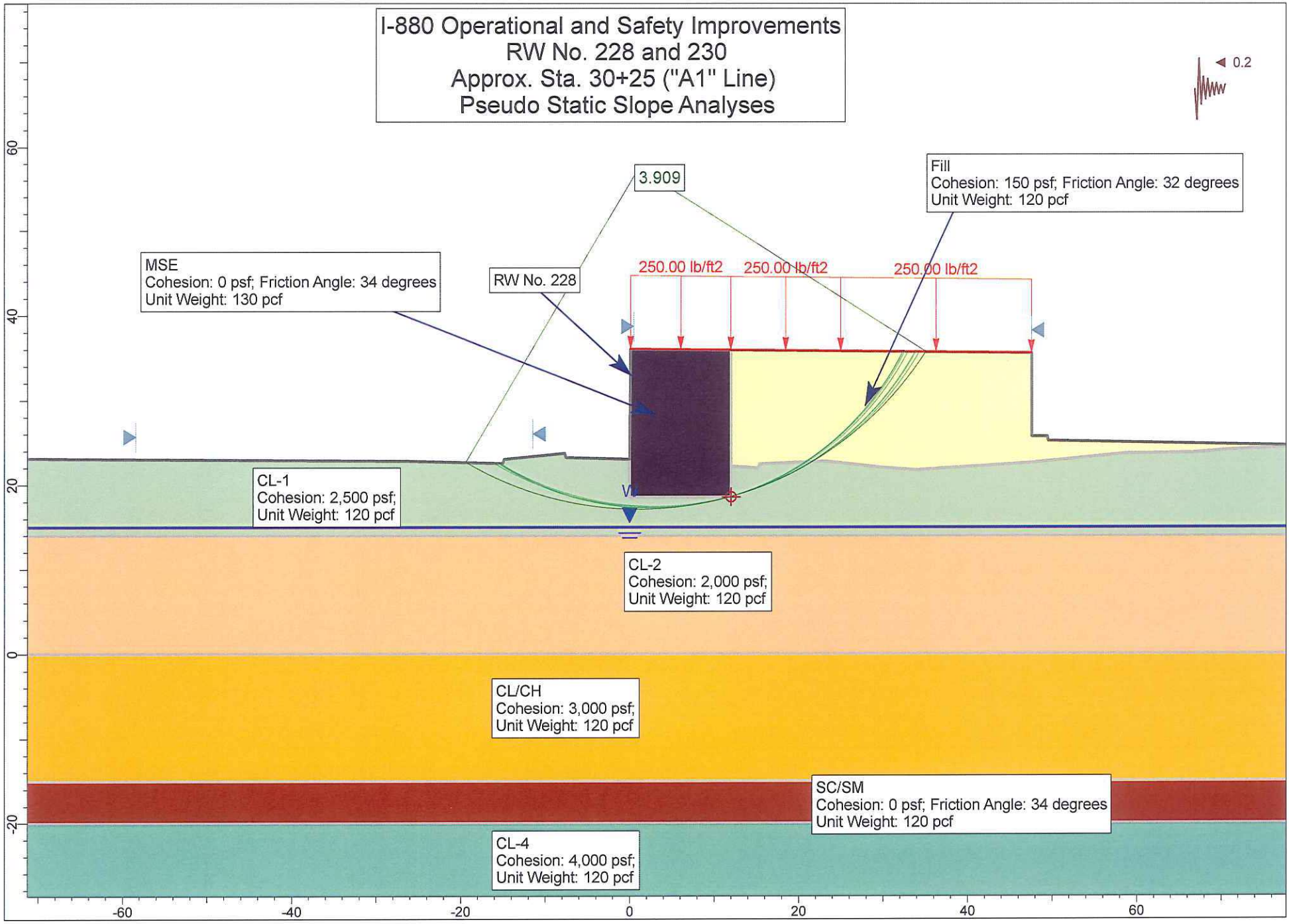
Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (ksf)	Initail Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	20	2	4	0.240	**2.473**	0.240	2.713	1.26
CL 2	16	6	4	0.720	**2.106**	0.720	2.826	0.71
CL 3	7	15	14	1.301	**1.228**	1.301	2.529	1.21
CL 4	-7	29	15	2.107	**0.591**	2.107	2.698	0.48
CL 5	-30	52	20	3.432	**0.341**	3.432	3.773	0.25
							Total Settlement (in):	**3.92**

4"

After 3' overex $\Rightarrow$ $\delta = 3"$

RW 228 & 230-Sta. 30+00


I-880 Operational and Safety Improvements
RW No. 228 and 230
Approx. Sta. 30+25 ("A1" Line)
Static Slope Analyses
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 228
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
5.563
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
60
40
20
0
-20
-60
-40
-20
0
20
40
60
80


I-880 Operational and Safety Improvements
RW No. 228 and 230
Approx. Sta. 30+25 ("A1" Line)
Pseudo Static Slope Analyses
0.2
3.909
Fill
Cohesion: 150 psf; Friction Angle: 32 degrees
Unit Weight: 120 pcf
MSE
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 130 pcf
RW No. 228
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
CL-1
Cohesion: 2,500 psf;
Unit Weight: 120 pcf
CL-2
Cohesion: 2,000 psf;
Unit Weight: 120 pcf
CL/CH
Cohesion: 3,000 psf;
Unit Weight: 120 pcf
SC/SM
Cohesion: 0 psf; Friction Angle: 34 degrees
Unit Weight: 120 pcf
CL-4
Cohesion: 4,000 psf;
Unit Weight: 120 pcf
60
40
20
0
-20
-60
-40
-20
0
20
40
60

C-100

Wick Drain Design Memorandum from Hayward Baker, Inc.

Hayward Baker, Inc.
by R. Robert Goughnour
6/19/2012

Summary of analysis of consolidation using PV drains at 29th Street Off-ramp:

Design Goal

A 30-day construction period was anticipated, and it was required that primary settlement after surcharge removal be 1 inch or less.

Design Methodology

There are, of course, many combinations of design parameters (drain spacing, surcharge loading, construction and application times, etc.) that could be considered for design. Based on experience, initial trial drain spacing was taken as 3-foot triangular. For analysis, this 300-foot long embankment was divided into 10 segments of 30 feet length each. Loading on each of these segments was considered to be uniform but time dependent, with abrupt change in magnitude at adjacent segments. Unit weight of the embankment material was taken 0.125 kips/ft^3. The design or final height of the lowest section was taken as 1.5 ft and the highest section was 15 feet. The initial trial included the following surcharge (in addition to the final embankment height):

Embankment section	Surcharge height	
Hi end to 0.9	5.0 feet	No drains required under this section
0.9 to 0.8	5.0 feet	No drains required under this section
0.8 to 0.7	4.5 feet	
0.7 to 0.6	4.0 feet	
0.6 to 0.5	3.5 feet	
0.5 to 0.4	3.0 feet	
0.4 to 0.3	2.5 feet	
0.3 to 0.2	2.0 feet	
0.2 to 0.1	1.5 feet	
0.1 to low end	1.0 feet	

Calculations were accomplished by means of the computer program PVDrain. This program was originally written about 15 years ago, and has undergone several updates and modifications. It has been applied on many and varied PV Drain projects, with excellent results.

Sample Computer Program Output

Sample output for the "0.9" point - i.e. the center of the embankment at 30 feet from the high end, is attached. In general, the output contains a problem summary as well as calculation results. A brief explanation of the output is included at the beginning of the attachment.

Results and Recommendations

The initial series of computer runs produced the following:

Point along embankment centerline	Long-term settlement	Settlement remaining for 30 day removal	
Low end	0.7 inches	0.2 inches	
0.1 point	1.6	0.6	Settlement remaining
0.2 point	2.4	1.0	for 45 day removal
0.3 point	3.0	1.2	1.0
0.4 point	3.6	1.1	1.0
0.5 point	4.5	1.1	0.9
0.6 point	5.4	0.9	
0.7 point	6.2	0.9	
0.8 point	6.9	0.8	Settlement remaining
0.9 point	7.5	0.9	for 60 day removal
High end	4.0	1.4	1.0

Sections 0.3, 0.4, 0.5 and High end require additional surcharge time to reduce remaining settlement to 1 inch or less. The 30-day requirement can be preserved by increasing the surcharge height to:

0.2 to 0.3	2.5 feet
0.3 to 0.4	3.0 feet
0.4 to 0.5	3.5 feet

Settlements remaining then change to:

Point along embankment centerline	Settlement remaining (30 days)
0.3 point	0.9 inches
0.4 point	0.9
0.5 point	0.8

To meet the settlement requirement at the high end of the embankment, the surcharge on the 0.9 to high end section would have to be increased to 8 feet (3 feet additional). Alternatively, adding 3 feet of surcharge outside of the wall footprint beyond the high end (i.e. 30 feet X 50 feet) would produce the required 1.0 inch of settlement remaining.

Vertical drain treatment is usually installed for some distance outside the wall footprint. An old rule-of-thumb is to carry treatment outside the footprint a distance equal to 1/2 of the depth of compressible soil. This would amount to 15 to 17.5 feet. Another rule-of-thumb for footings is to include the 0.2q stress bulb. This would be about 1/2 the embankment width or 17.5 feet. These rules were intended for rigid structures. Actually MSE walls are very tolerant to differential settlement. Also settlements indicated above were considered along the embankment centerline and settlements along the face of

the wall will be significantly less. It is the writers opinion that 10 to 12 feet outside the wall footprint would be sufficient.

This analysis has established a set of design parameters to meet the given construction and performance requirements. Computer output covering each situation has been preserved and is available.

ATTACHMENT

Sample Output from Computer Program, PV Drain

Explanation of Computer Output:

1. "Program provided by Hayward Baker, Version 1.05.01, August31, 2010," this is the most recent version.

2. Title to indicate project, date, and time of computer run. Units are feet, kips, and days. Unit weight of water was taken as .0624 kips/ft^3. Equivalent drain diameter taken as 0.23 ft, and spacing was 3-foot, triangular. N = equivalent spacing/equivalent drain diameter = 13.70.

3. Surcharge loading (considered in10 time-dependent segments) follows. A = length (30 ft) of segment, B = width (50 ft) of segment. A1 and B1 define the location of the point considered for analysis, relative to this loaded area or segment. A1 = location relative to A-dimension, zero indicates that point is on this boundary. B1 = location relative to B-dimension, 25 feet indicates center of 50-foot wide embankment. Final loading under surcharge conditions for this segment is 2.5 kips/ft^2, (15 ft final height + 5 ft surcharge = 20 ft high. 20 X 0.125 = 2.5 ksf).This load is applied linearly with respect to time over 30 days. A negative number for A1 or B1 indicates that point considered lies outside of the segment area.

Loading number 2 is also 30 feet long and 50 feet wide (as are all segments). The location being considered is at the "0.9" point or 30 feet from the high end of embankment, i.e. between segments 1 and 2. Therefore, relative to area 2, the point is centered on the embankment, and on the boundary with area 1. The final surcharge loading is 2.313 kips/ft^2, also linearly applied but completed in 27 days.

Loading number 3, same outside dimensions, but located one segment away from the location under consideration. Therefore, A1 = 25 ft, and B1 = -30 ft (i.e. 30 feet outside of section 3). Final surcharge loading is 2.063 kips/ft^2, applied linearly over 24 days. Etc. for remaining areas.

4. Final loading is also considered in 10 segments. Area dimensions and point location are identical to that for surcharge loading. For area 1 the final loading magnitude is 1.875 kips/ft^2. That is at the end of the surcharge period the 5-foot surcharge is removed leaving 15 feet, or 15 X 0.125 = 1.875 ksf. The remaining 9 sections follow.

5. Westergaard stress distribution used,
   water table 10 feet deep,
   Delta H for calculations = 4 ft,
   soil compression considered from ground surface to bottom of soil profile, 37.5 feet,
   outfall for drains is 10 feet above static GWT, i.e. a back pressure head of 10 feet of water applied to drains,
   no horizontal drainage was considered.

6. Summary of soil profile and parameters, and secondary settlement parameters.

7. Long-term settlement results; long-term settlement under surcharge conditions (0.784 ft) and under final loading conditions (0.621 ft).

8. Buoyancy effect of soil as it settles below water not considered,
equivalent radius of drain = 0.115 ft,
Delta t for computations = 2.0 days.

9. The following items concern the effect of drain flow capacity, which is considered to change with compression. The important item here is the R-value = 174.01. An R-value of 2 or 3 or less indicates that drain flow capacity will have virtually no effect on results, so expect no effect here.

10. Division of number of vertical increments for each soil for numerical calculation of consolidation with vertical drainage,
calculations terminated after 28 days - results will extend to 30 days,
convergence requirements,
both vertical and horizontal drainage considered,
small strain definition,
m_v changes with compression considered.

11. Table showing degree of consolidation based on surcharge load as a function of time.

12. Total flow rate from drain as a function of time.

13. Table showing primary settlement under surcharge load as a function of time.

14. Table showing degree of consolidation based on design loading as a function of time. Note that a degree of consolidation of 1 or greater here indicates that no settlement will occur at that element after surcharge removal.

15. Table showing primary settlement remaining under design load when surcharge is removed at times indicated up to 30 days. Indicates that total settlement remaining for surcharge removal at 30 days is 0.072 ft (0.86 inches).

16. Table showing expected secondary settlement as a function of time. Indicates that the expected 100-year secondary settlement would be about 0.03 ft.

17. Remainder of output assumes that surcharge load is applied instantaneously and that drainage elements have unlimited flow capacity.

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          ***********************************************
          *                                             *
          *       TIME-SETTLEMENT ANALYSIS OF SOIL      *
          *          CONTAINING VERTICAL DRAINS         *
          *                   COURTESY                  *
          *                HB WICK DRAINS               *
          *   VERSION 1.05.1          AUGUST 31, 2010   *
          *                                             *
          ***********************************************

Off ramp - 0.9 point - 3 ft spacing - variable surcharge

DATE: 12-25-2011
TIME: 16:33

UNITS: FEET-KIPS-DAYS
UNIT WEIGHT OF WATER =0.0624 KIPS/FT CUBED

VERTICAL DRAIN COMPUTATIONS:
(SMALL STRAIN OPTION)

 VERTICAL DRAIN DIAMETER = 0.2300 FEET/METERS.
 VERTICAL DRAIN SPACING (TRIANGULAR) =  3.0000 FEET/METERS.
 N = 13.70.

 SURCHARGE LOADING NUMBER  1:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =    0.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)        LOADING (K/F2 OR Mg/m2)
           0.0               0.000
          30.0               2.500

 SURCHARGE LOADING NUMBER  2:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =    0.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)        LOADING (K/F2 OR Mg/m2)
           0.0               0.000
          27.0               2.313

 SURCHARGE LOADING NUMBER  3:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =  -30.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)        LOADING (K/F2 OR Mg/m2)
           0.0               0.000
          24.0               2.063

 SURCHARGE LOADING NUMBER  4:
 APPLIED AT A DEPTH OF    0.00 FEET/METERS.
 RECTANGULAR AREA LOAD.
 A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
 A1 =  -60.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
    LOAD MAGNITUDE:
        TIME (DAYS)        LOADING (K/F2 OR Mg/m2)
           0.0               0.000
```

```
         21.0                1.813

SURCHARGE LOADING NUMBER  5:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 =  -90.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
         18.0                 1.563

SURCHARGE LOADING NUMBER  6:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -120.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
         15.0                 1.313

SURCHARGE LOADING NUMBER  7:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -150.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
         12.0                 1.063

SURCHARGE LOADING NUMBER  8:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -180.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
          9.0                 0.813

SURCHARGE LOADING NUMBER  9:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -210.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
          6.0                 0.563

SURCHARGE LOADING NUMBER 10:
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -240.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.
   LOAD MAGNITUDE:
       TIME (DAYS)         LOADING (K/F2 OR Mg/m2)
          0.0                 0.000
          3.0                 0.313

FINAL LOADING NUMBER  1 =  1.875 KIPS/FT2 OR Mg/m2
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APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 =    0.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  2 =  1.688 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 =    0.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  3 =  1.500 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 =  -30.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  4 =  1.313 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 =  -60.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  5 =  1.125 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 =  -90.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  6 =  0.938 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -120.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  7 =  0.750 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -150.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  8 =  0.563 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -180.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER  9 =  0.375 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -210.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

FINAL LOADING NUMBER 10 =  0.188 KIPS/FT2 OR Mg/m2
APPLIED AT A DEPTH OF    0.00 FEET/METERS.
RECTANGULAR AREA LOAD.
A =   30.00 FEET/METERS, B =   50.00 FEET/METERS,
A1 = -240.00 FEET/METERS, AND B1 =   25.00 FEET/METERS.

WESTERGAARD STRESS DISTRIBUTION WILL BE USED.

DEPTH TO WATER TABLE = 10.000 FEET/METERS.
DELTA H =  4.0 FEET/METERS.
```

COMPRESSION WILL BE COMPUTED BETWEEN A DEPTH OF 0.000 FEET/METERS
AND THE BOTTOM OF THE DESCRIBED SOIL PROFILE.

HEIGHT OUTFALL ABOVE STATIC GWT = 10.00 FT OR m

NO WICK EXTENSION OR HORIZONTAL DRAINAGE CONSIDERED.

SOIL INFORMATION:

SOIL NO.	THICKNESS FT	GAMMA TOTAL	CR	RR	OCR	Ch SF/DAY	DIA SMEAR	k(und)/k(rem)	Cv SF/DAY
1	7.50	0.1150	0.190	0.040	5.000	1.80000	1.000	1.000	1.20000
2	5.00	0.1150	0.190	0.040	4.000	1.80000	1.000	1.000	1.20000
3	5.00	0.1150	0.190	0.040	3.000	1.80000	1.000	1.000	1.20000
4	5.00	0.1150	0.190	0.040	2.000	1.80000	1.000	1.000	1.20000
5	5.00	0.1150	0.190	0.040	1.800	1.80000	1.000	1.000	1.20000
6	5.00	0.1150	0.190	0.040	1.600	1.80000	1.000	1.000	1.20000
7	5.00	0.1150	0.190	0.040	1.500	1.80000	1.000	1.000	1.20000

SECONDARY SETTLEMENT STARTS AT 28. DAYS (SURCHARGE REMOVED):

SOIL NO.	C(ALPHA-EPSILON)	A.O.S. MOD.
1	0.001	AVERAGE
2	0.005	AVERAGE
3	0.001	AVERAGE
4	0.001	AVERAGE
5	0.005	AVERAGE
6	0.001	AVERAGE
7	0.001	AVERAGE

SOIL NO	DEL H FT.	DEPTH FT.	Po KSF	Pm KSF	SURCHARGE Pf KSF	SURCHARGE DEL S FT.	DESIGN Pf KSF	DESIGN DEL S FT.
1	3.75	1.88	0.216	1.078	2.526	0.368	1.926	0.284
1	3.75	5.63	0.647	3.234	2.768	0.095	2.216	0.080
2	2.50	8.75	1.006	4.025	2.974	0.047	2.462	0.039
2	2.50	11.25	1.216	4.863	3.065	0.040	2.584	0.033
3	2.50	13.75	1.347	4.042	3.083	0.036	2.632	0.029
3	2.50	16.25	1.479	4.436	3.107	0.032	2.683	0.026
4	2.50	18.75	1.610	3.220	3.137	0.029	2.739	0.023
4	2.50	21.25	1.742	3.484	3.173	0.026	2.800	0.021
5	2.50	23.75	1.873	3.372	3.216	0.023	2.866	0.018
5	2.50	26.25	2.005	3.609	3.264	0.021	2.935	0.017
6	2.50	28.75	2.136	3.418	3.318	0.019	3.010	0.015
6	2.50	31.25	2.268	3.628	3.378	0.017	3.088	0.013
7	2.50	33.75	2.399	3.599	3.444	0.016	3.171	0.012
7	2.50	36.25	2.531	3.796	3.514	0.014	3.257	0.011
			TOTAL SETTLEMENT =			0.784		0.621

BUOYANCY OF SUBMERGING SOIL NOT CONSIDERED

EQUIVALENT RADIUS OF DRAIN = 0.1150 FEET/METERS.

DELTA T = 2.0 DAYS.

AVERAGE QW (EPSILON=0) = 0.31000E+03 FT3/DAY OR m3/DAY.
QW(TOP)/QW(BOTTOM = 1.0.
QW CUTS OFF AT 25.00 PERCENT.
QMIN = 0.50000E+01 FT3/DAY OR m3/DAY.

DEPTH	WELL RESIS(QW) AT ULT STRAIN	PERM	M SUB V
1.875	0.18822E+03	0.47747E-02	0.42510E-01

```
 5.625  0.27869E+03  0.13374E-02  0.11907E-01
 8.750  0.28666E+03  0.10746E-02  0.95677E-02
11.250  0.29008E+03  0.97565E-03  0.86864E-02
13.750  0.29216E+03  0.93052E-03  0.82845E-02
16.250  0.29400E+03  0.88965E-03  0.79207E-02
18.750  0.29563E+03  0.85222E-03  0.75875E-02
21.250  0.29708E+03  0.81762E-03  0.72794E-02
23.750  0.29836E+03  0.78540E-03  0.69925E-02
26.250  0.29950E+03  0.75526E-03  0.67242E-02
28.750  0.30051E+03  0.72695E-03  0.64721E-02
31.250  0.30141E+03  0.70028E-03  0.62347E-02
33.750  0.30221E+03  0.67513E-03  0.60108E-02
36.250  0.30293E+03  0.65136E-03  0.57992E-02

 AVERAGE PERMEABILITY = 0.12669E-02 FT/DAY OR m/DAY.
 R = 174.01 BASED ON THE AVERAGE VALUES OF
 PERMEABILITY AND QW. ALSO BASED ON
 THE TOTAL DESCRIBED SOIL DEPTH.
 R = QW/(PERM*DEPTH SQUARED.)

  FOR VERTICAL CONSOLIDATION:
  SOIL NUMBER  1 IS DIVIDED INTO   6 INCREMENTS -   7 NODES.
  M( 1)=  0.15360
  SOIL NUMBER  2 IS DIVIDED INTO   4 INCREMENTS -   5 NODES.
  M( 2)=  0.15360
  SOIL NUMBER  3 IS DIVIDED INTO   4 INCREMENTS -   5 NODES.
  M( 3)=  0.15360
  SOIL NUMBER  4 IS DIVIDED INTO   4 INCREMENTS -   5 NODES.
  M( 4)=  0.15360
  SOIL NUMBER  5 IS DIVIDED INTO   4 INCREMENTS -   5 NODES.
  M( 5)=  0.15360
  SOIL NUMBER  6 IS DIVIDED INTO   4 INCREMENTS -   5 NODES.
  M( 6)=  0.15360
  SOIL NUMBER  7 IS DIVIDED INTO   4 INCREMENTS -   5 NODES.
  M( 7)=  0.15360

  CALCULATIONS WILL BE TERMINATED AT   28. DAYS

  REQUIRED CONVERGENCE TO PRODUCE MAX Q OF0.000100
   FT3/DAY OR m3/DAY AT BOTTOM OF DRAIN

  **************************************************
  COMBINED RADIAL AND VERTICAL DRAINAGE - SMALL STRAIN
  **************************************************

  ***********
  TOP DRAINED
  ***********

  *********************
  Mv CORRECTION APPLIED
  *********************

 DEGREE CONSOLIDATION AT ELEMENTS:
   (BASED ON SURCHARGE LOAD)
  AVG    0.10   0.20   0.30   0.40   0.50   0.60   0.70   0.80   0.90  0.774
 DAYS    8.84  12.20  14.93  17.43  20.05  23.00  26.42   0.00   0.00  30.00
DEPTH
 1.875  0.137  0.253  0.380  0.505  0.626  0.741  0.852  0.000  0.000  0.930
 5.625  0.225  0.368  0.464  0.543  0.617  0.691  0.763  0.000  0.000  0.821
 8.750  0.095  0.236  0.336  0.424  0.509  0.595  0.684  0.000  0.000  0.751
11.250  0.042  0.169  0.266  0.356  0.443  0.533  0.629  0.000  0.000  0.701
13.750  0.018  0.129  0.220  0.307  0.393  0.484  0.581  0.000  0.000  0.656
```

16.250	0.003	0.097	0.184	0.267	0.350	0.441	0.539	0.000	0.000	0.614
18.750	0.000	0.066	0.152	0.235	0.318	0.406	0.501	0.000	0.000	0.576
21.250	0.000	0.037	0.118	0.202	0.286	0.376	0.472	0.000	0.000	0.543
23.750	0.000	0.013	0.085	0.168	0.253	0.344	0.441	0.000	0.000	0.514
26.250	0.000	0.002	0.053	0.133	0.219	0.311	0.409	0.000	0.000	0.483
28.750	0.000	0.000	0.024	0.098	0.183	0.277	0.376	0.000	0.000	0.451
31.250	0.000	0.000	0.010	0.064	0.147	0.241	0.342	0.000	0.000	0.417
33.750	0.000	0.000	0.000	0.033	0.110	0.205	0.306	0.000	0.000	0.381
36.250	0.000	0.000	0.000	0.011	0.073	0.167	0.268	0.000	0.000	0.344
FLOW	0.062	0.202	0.218	0.230	0.217	0.196	0.173	0.000	0.000	0.095

INITIAL FLOW = 0.000 FT3/DAY OR m3/DAY TOTAL FLOW = 3.931 FT3 OR m3.

PRIMARY SETTLEMENT AT ELEMENTS UNDER SURCHARGE LOAD:

DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.050	0.093	0.140	0.186	0.231	0.273	0.314	0.000	0.000	0.342
5.625	0.021	0.035	0.044	0.051	0.058	0.065	0.072	0.000	0.000	0.078
8.750	0.004	0.011	0.016	0.020	0.024	0.028	0.032	0.000	0.000	0.035
11.250	0.002	0.007	0.011	0.014	0.018	0.021	0.025	0.000	0.000	0.028
13.750	0.001	0.005	0.008	0.011	0.014	0.017	0.021	0.000	0.000	0.024
16.250	0.000	0.003	0.006	0.009	0.011	0.014	0.017	0.000	0.000	0.020
18.750	0.000	0.002	0.004	0.007	0.009	0.012	0.015	0.000	0.000	0.017
21.250	0.000	0.001	0.003	0.005	0.007	0.010	0.012	0.000	0.000	0.014
23.750	0.000	0.000	0.002	0.004	0.006	0.008	0.010	0.000	0.000	0.012
26.250	0.000	0.000	0.001	0.003	0.005	0.007	0.009	0.000	0.000	0.010
28.750	0.000	0.000	0.000	0.002	0.004	0.005	0.007	0.000	0.000	0.009
31.250	0.000	0.000	0.000	0.001	0.003	0.004	0.006	0.000	0.000	0.007
33.750	0.000	0.000	0.000	0.001	0.002	0.003	0.005	0.000	0.000	0.006
36.250	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.000	0.000	0.005
TOTAL	0.078	0.157	0.235	0.314	0.392	0.471	0.549	0.000	0.000	0.607

DEGREE CONSOLIDATION AT ELEMENTS:
(BASED ON DESIGN LOAD)

DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.177	0.328	0.492	0.654	0.811	0.960	1.103	0.000	0.000	1.204
5.625	0.266	0.434	0.547	0.641	0.728	0.815	0.900	0.000	0.000	0.969
8.750	0.115	0.285	0.407	0.514	0.616	0.721	0.829	0.000	0.000	0.910
11.250	0.051	0.207	0.327	0.436	0.543	0.654	0.771	0.000	0.000	0.860
13.750	0.023	0.159	0.272	0.380	0.487	0.599	0.719	0.000	0.000	0.811
16.250	0.003	0.120	0.230	0.333	0.437	0.550	0.672	0.000	0.000	0.765
18.750	0.000	0.082	0.190	0.295	0.399	0.510	0.629	0.000	0.000	0.723
21.250	0.000	0.046	0.149	0.255	0.361	0.475	0.596	0.000	0.000	0.687
23.750	0.000	0.017	0.108	0.213	0.321	0.437	0.561	0.000	0.000	0.654
26.250	0.000	0.003	0.068	0.170	0.279	0.397	0.523	0.000	0.000	0.618
28.750	0.000	0.000	0.031	0.126	0.235	0.356	0.484	0.000	0.000	0.579
31.250	0.000	0.000	0.013	0.083	0.190	0.311	0.441	0.000	0.000	0.538
33.750	0.000	0.000	0.000	0.043	0.143	0.265	0.396	0.000	0.000	0.494
36.250	0.000	0.000	0.000	0.014	0.095	0.217	0.349	0.000	0.000	0.447

PRIMARY SETTLEMENT REMAINING FOR DESIGN LOAD:

DAYS	8.84	12.20	14.93	17.43	20.05	23.00	26.42	0.00	0.00	30.00
DEPTH										
1.875	0.234	0.191	0.144	0.098	0.054	0.011	0.000	0.000	0.000	0.000
5.625	0.059	0.045	0.036	0.029	0.022	0.015	0.008	0.000	0.000	0.002
8.750	0.034	0.028	0.023	0.019	0.015	0.011	0.007	0.000	0.000	0.003
11.250	0.031	0.026	0.022	0.018	0.015	0.011	0.007	0.000	0.000	0.005
13.750	0.028	0.024	0.021	0.018	0.015	0.012	0.008	0.000	0.000	0.005
16.250	0.026	0.023	0.020	0.017	0.015	0.012	0.008	0.000	0.000	0.006
18.750	0.023	0.021	0.019	0.016	0.014	0.011	0.009	0.000	0.000	0.006
21.250	0.021	0.020	0.018	0.015	0.013	0.011	0.008	0.000	0.000	0.006
23.750	0.018	0.018	0.016	0.015	0.013	0.010	0.008	0.000	0.000	0.006

26.250	0.017	0.017	0.015	0.014	0.012	0.010	0.008	0.000	0.000	0.006
28.750	0.015	0.015	0.014	0.013	0.011	0.010	0.008	0.000	0.000	0.006
31.250	0.013	0.013	0.013	0.012	0.011	0.009	0.007	0.000	0.000	0.006
33.750	0.012	0.012	0.012	0.012	0.010	0.009	0.007	0.000	0.000	0.006
36.250	0.011	0.011	0.011	0.011	0.010	0.009	0.007	0.000	0.000	0.006
TOTAL	0.543	0.464	0.386	0.307	0.229	0.151	0.101	0.000	0.000	0.072

SECONDARY SETTLEMENT:

DEPTH	To	Tp	SEC COMP RATIO	BEFORE SUR REM	1 YR	5 YR	10 YR	25 YR	50 YR	100 YR
1.88	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.63	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.75	14.	0.	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.01
26.25	14.	0.	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.01
28.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.75	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.25	14.	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			TOTAL	0.00	0.01	0.02	0.02	0.02	0.03	0.03

NOTE:
END OF PRIMARY WAS DETERMINED BY THE SLOPE MATCHING METHOD.
SURCHARGE REMOVED AT 28. DAYS.
Tp EQUALS ZERO ABOVE INDICATES THAT THAT INCREMENT DID NOT REACH END OF PRIMARY BEFORE SURCHARGE REMOVAL. SETTLEMENT FOR THAT INCREMENT WAS COMPUTED USING SURCHARGE REMOVAL AS END OF PRIMARY.

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**************************************************
*  THE FOLLOWING ASSUMES THAT THE TOTAL SURCHARGE  *
*  LOAD IS APPLIED INSTANTANEOUSLY, AND THAT BOTH  *
*  VERTICAL AND HORIZONTAL DRAINAGE ELEMENTS HAVE  *
*  UNLIMITED FLOW CAPACITY - SMALL STRAIN -        *
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TIME TO CONSOLIDATION, QW = INFINITY:
(LOAD APPLIED IMMEDIATELY)

PERC	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
DAYS	0.14	0.29	0.47	0.67	0.90	1.19	1.56	2.09	2.99	30.00

TIME-SETTLEMENT RESULTS (RADIAL DRAINAGE FOR QW = INFINITY):

SOIL NO.	ULT.	3 DAYS	7 DAYS	15 DAYS	30 DAYS	60 DAYS	120 DAYS	240 DAYS	480 DAYS	960 DAYS	1920 DAYS
1	0.463	0.417	0.461	0.463	0.463	0.463	0.463	0.463	0.463	0.463	0.463
2	0.087	0.079	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087
3	0.068	0.061	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
4	0.055	0.050	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
5	0.045	0.040	0.044	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
6	0.036	0.033	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036
7	0.030	0.027	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
TOT	0.784	0.707	0.781	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784

CALCULATIONS HAVE BEEN COMPLETED.

Building and Utility Lines Settlement

I-880 Operational & Safety Improvement Project
Building Located West of RW 17 & 20
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft
Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.000**	**0.000**	0.300	0.300	0.00
CL 2	7.5	7.5	5	0.744	**0.003**	**0.001**	0.747	0.748	0.00
CL 3	-5	20	20	1.464	**0.037**	**0.020**	1.501	1.521	0.03
CL 4	-22.5	37.5	15	2.472	**0.138**	**0.061**	2.610	2.671	0.05
CL 5	-45	60	30	3.768	**0.265**	**0.085**	4.033	4.117	0.08
							Total Settlement (in):		**0.16**

I-880 Operational & Safety Improvement Project

Building Located West of RW 17 & 20

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.000**	**0.000**	0.300	0.300	0.00
CL 2	7.5	7.5	5	0.744	**0.007**	**0.004**	0.751	0.755	0.00
CL 3	-5	20	20	1.464	**0.078**	**0.048**	1.542	1.590	0.08
CL 4	-22.5	37.5	15	2.472	**0.224**	**0.109**	2.696	2.805	0.08
CL 5	-45	60	30	3.768	**0.362**	**0.118**	4.130	4.248	0.11
							Total Settlement (in):		**0.27**

I-880 Operational & Safety Improvement Project

Building Located West of RW 17 & 20

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 1	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 1	12.5	2.5	5	0.300	**0.002**	**0.001**	0.302	0.303	0.00
CL 2	7.5	7.5	5	0.744	**0.032**	**0.017**	0.776	0.793	0.01
CL 3	-5	20	20	1.464	**0.183**	**0.128**	1.647	1.776	0.20
CL 4	-22.5	37.5	15	2.472	**0.363**	**0.190**	2.835	3.025	0.13
CL 5	-45	60	30	3.768	**0.486**	**0.158**	4.254	4.412	0.14
							Total Settlement (in):		**0.48**

I-880 Operational & Safety Improvement Project
Building Located West of RW 17 & 20
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft
Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.188**	**0.007**	0.488	0.495	0.01
CL 2	7.5	7.5	5	0.744	**0.251**	**0.118**	0.995	1.113	0.07
CL 3	-5	20	20	1.464	**0.425**	**0.359**	1.889	2.248	0.45
CL 4	-22.5	37.5	15	2.472	**0.568**	**0.304**	3.040	3.344	0.19
CL 5	-45	60	30	3.768	**0.636**	**0.197**	4.404	4.601	0.17
							Total Settlement (in):		**0.89**

I-880 Operational & Safety Improvement Project
Building Located West of RW 17 & 20
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft
Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.780**	**1.393**	1.080	2.473	0.54
CL 2	7.5	7.5	5	0.744	**0.785**	**1.272**	1.529	2.801	0.39
CL 3	-5	20	20	1.464	**0.811**	**0.769**	2.275	3.044	0.76
CL 4	-22.5	37.5	15	2.472	**0.826**	**0.403**	3.298	3.701	0.23
CL 5	-45	60	30	3.768	**0.802**	**0.222**	4.570	4.792	0.19
							Total Settlement (in):		**2.10**

I-880 Operational & Safety Improvement Project
Building Located West of RW 17 & 20
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft
Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.481**	**0.995**	0.781	1.776	0.54
CL 2	7.5	7.5	5	0.744	**0.491**	**0.915**	1.235	2.151	0.36
CL 3	-5	20	20	1.464	**0.549**	**0.590**	2.013	2.603	0.67
CL 4	-22.5	37.5	15	2.472	**0.598**	**0.355**	3.070	3.425	0.21
CL 5	-45	60	30	3.768	**0.606**	**0.224**	4.374	4.599	0.20
							Total Settlement (in):		**1.98**

I-880 Operational & Safety Improvement Project
Building Located West of RW 17 & 20
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft
Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 1	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 1	12.5	2.5	5	0.300	**0.038**	**0.005**	0.338	0.344	0.01
CL 2	7.5	7.5	5	0.744	**0.112**	**0.087**	0.856	0.944	0.06
CL 3	-5	20	20	1.464	**0.268**	**0.284**	1.732	2.016	0.40
CL 4	-22.5	37.5	15	2.472	**0.401**	**0.272**	2.873	3.146	0.18
CL 5	-45	60	30	3.768	**0.475**	**0.200**	4.243	4.443	0.18
							Total Settlement (in):		**0.83**

I-880 Operational & Safety Improvement Project

Building Located West of RW 17 & 20

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.001**	**0.001**	0.301	0.301	0.00
CL 2	7.5	7.5	5	0.744	**0.015**	**0.014**	0.759	0.772	0.01
CL 3	-5	20	20	1.464	**0.113**	**0.107**	1.577	1.684	0.17
CL 4	-22.5	37.5	15	2.472	**0.253**	**0.176**	2.725	2.901	0.12
CL 5	-45	60	30	3.768	**0.360**	**0.163**	4.128	4.291	0.15
							Total Settlement (in):		**0.46**

I-880 Operational & Safety Improvement Project

Building Located West of RW 17 & 20

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft

Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.000**	**0.000**	0.300	0.300	0.00
CL 2	7.5	7.5	5	0.744	**0.004**	**0.004**	0.748	0.752	0.00
CL 3	-5	20	20	1.464	**0.050**	**0.043**	1.514	1.556	0.07
CL 4	-22.5	37.5	15	2.472	**0.155**	**0.105**	2.627	2.732	0.08
CL 5	-45	60	30	3.768	**0.266**	**0.124**	4.034	4.158	0.12
							Total Settlement (in):		**0.27**

I-880 Operational & Safety Improvement Project
Building Located West of RW 17 & 20
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft
Groundwater El. = 10 ft

Soil Layer	Top of Layer El. (ft)	Bot of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	15	10	0.025	0.13	4.00
CL 2	10	5	0.025	0.13	4.00
CL 3	5	-15	0.025	0.13	5.00
CL 4	-15	-30	0.025	0.13	6.00
CL 5	-30	-60	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12.5	2.5	5	0.300	**0.000**	**0.000**	0.300	0.300	0.00
CL 2	7.5	7.5	5	0.744	**0.002**	**0.001**	0.746	0.747	0.00
CL 3	-5	20	20	1.464	**0.025**	**0.019**	1.489	1.508	0.03
CL 4	-22.5	37.5	15	2.472	**0.096**	**0.061**	2.568	2.630	0.05
CL 5	-45	60	30	3.768	**0.195**	**0.090**	3.963	4.053	0.09
							Total Settlement (in):		**0.17**

I-880 Operational & Safety Improvement Project

Building Located West of RW 18 & 19

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.358**	**1.049**	**0.69**	0.715	1.407	0.66
CL 2	6	11.5	7.5	0.818	**0.345**	**1.023**	**0.68**	1.163	1.842	0.45
CL 3	-9	26.5	22.5	1.682	**0.327**	**0.872**	**0.55**	2.009	2.554	0.70
CL 4	-36	53.5	32.5	3.238	**0.280**	**0.592**	**0.31**	3.518	3.829	0.36
									Total Settlement (in):	**2.17**

I-880 Operational & Safety Improvement Project

Building Located West of RW 18 & 19

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.100**	**0.094**	**-0.01**	0.457	0.451	0.00
CL 2	6	11.5	7.5	0.818	**0.194**	**0.514**	**0.32**	1.013	1.333	0.27
CL 3	-9	26.5	22.5	1.682	**0.253**	**0.674**	**0.42**	1.935	2.357	0.58
CL 4	-36	53.5	32.5	3.238	**0.249**	**0.540**	**0.29**	3.487	3.777	0.34
							Total Settlement (in):			**1.18**

I-880 Operational & Safety Improvement Project

Building Located West of RW 18 & 19

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.011**	**0.016**	**0.01**	0.368	0.374	0.01
CL 2	6	11.5	7.5	0.818	**0.092**	**0.229**	**0.14**	0.911	1.047	0.14
CL 3	-9	26.5	22.5	1.682	**0.187**	**0.492**	**0.31**	1.869	2.175	0.44
CL 4	-36	53.5	32.5	3.238	**0.218**	**0.481**	**0.26**	3.456	3.718	0.31
							Total Settlement (in):			**0.91**

I-880 Operational & Safety Improvement Project

Building Located West of RW 18 & 19

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.001**	**0.002**	**0.00**	0.358	0.360	0.00
CL 2	6	11.5	7.5	0.818	**0.022**	**0.054**	**0.03**	0.840	0.873	0.04
CL 3	-9	26.5	22.5	1.682	**0.094**	**0.241**	**0.15**	1.776	1.924	0.23
CL 4	-36	53.5	32.5	3.238	**0.161**	**0.361**	**0.20**	3.398	3.598	0.24
							Total Settlement (in):			**0.52**

I-880 Operational & Safety Improvement Project
Building Located West of RW 18 & 19
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	17.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	14	3.5	7.5	0.358	**0.000**	**0.001**	**0.00**	0.358	0.358	0.00
CL 2	6	11.5	7.5	0.818	**0.007**	**0.018**	**0.01**	0.825	0.836	0.01
CL 3	-9	26.5	22.5	1.682	**0.047**	**0.118**	**0.07**	1.729	1.800	0.12
CL 4	-36	53.5	32.5	3.238	**0.114**	**0.257**	**0.14**	3.352	3.495	0.18
							Total Settlement (in):			**0.31**

I-880 Operational & Safety Improvement Project
Existing Sewer Located East of RW 18
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	12	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11	6.5	2	0.530	**0.000**	**0.001**	**0.00**	0.530	0.531	0.00
CL 2	6	11.5	7.5	0.818	**0.001**	**0.004**	**0.00**	0.819	0.822	0.00
CL 3	-9	26.5	22.5	1.682	**0.005**	**0.029**	**0.02**	1.687	1.712	0.04
CL 4	-36	53.5	32.5	3.238	**0.021**	**0.090**	**0.07**	3.259	3.327	0.09
							Total Settlement (in):			**0.13**

		I-880 Operational & Safety Improvement Project					Calculated By:	Ranjan	Date:	6/21/2012
		Existing Sewer Located East of RW 18					Checked By:	Lino	Date:	6/22/2012
		Consolidation Settlement								
				Ground Surface El. =			17.5 ft			
				Groundwater El. =			15 ft			

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	12	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11	6.5	2	0.530	**0.000**	**0.025**	**0.03**	0.531	0.556	0.01
CL 2	6	11.5	7.5	0.818	**0.006**	**0.354**	**0.35**	0.825	1.172	0.34
CL 3	-9	26.5	22.5	1.682	**0.036**	**0.726**	**0.69**	1.718	2.408	0.99
CL 4	-36	53.5	32.5	3.238	**0.074**	**0.623**	**0.55**	3.312	3.861	0.65
							Total Settlement (in):			**1.99**

I-880 Operational & Safety Improvement Project
Existing Sewer Located East of RW 18
Consolidation Settlement

Calculated By:	Ranjan	Date:	6/21/2012
Checked By:	Lino	Date:	6/22/2012

Ground Surface El. = 17.5 ft
Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	11	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	10.5	7	1	0.559	**0.076**	**0.249**	**0.17**	0.635	0.808	0.03
CL 2	6	11.5	7.5	0.818	**0.154**	**0.496**	**0.34**	0.972	1.314	0.29
CL 3	-9	26.5	22.5	1.682	**0.272**	**0.787**	**0.52**	1.954	2.469	0.69
CL 4	-36	53.5	32.5	3.238	**0.281**	**0.661**	**0.38**	3.518	3.899	0.43
							Total Settlement (in):			**1.45**

I-880 Operational & Safety Improvement Project

Existing Sewer Located East of RW 18

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 15 ft

Groundwater El. = 12.5 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 2	10.5	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 2	6.5	8.5	8	0.646	**0.103**	**0.325**	**0.22**	0.748	0.971	0.27
CL 3	-9	24	22.5	1.538	**0.200**	**0.541**	**0.34**	1.738	2.079	0.52
CL 4	-36	51	32.5	3.094	**0.207**	**0.440**	**0.23**	3.300	3.534	0.29
							Total Settlement (in):			**1.09**

I-880 Operational & Safety Improvement Project
Existing Sewer Located East of RW 18
Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012
Checked By: Lino Date: 6/22/2012

Ground Surface El. = 14 ft
Groundwater El. = 11.5 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 2	8	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 2	5.2	8.8	5.5	0.663	**0.045**	**0.196**	**0.15**	0.708	0.859	0.14
CL 3	-9	23	22.5	1.481	**0.061**	**0.234**	**0.17**	1.542	1.715	0.31
CL 4	-36	50	32.5	3.036	**0.061**	**0.175**	**0.11**	3.097	3.211	0.15
									Total Settlement (in):	**0.60**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 21)

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	14	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-5D) (ksf)	Stress Increase 2 (See Sheet # C-5D) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12	5.5	4	0.473	**0.000**	**0.000**	**0.00**	0.473	0.473	0.00
CL 2	6	11.5	7.5	0.818	**0.000**	**0.003**	**0.00**	0.818	0.821	0.00
CL 3	-9	26.5	22.5	1.682	**0.001**	**0.025**	**0.02**	1.683	1.707	0.04
CL 4	-36	53.5	32.5	3.238	**0.005**	**0.080**	**0.08**	3.242	3.317	0.10
							Total Settlement (in):			**0.14**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 21)

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	13.5	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-59) (ksf)	Stress Increase 2 (See Sheet # C-510) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	12	5.5	3.5	0.473	**0.000**	**0.001**	**0.00**	0.473	0.473	0.00
CL 2	6	11.5	7.5	0.818	**0.000**	**0.004**	**0.00**	0.819	0.823	0.00
CL 3	-9	26.5	22.5	1.682	**0.001**	**0.034**	**0.03**	1.684	1.717	0.06
CL 4	-36	53.5	32.5	3.238	**0.008**	**0.099**	**0.09**	3.246	3.336	0.12
								Total Settlement (in):		**0.18**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 21)

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	13	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11.5	6	3	0.502	**0.004**	**0.542**	**0.54**	0.506	1.044	0.28
CL 2	6	11.5	7.5	0.818	**0.019**	**0.937**	**0.92**	0.838	1.756	0.72
CL 3	-9	26.5	22.5	1.682	**0.071**	**1.076**	**1.01**	1.753	2.758	1.33
CL 4	-36	53.5	32.5	3.238	**0.104**	**0.739**	**0.63**	3.342	3.977	0.74
							Total Settlement (in):			**3.07**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 21)

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	12	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11	6.5	2	0.530	**0.115**	**0.317**	**0.20**	0.646	0.848	0.07
CL 2	6	11.5	7.5	0.818	**0.211**	**0.580**	**0.37**	1.029	1.399	0.30
CL 3	-9	26.5	22.5	1.682	**0.305**	**0.781**	**0.48**	1.987	2.463	0.63
CL 4	-36	53.5	32.5	3.238	**0.288**	**0.630**	**0.34**	3.525	3.868	0.39
								Total Settlement (in):		**1.39**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 21)

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 17.5 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	12	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	11	6.5	2	0.530	**0.831**	**1.926**	**1.10**	1.361	2.457	0.15
CL 2	6	11.5	7.5	0.818	**0.800**	**1.626**	**0.83**	1.619	2.444	0.40
CL 3	-9	26.5	22.5	1.682	**0.644**	**1.131**	**0.49**	2.326	2.813	0.56
CL 4	-36	53.5	32.5	3.238	**0.410**	**0.673**	**0.26**	3.648	3.910	0.29
							Total Settlement (in):			**1.41**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 21)

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 14 ft

Groundwater El. = 11.5 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	11	10	0.025	0.13	4.00
CL 2	10	2.5	0.025	0.13	5.00
CL 3	2.5	-20	0.025	0.13	6.00
CL 4	-20	-52.5	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	10.5	3.5	1	0.358	**0.150**	**0.745**	**0.60**	0.507	1.103	0.10
CL 2	6	8	7.5	0.617	**0.148**	**0.631**	**0.48**	0.765	1.247	0.48
CL 3	-9	23	22.5	1.481	**0.129**	**0.390**	**0.26**	1.610	1.871	0.44
CL 4	-36	50	32.5	3.036	**0.090**	**0.208**	**0.12**	3.126	3.244	0.16
									Total Settlement (in):	**1.18**

I-880 Operational & Safety Improvement Project

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Existing VCP Sewer Next to RW 28

Consolidation Settlement

Ground Surface El. = 25 ft

Groundwater El. = 17 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 2	17	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 2	15	10	4	1.075	**0.001**	**0.001**	**0.00**	1.076	1.077	0.00
CL 3	4	21	18	1.709	**0.004**	**0.011**	**0.01**	1.713	1.720	0.01
CL 4	-16	41	22	2.861	**0.018**	**0.045**	**0.03**	2.879	2.905	0.03
CL 5	-38	63	23	4.128	**0.031**	**0.075**	**0.04**	4.159	4.203	0.03
							Total Settlement (in):			**0.07**

I-880 Operational & Safety Improvement Project

Calculated By: Ranjan Date: 6/21/2012

Existing VCP Sewer Next to RW 28

Checked By: Lino Date: 6/22/2012

Consolidation Settlement

Ground Surface El. = 25 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 2	18	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-54) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 2	15.5	9.5	5	0.984	**0.054**	**0.202**	**0.15**	1.038	1.186	0.09
CL 3	4	21	18	1.646	**0.141**	**0.506**	**0.37**	1.787	2.152	0.44
CL 4	-16	41	22	2.798	**0.166**	**0.539**	**0.37**	2.965	3.337	0.34
CL 5	-38	63	23	4.066	**0.143**	**0.416**	**0.27**	4.209	4.481	0.19
							Total Settlement (in):			**1.05**

I-880 Operational & Safety Improvement Project

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Existing VCP Sewer Next to RW 28

Consolidation Settlement

Ground Surface El. = 25 ft

Groundwater El. = 18.5 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 2	18.5	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 2	15.5	9.5	5.5	0.953	**0.110**	**0.604**	**0.49**	1.062	1.557	0.27
CL 3	4	21	18	1.615	**0.134**	**0.701**	**0.57**	1.749	2.316	0.66
CL 4	-16	41	22	2.767	**0.126**	**0.560**	**0.43**	2.893	3.327	0.40
CL 5	-38	63	23	4.034	**0.109**	**0.408**	**0.30**	4.143	4.442	0.21
							Total Settlement (in):			**1.54**

I-880 Operational & Safety Improvement Project

Existing VCP Sewer Next to RW 28

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 24 ft

Groundwater El. = 18 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL 2	19	13	0.025	0.13	4.00
CL 3	13	-5	0.025	0.13	5.00
CL 4	-5	-27	0.025	0.13	6.00
CL 5	-27	-50	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase 1 (See Sheet # C-50) (ksf)	Stress Increase 2 (See Sheet # C-50) (ksf)	Net Stress Increase 1-2 (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL 2	16	8	6	0.835	**0.000**	**0.338**	**0.34**	0.835	1.173	0.27
CL 3	4	20	18	1.526	**0.001**	**0.235**	**0.23**	1.528	1.762	0.33
CL 4	-16	40	22	2.678	**0.008**	**0.179**	**0.17**	2.686	2.858	0.18
CL 5	-38	62	23	3.946	**0.015**	**0.156**	**0.14**	3.961	4.101	0.10
							Total Settlement (in):			**0.88**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 1) Located South of RW 228

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	19	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	18.5	3.5	1	0.420	**0.000**	0.420	0.420	0.00
CL 2	16	6	4	0.720	**0.000**	0.720	0.720	0.00
CL 3	7	15	14	1.301	**0.003**	1.301	1.304	0.00
CL 4	-7	29	15	2.107	**0.016**	2.107	2.124	0.02
CL 5	-30	52	20	3.432	**0.042**	3.432	3.474	0.03
						Total Settlement (in):		**0.05**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 1) Located South of RW 228

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	19	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	18.5	3.5	1	0.420	**0.017**	0.420	0.437	0.01
CL 2	16	6	4	0.720	**0.067**	0.720	0.787	0.05
CL 3	7	15	14	1.301	**0.294**	1.301	1.595	0.37
CL 4	-7	29	15	2.107	**0.372**	2.107	2.479	0.32
CL 5	-30	52	20	3.432	**0.284**	3.432	3.716	0.21
							Total Settlement (in):	**0.95**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 1) Located South of RW 228

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	19	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	18.5	3.5	1	0.420	**0.005**	0.420	0.425	0.00
CL 2	16	6	4	0.720	**0.021**	0.720	0.741	0.01
CL 3	7	15	14	1.301	**0.157**	1.301	1.458	0.21
CL 4	-7	29	15	2.107	**0.313**	2.107	2.420	0.27
CL 5	-30	52	20	3.432	**0.314**	3.432	3.746	0.23
							Total Settlement (in):	**0.72**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 1) Located South of RW 228

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	19	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	18.5	3.5	1	0.420	**0.007**	0.420	0.427	0.00
CL 2	16	6	4	0.720	**0.027**	0.720	0.747	0.02
CL 3	7	15	14	1.301	**0.127**	1.301	1.428	0.17
CL 4	-7	29	15	2.107	**0.181**	2.107	2.289	0.16
CL 5	-30	52	20	3.432	**0.164**	3.432	3.596	0.12
							Total Settlement (in):	**0.47**

I-880 Operational & Safety Improvement Project

Proposed Storm Drain (System No. 1) Located South of RW 228

Consolidation Settlement

Calculated By: Ranjan Date: 6/21/2012

Checked By: Lino Date: 6/22/2012

Ground Surface El. = 22 ft

Groundwater El. = 15 ft

Soil Layer	Top of Layer El. (ft)	Bottom of Layer El. (ft)	Cre	Cce	Preconsolidation Pressure (ksf)
CL I	19	18	0.025	0.13	4.00
CL 2	18	14	0.025	0.13	4.00
CL 3	14	0	0.025	0.13	5.00
CL 4	0	-15	0.025	0.13	6.00
CL 5	-20	-40	0.025	0.13	6.00

Soil Layer	Mid Layer El. (ft)	Mid Layer Depth (ft)	Layer Thickness (ft)	Vertical Overburden Stress (ksf)	Stress Increase (See Sheet # C-50) (ksf)	Initial Stress (ksf)	Final Stress (ksf)	Estimated Settlements (in)
CL I	18.5	3.5	1	0.420	**0.000**	0.420	0.420	0.00
CL 2	16	6	4	0.720	**0.000**	0.720	0.720	0.00
CL 3	7	15	14	1.301	**0.003**	1.301	1.304	0.00
CL 4	-7	29	15	2.107	**0.014**	2.107	2.122	0.01
CL 5	-30	52	20	3.432	**0.035**	3.432	3.467	0.03
							Total Settlement (in):	**0.04**

Appendix D

Caltrans Review Comments and EMI Responses

June 25, 2012

EMI Project No. 10-133

RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 92618

Attention: Mr. Garrett Gritz, P.E.

Subject: Responses to Caltrans Review Comments on the Final Geotechnical Design Report
I-880 Operational and Safety Improvements Project
Alameda County, California
04-ALA-880, PM 28.4/29.2
Caltrans Project No. 04000001601 (EA 04-0A7100)

Dear Mr. Gritz:

Earth Mechanics, Inc. (EMI) submitted the Final Geotechnical Design Report (GDR) for the I-880 Operational and Safety Improvement Project, dated April 13, 2012, to Caltrans for review. Earlier versions of this report dated September 6, 2011 and January 10, 2012 were also submitted to Caltrans for review. Caltrans also provided their comments on October 18, 2011 and February 24, 2012. The responses to those comments have been incorporated into the Final Geotechnical Report dated April 13, 2012.

After Caltrans completed their review of the final GDR, the Caltrans reviewer provided comments in a memorandum dated May 3, 2012. Our responses to these comments are documented in this letter. For convenience, Caltrans review comments are provided in italics followed by our responses including section and page numbers (of the revised Final GDR) indicating where changes were made to accommodate the Caltrans reviewer's comments.

1) *Page 6, Section 4.2.1.3:*
Please include geotechnical information on existing embankment fills.

We will add the following existing embankment fill information based on the current field investigation. (See Page 6, Section 4.2.1.3).

"Based on the current field investigation, the approach embankment fills at 23rd Avenue OC and 29th Avenue OC predominantly consist of sandy lean clay and lean clay with sand and gravel with interbedded clayey sand and silty sand. Based on CPT correlations and (Robertson and Campanella, 1989) and laboratory test results, the undrained shear strength of these clayey soils in the existing embankment is about 2,000 psf".

4) *Consolidation lab testing is not in compliance with ASTM standard. This puts the settlement calculations in question. Please explain the reason you used lab testing not conforming to ASTM standard.*

We deleted all the previous consolidation test results and settlement calculations. We added eleven consolidation tests following ASTM procedure of not allowing soil specimen to expand during inundation. These eleven test results and the five consolidation tests performed by URS were used in a new set of settlement calculations. These updated consolidation test results and revised calculations are included in Appendix B and Appendix C, respectively (See Appendix C, Page No. C-50 to C-149).

8) *We requested a chart for each embankment indicating: embankment location, height, safety factors for global slope stability, local slope stability, temporary slope stability and seismic slope stability. This chart is not found.*

We comply. See Table 8-2 and the first paragraph under Section 8.3.2 in Page 29.

11) a) *Settlement monitoring is used as confirmation only, <u>not as a substitute</u> for design calculations and specified mitigation measures.*

RBF has compared the distance to the buildings from the embankments and the estimated settlement provided in Table 8-3 and Table 8-4 of the revised final GDR. At the building located West of the Southern Approach to 23rd Avenue OC Replacement, the settlement varies from 0 to ¾ inch over an approximate building length of 54 feet. At the building located West of the Southern Approach to 29th Avenue OC Replacement, the settlement varies from 0 to 1 inch over an approximate building length of 137 feet. Several references indicate an upper bound of differential settlement of 0.0004 (or 1 inch over 50 feet) can be tolerated. In addition, the worst case of ¾ inch over 50 feet is equivalent to a deflection ratio of 1/800, which is within the limit of 1/500 as indicated by Bjerrum (1963) as the safe limit for no cracking (See Page 30).

Bjerrum, L., 1963, Allowable Settlements of Structures, Proceedings of European Conference on Soil Mechanics and Foundation Engineering, Wiesbaden, Germany, pp. 135-137.

b) *Settlement monitoring program details should be provided in the GDR and Specifications.*

To protect the stake holders from potential claims, the specifications and GDR will require settlement monitoring and photographic documentation before, during and after construction, though no damage is anticipated. The monitoring should include pre-construction, during-construction and post-construction surveys performed by personnel experienced in this type of survey and monitoring. Further, construction will be stopped, if settlement at the buildings exceeds ½ inch (See Page 30).

c) Page 45, 6th bullet from page bottom: What are the "in place protections"?

For utility pipes, in-place protections such as steel casing or encasement are recommended by the structural designers. This is discussed in Page 32 as bullet items. We will modify the 6th bullet from bottom of Page 45 as follows.

"Settlement estimates at nearby buildings, and existing and proposed buried lines in close proximity of fill embankments have been summarized in this report. The structural, civil, utility, drainage and pipe designers should review these settlement estimates and develop mitigations, if necessary. Precautions including distress and settlement monitoring and in-place protections such as steel casing or concrete encasement were recommended in this report".

12) Pipe settlement tolerances and proposed mitigation measures should be reviewed by Caltrans Hydraulic Branch.

RBF Consulting will provide the pipe settlement and mitigation measure to Caltrans Hydraulic Branch for their review.

17) a) Settlement calculations are in question because the consolidation tests did no conform to ASTM standard.

We deleted all the previous consolidation test results and settlement calculations. We added eleven (11) consolidation tests following ASTM procedure of not allowing soil specimen to expand during inundation. These eleven (11) test results and the five (5) consolidation tests performed by URS were used for the latest settlement calculations.

b) The GDR did not mention using wick drains at all. If wick drains are used, wick drain design and specifications are needed in the GDR and Specs.

Wick drains were discussed in Page 28 of the previous version of the report, dated April 13, 2012.

Wick drains are presented in Page 28 of this report. We also added the wick drain design memorandum in Appendix D of this GDR (See Appendix D, Page D-1 through D-13). The wick drain design calculation and memorandum included in Appendix D were prepared by Mr. Robert Goughnour, a specialist in wick drain design and construction. Mr. Goughnour is a consultant for Hayward-Baker and the author of the computer program PVDRAIN which was used for the wick drain design on this project.

c) Wick drain design needs to specify a waiting period.

As presented in the last paragraph of Page 28 of this report, wick drain design included a 30-day waiting period.

d) As mentioned before, settlement monitoring is for confirmation only, not as a substitute for calculations.

Design calculations for the wick drain are included in Appendix C (See Page No. C-101 to C-114).

18) Please show plan revisions showing the over-excavation limits. Please indicate page number where these revisions are found.

We reviewed and confirmed that our recommended overexcavation limits are shown on the wall plan set. The Sheet Numbers are presented below.

Wall 17: Sheet 2	Wall 26: Sheet 1	Wall 224: Sheet 5
Wall 18: Sheet 2	Wall 28: Sheet 2	Wall 228: Sheet 2
Wall 19: Sheet 2	Wall 29: Sheet 2	Wall 230: Sheet 1

19) a) Consultant has provided a copy of the ASTM, however, it shows that the consolidation tests run were not in compliance with ASTM standard.

We deleted all the previous consolidation test results and settlement calculations. We added eleven (11) consolidation tests following ASTM procedure of not allowing soil specimen to expand during inundation. These eleven (11) test results and the five (5) consolidation tests performed by URS were used for the latest settlement calculations.

b) Where are the locations of Borings R-2, R-6, and R-10? These are missing from the LOTB, but should be included.

It was a typo. The borings numbers referred in the responses are R-11-002, R-11-006 and R-11-010. These borings (R-11-002, R-11006 and R-11-010) are shown in the LOTB sheets.

c) Disregarding sample data because they show "significant swelling" is overlooking potential problem areas. This will lead to unconservative design.

We deleted all the previous consolidation test results and re-ran the consolidation tests following ASTM procedure of not allowing soil specimen to expand during inundation. These test results were used for the latest settlement calculations.

d) The revised settlement calculations should be in the GDR as well as in the foundation report. Please indicate page number.

The revised settlement calculations for the embankment and the walls are presented in Appendix C (See Page No. C-50 to C-100).

20) Please see comments #4, 11, 12.

We deleted all the previous consolidation test results and settlement calculations. We added eleven (11) consolidation tests following ASTM procedure of not allowing soil specimen to expand during inundation. These eleven (11) test results and the five (5) consolidation tests performed by URS were used for the latest settlement calculations. The revised settlement values are presented in Table 8-3 and Table 8-4 in Page 31 for buildings, and Table 8-5 in Page 32 for utility lines (See Appendix C, Page No. C-115 to C-149). The settlement calculations for the embankment and walls are presented in Appendix C (See Page No. C-50 to C-100).

22) a) Expansive material should also be discussed in the GDR (as well as the Materials Report), describing locations, impacts and proposed mitigation measures.

The lean clay and fat clay encountered in all of our borings have a medium to high expansion potential. Expansive soils could impose uplift pressures on pavement and lateral swell pressure on retaining structures. Mitigation measures such as lime treatment has been recommended for the pavement. Onsite soils are also not allowed to be re-used as MSE wall and retaining wall backfill (See Section 7.2.2 in Page 22).

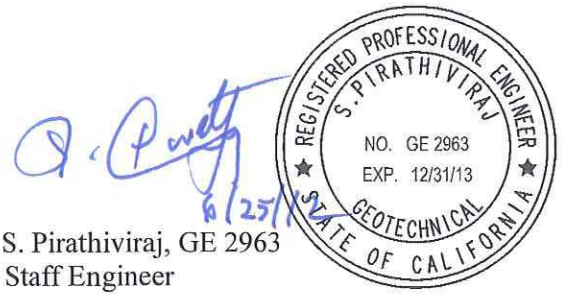
b) Lime treatment of expansive subsoil should be reviewed by Caltrans Materials Branch.

The Final Materials Report dated April 17, 2012 was submitted to District Materials Engineer (Leonardo Deleon, 510-622-5444) for his review. We have not received any additional comments from Mr. Deleon. Based on this, Mr. Deleon has approved our recommendations of using lime treatment to mitigate the expansive subgrade for pavement design.

EMI has incorporated the above responses in this Revised Final Geotechnical Design Report.

Sincerely,

EARTH MECHANICS, INC.



(Raja) S. Pirathiviraj, GE 2963
Senior Staff Engineer

Lino Cheang, GE 2345
Project Manager

Attachment A – Caltrans Review of Geotechnical Design Report (GDR) – 3rd Review

ATTACHMENT A

Caltrans Review of Geotechnical Design Report (GDR) – 3rd Review

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. HALIM MATHKOUR
District Branch Chief
Office of Design –Alameda I

Date: May 03, 2012

Attention: Del Tabancay

File : 4-ALA-880 PM 28.4/29.2
04-0A7100
29th and 23th Ave Overcrossings

From: BETTY LEE, P.E.
Associate Material & Research Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

MAHMOOD MOMENZADEH, P.E.
Chief, Branch C
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: Review of Geotechnical Design Report (GDR) - 3nd Review

We have reviewed Geotechnical Design Report (dated April 13, 2012), from Earth Mechanics Consultants and have the following comments:

1) Page 6, Section 4.2.1.3:
Please include geotechnical information on existing embankment fills.

4) Consolidation lab testing is not in compliance with ASTM standard. This puts the settlement calculations in question. Please explain the reason you used lab testing not conforming to ASTM standard.

8) We requested a chart for each embankment indicating: embankment location, height, safety factors for global slope stability, local slope stability, temporary slope stability and seismic slope stability. This chart is not found.

11) a) Settlement monitoring is used as confirmation only, <u>not as a substitute</u> for design calculations and specified mitigation measures.
b) Settlement monitoring program details should be provided in the GDR and Specifications.
c) Page 45, 6th bullet from page bottom: What are the "in place protections"?

12) Pipe settlement tolerances and proposed mitigation measures should be reviewed by Caltrans Hydraulics Branch.

17) a) Settlement calculations are in question because the consolidation tests did not conform to ASTM standard.

b) The GDR did not mention using wick drains at all. If wick drains are used, wick drain design and specifications are needed in the GDR and Specs.
c) Wick drain design needs to specify a waiting period.
d) As mentioned before, settlement monitoring is for confirmation only, not as a substitute for calculations.

18) Please show Plan revisions showing the over-excavation limits. Please indicate page number where these revisions are found.

19) a) Consultant has provided a copy of the ASTM, however, it shows that the consolidation tests run were not in compliance with ASTM standard.
b) Where are the locations of Borings R-2, R-6, and R-10? These are missing from the LOTB, but should be included.
c) Disregarding sample data because they show "significant swelling" is overlooking potential problem areas. This will lead to unconservative design.
d) The revised settlement calculations should be in the GDR as well as in the foundation report. Please indicate page number.

20) Please see comments #4, 11, 12.

22)
a) Expansive material should also be discussed in the GDR (as well as the Materials Report), describing locations, impacts and proposed mitigation measures.
b) Lime treatment of expansive subsoil should be reviewed by Caltrans Materials Branch.

In your future responses, please include PAGE NUMBERS where revisions are found.

If you have any questions, please call Betty Lee at (510) 286-4825 or Mahmood Momenzadeh at (510) 286-5732.

c: MMomenzadeh, TPokrywka, BLee, Daily File, Route File

BLee/mm

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
DES Geotechnical Design																
2/24/2012	84	Betty Lee	1	Page 6, Section 4.2.1.3	In the original report: "Documentation regarding placement of existing fills was not available for review". Your response: "EMI did not review any documents regarding the placement of the existing fill. Also, it is unlikely the up-graded geotechnical report...will be available because it was constructed in 1974."Your response does not mean the same as what you wrote on the report. Not reviewing or searching for the info is not the same as it "not being available". Please rewrite.	We will rewrite the section as follows: The existing 23rd Avenue OC and 29th Avenue OC and approaches are constructed on top of earthen embankments of varing heights. EMI did not review any documents regarding placement of the existing embankment fills.	A			EMI						
2/24/2012	85	Betty Lee	2	Geotech Report	The legend font is too small, not legible.	We will comply	A			EMI						
2/24/2012	86	Betty Lee	4	Geotech Report	Consolidation lab testing looks faulty. Please provide reference to test used. Please attach the full procedure and description in original form. (Xerox test in its entirety from procedure manual used.)	A Xerox copy has already been provided to the Caltrans Reviewer	C			EMI						
2/24/2012	87	Betty Lee	5	Geotech Report	Please provide the NCEER (1997) reference in its entirety.	We will comply	A			EMI						
2/24/2012	88	Betty Lee	6	Geotech Report	Your response: "...the seismic settlement is expected to be less than 0.25 inches,..." How is the "0.25 inch" determined? Please provide calculations and discuss in text.	We will provide liquefaction analysis of all the borings and discuss in report text.	A			EMI						
2/24/2012	89	Betty Lee	7	Geotech Report	Need to put this in the text. Also, please provide the calculations.	We will comply	A			EMI						
2/24/2012	90	Betty Lee	8	Geotech Report	Your response is contradictory: How can the embankment be "raised" and "cut" at the same time? Please rewrite text with clarity. Please provide chart for each embankment indicating: embankment location, height, safety factors for global slope stability, local slope stability, temporary slope stability, and seismic stability.	We cut into the existing side slope to construct the proposed retaining wall and we place fill to raise the existing grade behind the retaining wall. We will re-write the text for clarification. We will extract the slope stability analyses from the Foundation Report for the Walls, and present in this report.	A			EMI						
2/24/2012	91	Betty Lee	9	Geotech Report	Make sure this is done. Geotechnical Engineer should provide backfill requirement info.	Geotechnical Engineer has reviewed the specifications. Backfill gradation and property requirements are specified in the specifications.	C			EMI						
2/24/2012	92	Betty Lee	11	Geotech Report	Determination of acceptable structures settlement and mitigation measures should be addressed now.	According to RBF, the specifications require the contractor to install settlement monitoring stations for the existing buildings in-question. We will add this statement into the GDR.	A			EMI						

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
2/24/2012	93	Betty Lee	12	Geotech Report	Settlement monitoring program should be provided now by Geotechnical Engineer.	According to the structural designer, for the existing 15" sewer that is crossing the northern approach to 29th Ave OC Replacement (Wall 28), an encasement will be added to protect the existing utility. For the proposed 18" storm drain that is crossing under the southern approach to 29th Ave OC Replacement (Wall 19), a 48" steel casing will be added. Protection is not required for the other two lines in Table 8-3. We will add these settlement mitigations into the GDR.	A			EMI						
2/24/2012	94	Betty Lee	13	Geotech Report	Table 8-4 does not indicate whether the retaining walls are cut or fill walls.	We will add cut wall or fill wall	A			EMI						
2/24/2012	95	Betty Lee	14	Geotech Report	Evaluation of the settlements and mitigation measures should be done now, by the Geotechnical Engineer, not the general engineer.	We discussed with the Project Drainage and Utility Plans preparer, in addition to the 4 lines identified in the GDR, there is only one more utility corridor that will be affected by fill placement. This utility corridor is located in front of the future Abutment 1 of the Ave 29 OC. We performed settlement calculations at this utility corridor, and the resulting maximum settlement is 0.1 inch. Thus, there is no impact. We will include this settlement result in the GDR.	A			EMI						
2/24/2012	96	Betty Lee	15 (a)	Geotech Report	Please discuss in text the purpose of the retention basin. Is it to retain storm water run-off? gasoline run-off? Why is it not designed with a liner?	Based on our discussions with the Drainage designer, this is actually a DETENTION basin. Originally, the detention basin was to be used as a water quality measure for treating storm water run-off, however, this was not accepted by the San Francisco Regional Water Quality Control Board. Storm water run-off is now treated with bio-strips and bio-swales. The use of this detention basin now is for flood control and for conveyance of the strips and swales into the inlets. Also per the drainage designer, a liner is not required for this detention basin.	C			EMI						
2/24/2012	97	Betty Lee	15 (b)	Geotech Report	Comparing the GDR dated September 6, 2011 and the GDR dated January 10, 2012, important information is removed from the 2nd GDR: Paragraph 6: "Soil fines contents are greater than 40%, which is greater than Caltrans PPDG (Caltrans, 2007c) criteria for infiltration basins." Paragraph 8: "Based on the information summarized above, the site is not meeting the Caltrans PPDG requirements for an infiltration basin." Please explain why these sentences are removed on the revised report.	This information pertains to an infiltration basin. It is now a detention basin, therefore, the information was deleted.	C			EMI						

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
2/24/2012	98	Betty Lee	17	Geotech Report	What is the waiting period now?	We removed the waiting period requirement because the maximum calculated settlement at the off-ramp embankment is 1.5" and is less at other locations. As the off-ramp alignment approaches the off-ramp bridge structure, wick drains will be installed between MSE walls and bridge abutment with monitoring to accelerate the settlement period. Based on this, we believe it is too conservative to impose a waiting period.	C			EMI						
2/24/2012	99	Betty Lee	18	Geotech Report	Please show Plan revisions.	RBF Consulting will provide the plans showing the overexcavation limits.	C			EMI						
2/24/2012	100	Betty Lee	19	Geotech Report	Are the embankments the same as the retaining walls? Please also see Comment #4.	Except for a portion of the 29th Ave Off-Ramp, all embankments are confined by retaining walls. Regarding faulty consolidation test results, we have provided a copy of the ASTM guideline already and impact of our consolidation test results have been addressed in responses to review comments of the wall foundation report. We repeat the highlights of that response below. As part of this project, EMI performed a total of 15 consolidation tests on site-specific soil boring samples. Based on the test results, three consolidation test results (Boring R-2 Sample D8, Boring R-6 Sample D7 and Boring R-10 Sample D-4) show a significant swelling. We will not use these test results in our analyses and not include them in our report as well. In addition, five consolidation tests were also performed by URS on similar soils obtained from nearby soil borings. Using the consolidation properties obtained from the remaining EMI consolidation tests plus the URS consolidation tests, we re-evaluated our settlement calculations. The resulting settlement values are less than those reported in the foundation report. We will include these revised settlement calculations in the foundation report.	C			EMI						
2/24/2012	101	Betty Lee	20	Geotech Report	Please see comments #4 and #14.	Please see the above responses and our responses to comments #14.	C			EMI						
2/24/2012	102	Betty Lee	22 (a)	Geotech Report	Please write a section in the GDR describing the expansive material, locations, impacts and proposed mitigation measures.	Section 7.2.2 of the report addresses the expansion potential of the project. As discussed in Section 7.2.2, the on-site soils are expansive. Lime treatment is recommended to stabilize the pavement subgrade. Onsite soils are also not suitable for use as wall backfill.	C			EMI						
2/24/2012	103	Betty Lee	22 (b)	Geotech Report	Abutment backfill requirements should be provided by the Geotechnical engineer.	URS will address the Abutment Backfill requirements in their Foundation Reports for the bridges.	C			EMI						

Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils[a]

By T. L. Youd,[1] Member, ASCE, and I. M. Idriss,[2] Fellow, ASCE

Abstract: Following disastrous earthquakes in Alaska and in Niigata, Japan in 1964, Professors H. B. Seed and I. M. Idriss developed and published a methodology termed the "simplified procedure" for evaluating liquefaction resistance of soils. This procedure has become a standard of practice throughout North America and much of the world. The methodology which is largely empirical, has evolved over years, primarily through summary papers by H. B. Seed and his colleagues. No general review or update of the procedure has occurred, however, since 1985, the time of the last major paper by Professor Seed and a report from a National Research Council workshop on liquefaction of soils. In 1996 a workshop sponsored by the National Center for Earthquake Engineering Research (NCEER) was convened by Professors T. L. Youd and I. M. Idriss with 20 experts to review developments over the previous 10 years. The purpose was to gain consensus on updates and augmentations to the simplified procedure. The following topics were reviewed and recommendations developed: (1) criteria based on standard penetration tests; (2) criteria based on cone penetration tests; (3) criteria based on shear-wave velocity measurements; (4) use of the Becker penetration test for gravelly soil; (4) magnitude scaling factors; (5) correction factors for overburden pressures and sloping ground; and (6) input values for earthquake magnitude and peak acceleration. Probabilistic and seismic energy analyses were reviewed but no recommendations were formulated.

INTRODUCTION

Over the past 25 years a methodology termed the "simplified procedure" has evolved as a standard of practice for evaluating the liquefaction resistance of soils. Following disastrous earthquakes in Alaska and in Niigata, Japan in 1964, Seed and Idriss (1971) developed and published the basic "simplified procedure." That procedure has been modified and improved periodically since that time, primarily through landmark papers by Seed (1979), Seed and Idriss (1982), and Seed et al. (1985). In 1985, Professor Robert V. Whitman convened a workshop on behalf of the National Research Council (NRC) in which 36 experts and observers thoroughly reviewed the state-of-knowledge and the state-of-the-art for assessing liquefaction hazard. That workshop produced a report (NRC 1985) that has become a widely used standard and reference for liquefaction hazard assessment. In January 1996, T. L. Youd and I. M. Idriss convened a workshop of 20 experts to update the simplified procedure and incorporate research findings from the previous decade. This paper summarizes recommendations from that workshop (Youd and Idriss 1997).

To keep the workshop focused, the scope of the workshop was limited to procedures for evaluating liquefaction resistance of soils under level to gently sloping ground. In this context, liquefaction refers to the phenomena of seismic generation of large pore-water pressures and consequent softening of granular soils. Important postliquefaction phenomena, such as residual shear strength, soil deformation, and ground failure, were beyond the scope of the workshop.

The simplified procedure was developed from empirical evaluations of field observations and field and laboratory test data. Field evidence of liquefaction generally consisted of surficial observations of sand boils, ground fissures, or lateral spreads. Data were collected mostly from sites on level to gently sloping terrain, underlain by Holocene alluvial or fluvial sediment at shallow depths (<15 m). The original procedure was verified for, and is applicable only to, these site conditions. Similar restrictions apply to the implementation of the updated procedures recommended in this report.

Liquefaction is defined as the transformation of a granular material from a solid to a liquefied state as a consequence of increased pore-water pressure and reduced effective stress (Marcuson 1978). Increased pore-water pressure is induced by the tendency of granular materials to compact when subjected to cyclic shear deformations. The change of state occurs most readily in loose to moderately dense granular soils with poor drainage, such as silty sands or sands and gravels capped by or containing seams of impermeable sediment. As liquefaction occurs, the soil stratum softens, allowing large cyclic deformations to occur. In loose materials, the softening is also accompanied by a loss of shear strength that may lead to large shear deformations or even flow failure under moderate to high shear stresses, such as beneath a foundation or sloping ground. In moderately dense to dense materials, liquefaction leads to transient softening and increased cyclic shear strains, but a tendency to dilate during shear inhibits major strength loss and large ground deformations. A condition of cyclic mobility or cyclic liquefaction may develop following liquefaction of moderately dense granular materials. Beneath gently sloping to flat ground, liquefaction may lead to ground oscillation or lateral spread as a consequence of either flow deformation or cyclic mobility. Loose soils also compact during liquefaction and reconsolidation, leading to ground settlement. Sand boils may also erupt as excess pore water pressures dissipate.

CYCLIC STRESS RATIO (CSR) AND CYCLIC RESISTANCE RATIO (CRR)

Calculation, or estimation, of two variables is required for evaluation of liquefaction resistance of soils: (1) the seismic demand on a soil layer, expressed in terms of CSR; and (2) the capacity of the soil to resist liquefaction, expressed in terms of CRR. The latter variable has been termed the cyclic stress ratio or the cyclic stress ratio required to generate liquefaction, and has been given different symbols by different writers. For example, Seed and Harder (1990) used the symbol CSR_ℓ, Youd (1993) used the symbol CSRL, and Kramer

[a]Workshop participants are listed on page 311.

[1]Prof., Brigham Young Univ., Provo, UT 84602.

[2]Prof., Univ. of California at Davis, Davis, CA 95616.

Note. Discussion open until September 1, 2001. To extend the closing date one month, a written request must be filed with the ASCE Manager of Journals. The manuscript for this paper was submitted for review and possible publication on January 18, 2000; revised November 14, 2000. This paper is part of the *Journal of Geotechnical and Geoenvironmental Engineering*, Vol. 127, No. 4, April, 2001. ©ASCE, ISSN 1090-0241/01/0004-0297–0313/$8.00 + $.50 per page. Paper No. 22223.

(1996) used the symbol CSR_L to denote this ratio. To reduce confusion and to better distinguish induced cyclic shear stresses from mobilized liquefaction resistance, the capacity of a soil to resist liquefaction is termed the CRR in this report. This term is recommended for engineering practice.

EVALUATION OF CSR

Seed and Idriss (1971) formulated the following equation for calculation of the cyclic stress ratio:

$$\text{CSR} = (\tau_{av}/\sigma'_{vo}) = 0.65(a_{max}/g)(\sigma_{vo}/\sigma'_{vo})r_d \quad (1)$$

where a_{max} = peak horizontal acceleration at the ground surface generated by the earthquake (discussed later); g = acceleration of gravity; σ_{vo} and σ'_{vo} are total and effective vertical overburden stresses, respectively; and r_d = stress reduction coefficient. The latter coefficient accounts for flexibility of the soil profile. The workshop participants recommend the following minor modification to the procedure for calculation of CSR.

For routine practice and noncritical projects, the following equations may be used to estimate average values of r_d (Liao and Whitman 1986b):

$$r_d = 1.0 - 0.00765z \quad \text{for } z \leq 9.15 \text{ m} \quad (2a)$$

$$r_d = 1.174 - 0.0267z \quad \text{for } 9.15 \text{ m} < z \leq 23 \text{ m} \quad (2b)$$

where z = depth below ground surface in meters. Some investigators have suggested additional equations for estimating r_d at greater depths (Robertson and Wride 1998), but evaluation of liquefaction at these greater depths is beyond the depths where the simplified procedure is verified and where routine applications should be applied. Mean values of r_d calculated from (2) are plotted in Fig. 1, along with the mean and range of values proposed by Seed and Idriss (1971). The workshop participants agreed that for convenience in programming spreadsheets and other electronic aids, and to be consistent with past practice, r_d values determined from (2) are suitable for use in routine engineering practice. The user should understand, however, that there is considerable variability in the flexibility and thus r_d at field sites, that r_d calculated from (2) are the mean of a wide range of possible r_d, and that the range of r_d increases with depth (Golesorkhi 1989).

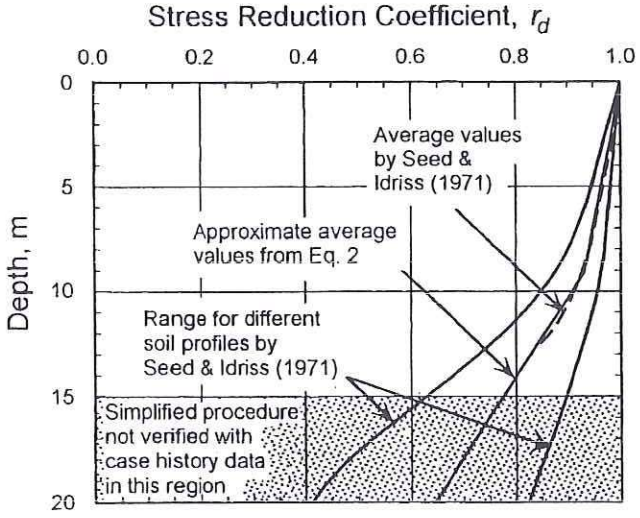


FIG. 1. r_d versus Depth Curves Developed by Seed and Idriss (1971) with Added Mean-Value Lines Plotted from Eq. (2)

For ease of computation, T. F. Blake (personal communication, 1996) approximated the mean curve plotted in Fig. 1 by the following equation:

$$r_d = \frac{(1.000 - 0.4113z^{0.5} + 0.04052z + 0.001753z^{1.5})}{(1.000 - 0.4177z^{0.5} + 0.05729z - 0.006205z^{1.5} + 0.001210z^2)} \quad (3)$$

where z = depth beneath ground surface in meters. Eq. (3) yields essentially the same values for r_d as (2), but is easier to program and may be used in routine engineering practice.

I. M. Idriss [Transportation Research Board (TRB) (1999)] suggested a new procedure for determining magnitude-dependent values of r_d. Application of these r_d require use of a corresponding set of magnitude scaling factors that are compatible with the new r_d. Because these r_d were developed after the workshop and have not been independently evaluated by other experts, the workshop participants chose not to recommend the new factors at this time.

EVALUATION OF LIQUEFACTION RESISTANCE (CRR)

A major focus of the workshop was on procedures for evaluating liquefaction resistance. A plausible method for evaluating CRR is to retrieve and test undisturbed soil specimens in the laboratory. Unfortunately, in situ stress states generally cannot be reestablished in the laboratory, and specimens of granular soils retrieved with typical drilling and sampling techniques are too disturbed to yield meaningful results. Only through specialized sampling techniques, such as ground freezing, can sufficiently undisturbed specimens be obtained. The cost of such procedures is generally prohibitive for all but the most critical projects. To avoid the difficulties associated with sampling and laboratory testing, field tests have become the state-of-practice for routine liquefaction investigations.

Several field tests have gained common usage for evaluation of liquefaction resistance, including the standard penetration test (SPT), the cone penetration test (CPT), shear-wave velocity measurements (V_s), and the Becker penetration test (BPT). These tests were discussed at the workshop, along with associated criteria for evaluating liquefaction resistance. The participants made a conscientious attempt to correlate liquefaction resistance criteria from each of the various field tests to provide generally consistent results, no matter which test is applied. SPTs and CPTs are generally preferred because of the more extensive databases and past experience, but the other tests may be applied at sites underlain by gravelly sediment

TABLE 1. Comparison of Advantages and Disadvantages of Various Field Tests for Assessment of Liquefaction Resistance

Feature (1)	Test Type			
	SPT (2)	CPT (3)	V_s (4)	BPT (5)
Past measurements at liquefaction sites	Abundant	Abundant	Limited	Sparse
Type of stress-strain behavior influencing test	Partially drained, large strain	Drained, large strain	Small strain	Partially drained, large strain
Quality control and repeatability	Poor to good	Very good	Good	Poor
Detection of variability of soil deposits	Good for closely spaced tests	Very good	Fair	Fair
Soil types in which test is recommended	Nongravel	Nongravel	All	Primarily gravel
Soil sample retrieved	Yes	No	No	No
Test measures index or engineering property	Index	Index	Engineering	Index

or where access by large equipment is limited. Primary advantages and disadvantages of each test are listed in Table 1.

SPT

Criteria for evaluation of liquefaction resistance based on the SPT have been rather robust over the years. Those criteria are largely embodied in the CSR versus $(N_1)_{60}$ plot reproduced in Fig. 2. $(N_1)_{60}$ is the SPT blow count normalized to an overburden pressure of approximately 100 kPa (1 ton/sq ft) and a hammer energy ratio or hammer efficiency of 60%. The normalization factors for these corrections are discussed in the section entitled Other Corrections. Fig. 2 is a graph of calculated CSR and corresponding $(N_1)_{60}$ data from sites where liquefaction effects were or were not observed following past earthquakes with magnitudes of approximately 7.5. CRR curves on this graph were conservatively positioned to separate regions with data indicative of liquefaction from regions with data indicative of nonliquefaction. Curves were developed for granular soils with the fines contents of 5% or less, 15%, and 35% as shown on the plot. The CRR curve for fines contents <5% is the basic penetration criterion for the simplified procedure and is referred to hereafter as the "SPT clean-sand base curve." The CRR curves in Fig. 2 are valid only for magnitude 7.5 earthquakes. Scaling factors to adjust CRR curves to other magnitudes are addressed in a later section of this report.

SPT Clean-Sand Base Curve

Several changes to the SPT criteria are recommended by the workshop participants. The first change is to curve the trajectory of the clean-sand base curve at low $(N_1)_{60}$ to a projected intercept of about 0.05 (Fig. 2). This adjustment reshapes the clean-sand base curve to achieve greater consistency with CRR curves developed for the CPT and shear-wave velocity procedures. Seed and Idriss (1982) projected the original curve through the origin, but there were few data to constrain the curve in the lower part of the plot. A better fit to the present empirical data is to bow the lower end of the base curve as indicated in Fig. 2.

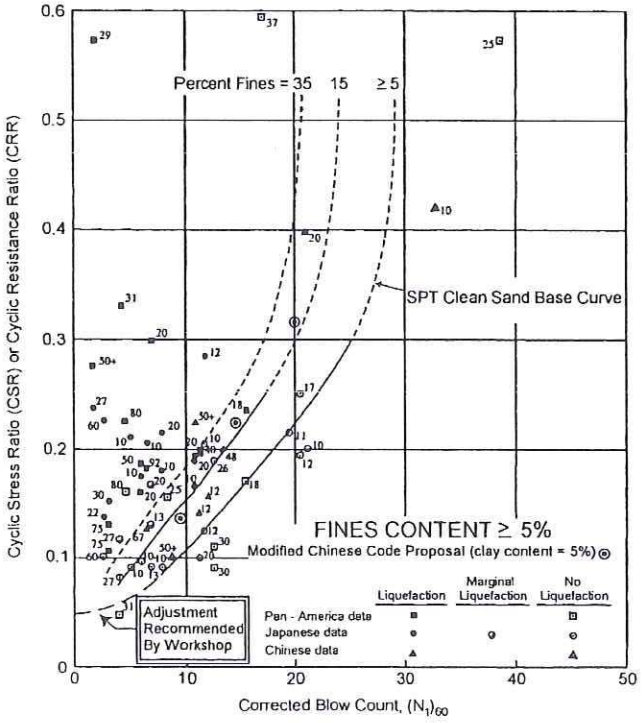


FIG. 2. SPT Clean-Sand Base Curve for Magnitude 7.5 Earthquakes with Data from Liquefaction Case Histories (Modified from Seed et al. 1985)

At the University of Texas, A. F. Rauch (personal communication, 1998), approximated the clean-sand base curve plotted in Fig. 2 by the following equation:

$$\mathrm{CRR}_{7.5} = \frac{1}{34 - (N_1)_{60}} + \frac{(N_1)_{60}}{135} + \frac{50}{[10 \cdot (N_1)_{60} + 45]^2} - \frac{1}{200} \quad (4)$$

This equation is valid for $(N_1)_{60} < 30$. For $(N_1)_{60} \geq 30$, clean granular soils are too dense to liquefy and are classed as nonliquefiable. This equation may be used in spreadsheets and other analytical techniques to approximate the clean-sand base curve for routine engineering calculations.

Influence of Fines Content

In the original development, Seed et al. (1985) noted an apparent increase of CRR with increased fines content. Whether this increase is caused by an increase of liquefaction resistance or a decrease of penetration resistance is not clear. Based on the empirical data available, Seed et al. developed CRR curves for various fines contents reproduced in Fig. 2. A revised correction for fines content was developed by workshop attendees to better fit the empirical database and to better support computations with spreadsheets and other electronic computational aids.

The workshop participants recommend (5) and (6) as approximate corrections for the influence of fines content (FC) on CRR. Other grain characteristics, such as soil plasticity, may affect liquefaction resistance as well as fines content, but widely accepted corrections for these factors have not been developed. Hence corrections based solely on fines content should be used with engineering judgment and caution. The following equations were developed by I. M. Idriss with the assistance of R. B. Seed for correction of $(N_1)_{60}$ to an equivalent clean sand value, $(N_1)_{60cs}$:

$$(N_1)_{60cs} = \alpha + \beta(N_1)_{60} \quad (5)$$

where α and β = coefficients determined from the following relationships:

$$\alpha = 0 \quad \text{for FC} \leq 5\% \quad (6a)$$

$$\alpha = \exp[1.76 - (190/\mathrm{FC}^2)] \quad \text{for } 5\% < \mathrm{FC} < 35\% \quad (6b)$$

$$\alpha = 5.0 \quad \text{for FC} \geq 35\% \quad (6c)$$

$$\beta = 1.0 \quad \text{for FC} \leq 5\% \quad (7a)$$

$$\beta = [0.99 + (\mathrm{FC}^{1.5}/1{,}000)] \quad \text{for } 5\% < \mathrm{FC} < 35\% \quad (7b)$$

$$\beta = 1.2 \quad \text{for FC} \geq 35\% \quad (7c)$$

These equations may be used for routine liquefaction resistance calculations. A back-calculated curve for a fines content of 35% is essentially congruent with the 35% curve plotted in Fig. 2. The back-calculated curve for a fines contents of 15% plots to the right of the original 15% curve.

Other Corrections

Several factors in addition to fines content and grain characteristics influence SPT results, as noted in Table 2. Eq. (8) incorporates these corrections

$$(N_1)_{60} = N_m C_N C_E C_B C_R C_S \quad (8)$$

where N_m = measured standard penetration resistance; C_N = factor to normalize N_m to a common reference effective overburden stress; C_E = correction for hammer energy ratio (ER); C_B = correction factor for borehole diameter; C_R = correction

TABLE 2. Corrections to SPT (Modified from Skempton 1986) as Listed by Robertson and Wride (1998)

Factor (1)	Equipment variable (2)	Term (3)	Correction (4)
Overburden pressure	—	C_N	$(P_a/\sigma'_{vo})^{0.5}$
Overburden pressure	—	C_N	$C_N \leq 1.7$
Energy ratio	Donut hammer	C_E	0.5–1.0
Energy ratio	Safety hammer	C_E	0.7–1.2
Energy ratio	Automatic-trip Donut-type hammer	C_E	0.8–1.3
Borehole diameter	65–115 mm	C_B	1.0
Borehole diameter	150 mm	C_B	1.05
Borehole diameter	200 mm	C_B	1.15
Rod length	<3 m	C_R	0.75
Rod length	3–4 m	C_R	0.8
Rod length	4–6 m	C_R	0.85
Rod length	6–10 m	C_R	0.95
Rod length	10–30 m	C_R	1.0
Sampling method	Standard sampler	C_S	1.0
Sampling method	Sampler without liners	C_S	1.1–1.3

factor for rod length; and C_S = correction for samplers with or without liners.

Because SPT N-values increase with increasing effective overburden stress, an overburden stress correction factor is applied (Seed and Idriss 1982). This factor is commonly calculated from the following equation (Liao and Whitman 1986a):

$$C_N = (P_a/\sigma'_{vo})^{0.5} \quad (9)$$

where C_N normalizes N_m to an effective overburden pressure σ'_{vo} of approximately 100 kPa (1 atm) P_a. C_N should not exceed a value of 1.7 [A maximum value of 2.0 was published in the National Center for Earthquake Engineering Research (NCEER) workshop proceedings (Youd and Idriss 1997), but later was reduced to 1.7 by consensus of the workshop participants] Kayen et al. (1992) suggested the following equation, which limits the maximum C_N value to 1.7, and in these writers' opinion, provides a better fit to the original curve specified by Seed and Idriss (1982):

$$C_N = 2.2/(1.2 + \sigma'_{vo}/P_a) \quad (10)$$

Either equation may be used for routine engineering applications.

The effective overburden pressure σ'_{vo} applied in (9) and (10) should be the overburden pressure at the time of drilling and testing. Although a higher ground-water level might be used for conservatism in the liquefaction resistance calculations, the C_N factor must be based on the stresses present at the time of the testing.

The C_N correction factor was derived from SPT performed in test bins with large sand specimens subjected to various confining pressures (Gibbs and Holtz 1957; Marcuson and Bieganousky 1997a,b). The results of several of these tests are reproduced in Fig. 3 in the form of C_N curves versus effective overburden stress (Castro 1995). These curves indicate considerable scatter of results with no apparent correlation of C_N with soil type or gradation. The curves from looser sands, however, lie in the lower part of the C_N range and are reasonably approximated by (9) and (10) for low effective overburden pressures [200 kPa (<2 tsf)]. The workshop participants endorsed the use of (9) for calculation of C_N, but acknowledged that for overburden pressures >200 kPa (2 tsf) the results are uncertain. Eq. (10) provides a better fit for overburden pressures up to 300 kPa (3 tsf). For pressures >300 kPa (3 tsf), the uncertainty is so great that (9) should not be applied. At these high pressures, which are generally below the depth for which the simplified procedure has been verified, C_N should be estimated by other means.

Another important factor is the energy transferred from the

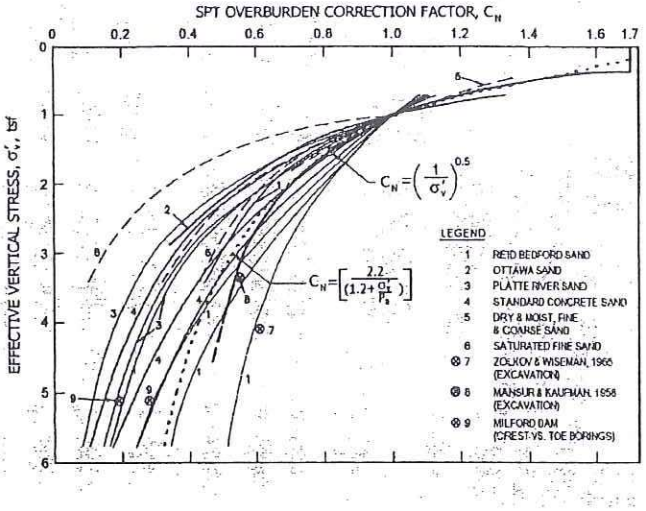


FIG. 3. C_N Curves for Various Sands Based on Field and Laboratory Test Data along with Suggested C_N Curve Determined from Eqs. (9) and (10) (Modified from Castro 1995)

falling hammer to the SPT sampler. An ER of 60% is generally accepted as the approximate average for U.S. testing practice and as a reference value for energy corrections. The ER delivered to the sampler depends on the type of hammer, anvil, lifting mechanism, and the method of hammer release. Approximate correction factors (C_E = ER/60) to modify the SPT results to a 60% energy ratio for various types of hammers and anvils are listed in Table 2. Because of variations in drilling and testing equipment and differences in testing procedures, a rather wide range in the energy correction factor C_E has been observed as noted in the table. Even when procedures are carefully monitored to conform to established standards, such as ASTM D 1586-99, some variation in C_E may occur because of minor variations in testing procedures. Measured energies at a single site indicate that variations in energy ratio between blows or between tests in a single borehole typically vary by as much as 10%. The workshop participants recommend measurement of the hammer energy frequently at each site where the SPT is used. Where measurements cannot be made, careful observation and notation of the equipment and procedures are required to estimate a C_E value for use in liquefaction resistance calculations. Use of good-quality testing equipment and carefully controlled testing procedures conforming to ASTM D 1586-99 will generally yield more consistent energy ratios and C_E with values from the upper parts of the ranges listed in Table 2.

Skempton (1986) suggested and Robertson and Wride (1998) updated correction factors for rod lengths <10 m, borehole diameters outside the recommended interval (65–125 mm), and sampling tubes without liners. Range for these correction factors are listed in Table 2. For liquefaction resistance calculations and rod lengths <3 m, a C_R of 0.75 should be applied as was done by Seed et al. (1985) in formulating the simplified procedure. Although application of rod-length correction factors listed in Table 2 will give more precise $(N_1)_{60}$ values, these corrections may be neglected for liquefaction resistance calculations for rod lengths between 3 and 10 m because rod-length corrections were not applied to SPT test data from these depths in compiling the original liquefaction case history databases. Thus rod-length corrections are implicitly incorporated into the empirical SPT procedure.

A final change recommended by workshop participants is the use of revised magnitude scaling factors rather than the original Seed and Idriss (1982) factors to adjust CRR for earth-

quake magnitudes other than 7.5. Magnitude scaling factors are addressed later in this report.

CPT

A primary advantage of the CPT is that a nearly continuous profile of penetration resistance is developed for stratigraphic interpretation. The CPT results are generally more consistent and repeatable than results from other penetration tests listed in Table 1. The continuous profile also allows a more detailed definition of soil layers than the other tools listed in the table. This stratigraphic capability makes the CPT particularly advantageous for developing liquefaction-resistance profiles. Interpretations based on the CPT, however, must be verified with a few well-placed boreholes preferably with standard penetration tests, to confirm soil types and further verify liquefaction-resistance interpretations.

Fig. 4 provides curves prepared by Robertson and Wride (1998) for direct determination of CRR for clean sands (FC $\leq$ 5%) from CPT data. This figure was developed from CPT case history data compiled from several investigations, including those by Stark and Olson (1995) and Suzuki et al. (1995). The chart, valid for magnitude 7.5 earthquakes only, shows calculated cyclic resistance ratio plotted as a function of dimensionless, corrected, and normalized CPT resistance q_{c1N} from sites where surface effects of liquefaction were or were not observed following past earthquakes. The CRR curve conservatively separates regions of the plot with data indicative of liquefaction from regions indicative of nonliquefaction.

Based on a few misclassified case histories from the 1989 Loma Prieta earthquake, I. M. Idriss suggested that the clean sand curve in Fig. 4 should be shifted to the right by 10–15%. However, a majority of workshop participants supported a curve in its present position, for three reasons. First, purpose of the workshop was to recommend criteria that yield roughly equivalent CRR for the field tests listed in Table 1. Shifting the base curve to the right makes the CPT criteria generally more conservative. For example, for $(N_1)_{60} > 5$, q_{c1N}:$(N_1)_{60}$ ratios between the two clean-sand base curves, plotted in Figs. 4 and 2, respectively, range from 5 to 8—values that are slightly higher than those expected for clean sands. Shifting the CPT base curve to the right by 10 to 15% would increase those ratios to unusually high values ranging from 6 to 9.

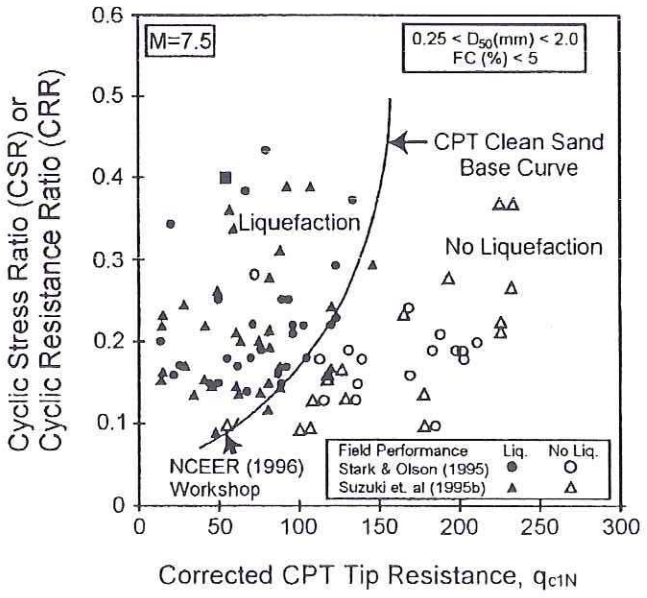


FIG. 4. Curve Recommended for Calculation of CRR from CPT Data along with Empirical Liquefaction Data from Compiled Case Histories (Reproduced from Robertson and Wride 1998)

Second, base curves, such as those plotted in Figs. 2 and 4, were intended to be conservative, but not necessarily to encompass every data point on the plot. Thus the presence of a few points beyond the base curve should be allowable. Finally, several studies have confirmed that the CPT criteria in Fig. 4 are generally conservative. Robertson and Wride (1998) verified these criteria against SPT and other data from sites they investigated. Gilstrap and Youd (1998) compared calculated liquefaction resistances against field performance at 19 sites and concluded that the CPT criteria correctly predicted the occurrence or nonoccurrence of liquefaction with >85% reliability.

The clean-sand base curve in Fig. 4 may be approximated by the following equation (Robertson and Wride 1998):

$$\text{If } (q_{c1N})_{cs} < 50 \quad \text{CRR}_{7.5} = 0.833[(q_{c1N})_{cs}/1{,}000] + 0.05 \tag{11a}$$

$$\text{If } 50 \leq (q_{c1N})_{cs} < 160 \quad \text{CRR}_{7.5} = 93[(q_{c1N})_{cs}/1{,}000]^3 + 0.08 \tag{11b}$$

where $(q_{c1N})_{cs}$ = clean-sand cone penetration resistance normalized to approximately 100 kPa (1 atm).

Normalization of Cone Penetration Resistance

The CPT procedure requires normalization of tip resistance using (12) and (13). This transformation yields normalized, dimensionless cone pentration resistance q_{c1N}

$$q_{c1N} = C_Q(q_c/P_a) \tag{12}$$

where

$$C_Q = (P_a/\sigma'_{vo})^n \tag{13}$$

and where C_Q = normalizing factor for cone penetration resistance; P_a = 1 atm of pressure in the same units used for σ'_{vo}; n = exponent that varies with soil type; and q_c = field cone penetration resistance measured at the tip. At shallow depths C_Q becomes large because of low overburden pressure; however, values >1.7 should not be applied. As noted in the following paragraphs, the value of the exponent n varies from 0.5 to 1.0, depending on the grain characteristics of the soil (Olsen 1997).

The CPT friction ratio (sleeve resistance f_s divided by cone tip resistance q_c) generally increases with increasing fines content and soil plasticity, allowing rough estimates of soil type and fines content to be determined from CPT data. Robertson and Wride (1998) constructed the chart reproduced in Fig. 5 for estimation of soil type. The boundaries between soil types 2–7 can be approximated by concentric circles and can be used to account for effects of soil characteristics on q_{c1N} and CRR. The radius of these circles, termed the soil behavior type index I_c is calculated from the following equation:

$$I_c = [(3.47 - \log Q)^2 + (1.22 + \log F)^2]^{0.5} \tag{14}$$

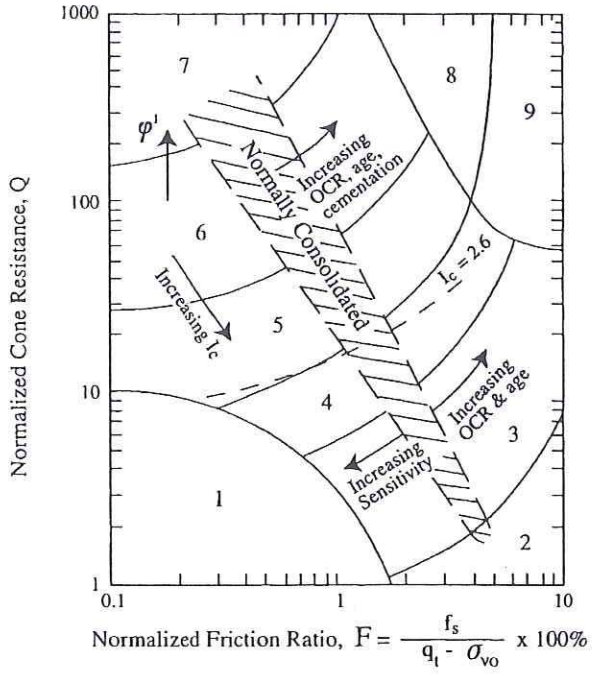
where

$$Q = [(q_c - \sigma_{vo})/P_a][(P_a/\sigma'_{vo})^n] \tag{15}$$

and

$$F = [f_s/(q_c - \sigma_{vo})] \times 100\% \tag{16}$$

The soil behavior chart in Fig. 5 was developed using an exponent n of 1.0, which is the appropriate value for clayey soil types. For clean sands, however, an exponent value of 0.5 is more appropriate, and a value intermediate between 0.5 and 1.0 would be appropriate for silts and sandy silts. Robertson and Wride recommended the following procedure for calculating the soil behavior type index I_c. The first step is to differentiate soil types characterized as clays from soil types characterized as sands and silts. This differentiation is performed by assuming an exponent n of 1.0 (characteristic of clays) and calculating the dimensionless CPT tip resistance Q from the following equation:



1. Sensitive, fine grained
2. Organic soils - peats
3. Clays - silty clay to clay
4. Silt mixtures - clayey silt to silty clay
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravelly sand to dense sand
8. Very stiff sand to clayey sand*
9. Very stiff, fine grained*

**Heavily overconsolidated or cemented*

FIG. 5. CPT-Based Soil Behavior-Type Chart Proposed by Robertson (1990)

$$Q = [(q_c - \sigma_{vo})/P_a][P_a/\sigma'_{vo}]^{1.0} = [(q_c - \sigma_{vo})/\sigma'_{vo}] \quad (17)$$

If the I_c calculated with an exponent of 1.0 is >2.6, the soil is classified as clayey and is considered too clay-rich to liquefy, and the analysis is complete. However, soil samples should be retrieved and tested to confirm the soil type and liquefaction resistance. Criteria such as the Chinese criteria might be applied to confirm that the soil is nonliquefiable. The so-called Chinese criteria, as defined by Seed and Idriss (1982), specify that liquefaction can only occur if all three of the following conditions are met:

1. The clay content (particles smaller than 5 μ) is <15% by weight.
2. The liquid limit is <35%.
3. The natural moisture content is >0.9 times the liquid limit.

If the calculated I_c is <2.6, the soil is most likely granular in nature, and therefore C_q and Q should be recalculated using an exponent n of 0.5. I_c should then be recalculated using (14). If the recalculated I_c is <2.6, the soil is classed as nonplastic and granular. This I_c is used to estimate liquefaction resistance, as noted in the next section. However, if the recalculated I_c is >2.6, the soil is likely to be very silty and possibly plastic. In this instance, q_{c1N} should be recalculated from (12) using an intermediate exponent n of 0.7 in (13). I_c is then recalculated from (14) using the recalculated value for q_{c1N}. This intermediate I_c is then used to calculate liquefaction resistance. In this instance, a soil sample should be retrieved and tested to verify the soil type and whether the soil is liquefiable by other criteria, such as the Chinese criteria.

Because the relationship between I_c and soil type is approximate, the consensus of the workshop participants is that all soils with an I_c of 2.4 or greater should be sampled and tested to confirm the soil type and to test the liquefiability with other criteria. Also, soil layers characterized by an $I_c > 2.6$, but with a normalized friction ratio $F < 1.0\%$ (region 1 of Fig. 5) may be very sensitive and should be sampled and tested. Although not technically liquefiable according to the Chinese criteria, such sensitive soils may suffer softening and strength loss during earthquake shaking.

Calculation of Clean-Sand Equivalent Normalized Cone Penetration Resistance (q_{c1N})$_{cs}$

The normalized penetration resistance (q_{c1N}) for silty sands is corrected to an equivalent clean sand value (q_{c1N})$_{cs}$, by the following relationship:

$$(q_{c1N})_{cs} = K_c q_{c1N} \quad (18)$$

where K_c, the correction factor for grain characteristics, is defined by the following equation (Robertson and Wride 1998):

$$\text{for } I_c \leq 1.64 \quad K_c = 1.0 \quad (19a)$$

$$\text{for } I_c > 1.64 \quad K_c = -0.403I_c^4 + 5.581I_c^3 - 21.63I_c^2 + 33.75I_c - 17.88 \quad (19b)$$

The K_c curve defined by (19) is plotted in Fig. 6. For $I_c > 2.6$, the curve is shown as a dashed line, indicating that soils in this range of I_c are most likely too clay-rich or plastic to liquefy.

With an appropriate I_c and K_c, (11) and (19) can be used to calculate $CRR_{7.5}$. To adjust CRR to magnitudes other than 7.5, the calculated $CRR_{7.5}$ is multiplied by an appropriate magnitude scaling factor. The same magnitude scaling factors are used with CPT data as with SPT data. Magnitude scaling factors are discussed in a later section of this report.

Olsen (1997) and Suzuki et al. (1995) Procedures

Olsen (1997), who pioneered many of the techniques for assessing liquefaction resistance from CPT soundings, suggested a somewhat different procedure for calculating CRR from CPT data. Reasons for recommending the Robertson and Wride (1998) procedure over that of Olsen are the ease of application and the ease with which relationships can be quantified for computer-aided calculations. Results from Olsen's procedure, however, are consistent with results from the procedure proposed here for shallow (<15 m deep) sediment be-

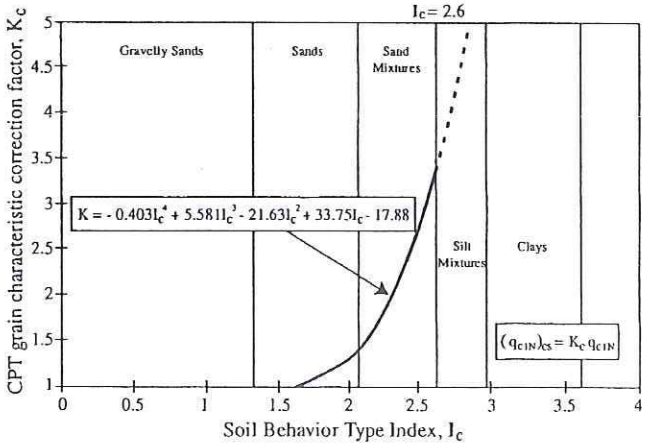


FIG. 6. Grain-Characteristic Correction Factor K_c for Determination of Clean-Sand Equivalent CPT Resistance (Reproduced from Robertson and Wride 1998)

neath level to gently sloping terrain. Olsen (1997) noted that almost any CPT normalization technique will give results consistent with his normalization procedure for soil layers in the 3–15 m depth range. For deeper layers, significant differences may develop between the two procedures. Those depths are also beyond the depth for which the simplified procedure has been verified. Hence any procedure based on the simplified procedure yields rather uncertain results at depths >15 m.

Suzuki et al. (1995) also developed criteria for evaluating CRR from CPT data. Those criteria are slightly more conservative than those of Robertson and Wride (1998) and were considered by the latter investigators in developing the criteria recommended herein.

Correction of Cone Penetration Resistance for Thin Soil Layers

Theoretical as well as laboratory studies indicate that CPT tip resistance is influenced by softer soil layers above or below the cone tip. As a result, measured CPT tip resistance is smaller in thin layers of granular soils sandwiched between softer layers than in thicker layers of the same granular soil. The amount of the reduction of penetration resistance in soft layers is a function of the thickness of the softer layer and the stiffness of the stiffer layers.

Using a simplified elastic solution, Vreugdenhil et al. (1994) developed a procedure for estimating the thick-layer equivalent cone penetration resistance of thin stiff layers lying within softer strata. The correction applies only to thin stiff layers embedded within thick soft layers. Because the corrections have a reasonable trend, but appear rather large, Robertson and Fear (1995) recommended conservative corrections from the $q_{cA}/q_{cB} = 2$ curve sketched in Fig. 7.

Further analysis of field data by Gonzalo Castro and Peter Robertson for the NCEER workshop indicates that corrections based on the $q_{cA}/q_{cB} = 2$ curve may still be too large and not adequately conservative. They suggested, and the workshop participants agreed, that the lower bound of the range of field data plotted by G. Castro in Fig. 7 provides more conservative K_H values that should be used until further field studies and analyses indicate that higher values are viable. The equation for the lower bound of the field curve is

$$K_H = 0.25[((H/d_c)/17) - 1.77]^2 + 1.0 \qquad (20)$$

where H = thickness of the interbedded layer in mm; q_{cA} and q_{cB} = cone resistances of the stiff and soft layers, respectively; and d_c = diameter of the cone in mm (Fig. 7).

V_s

Andrus and Stokoe (1997, 2000) developed liquefaction resistance criteria from field measurements of shear wave velocity V_s. The use of V_s as a field index of liquefaction resistance is soundly based because both V_s and CRR are similarly, but not proportionally, influenced by void ratio, effective confining stresses, stress history, and geologic age. The advantages of using V_s include the following: (1) V_s measurements are possible in soils that are difficult to penetrate with CPT and SPT or to extract undisturbed samples, such as gravelly soils, and at sites where borings or soundings may not be permitted; (2) V_s is a basic mechanical property of soil materials, directly related to small-strain shear modulus; and (3) the small-strain shear modulus is a parameter required in analytical procedures for estimating dynamic soil response and soil-structure interaction analyses.

Three concerns arise when using V_s for liquefaction-resistance evaluations: (1) seismic wave velocity measurements are made at small strains, whereas pore-water pressure buildup and the onset of liquefaction are medium- to high-strain phenomena;

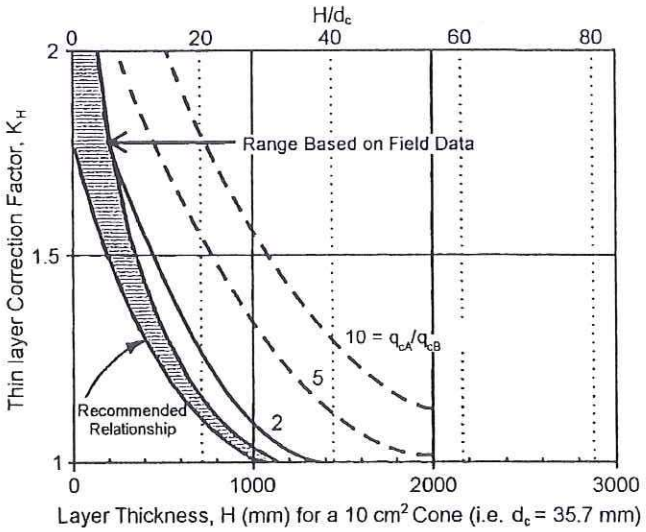


FIG. 7. Thin-Layer Correction Factor K_H for Determination of Equivalent Thick-Layer CPT Resistance (Modified from Robertson and Fear 1995)

(2) seismic testing does not provide samples for classification of soils and identification of nonliquefiable soft clay-rich soils; and (3) thin, low V_s strata may not be detected if the measurement interval is too large. Therefore the preferred practice is to drill sufficient boreholes and conduct in situ tests to detect and delineate thin liquefiable strata, nonliquefiable clay-rich soils, and silty soils above the ground-water table that might become liquefiable should the water table rise. Other tests, such as the SPT or CPT, are needed to detect liquefiable weakly cemented soils that may have high V_s values.

V_s Criteria for Evaluating Liquefaction Resistance

Following the traditional procedures for correcting penetration resistance to account for overburden stress, V_s is also corrected to a reference overburden stress using the following equation (Sykora 1987; Kayen et al. 1992; Robertson et al. 1992):

$$V_{s1} = V_s \left(\frac{P_a}{\sigma'_{vo}}\right)^{0.25} \qquad (21)$$

where V_{s1} = overburden-stress corrected shear wave velocity; P_a = atmospheric pressure approximated by 100 kPa (1 TSF);

and σ'_{vo} = initial effective vertical stress in the same units as P_a. Eq. (21) implicitly assumes a constant coefficient of earth pressure K'_o which is approximately 0.5 for sites susceptible to liquefaction. Application of (21) also implicitly assumes that V_s is measured with both the directions of particle motion and wave propagation polarized along principal stress directions and that one of those directions is vertical (Stokoe et al. 1985).

Fig. 8 compares seven CRR-V_{s1} curves. The "best fit" curve by Tokimatsu and Uchida (1990) was determined from laboratory cyclic triaxial test results for various sands with <10% fines and 15 cycles of loading. The more conservative "lower bound" curve for Tokimatsu and Uchida's laboratory test results is also shown as a lower bound for liquefaction occurrences. The bounding curve by Robertson et al. (1992) was developed using field performance data from sites in Imperial Valley, Calif., along with data from four other sites. The curves by Kayen et al. (1992) and Lodge (1994) are from sites that did and did not liquefy during the 1989 Loma Prieta earthquake. Andrus and Stokoe's (1997) curve was developed for uncemented, Holocene-age soils with 5% or less fines using field performance data from 20 earthquakes and over 50 measurement sites. Andrus and Stokoe (2000) revised this curve based on new information and an expanded database that includes 26 earthquakes and more than 70 measurement sites.

Andrus and Stokoe (1997) proposed the following relationship between CRR and V_{s1}:

$$\text{CRR} = a\left(\frac{V_{s1}}{100}\right)^2 + b\left(\frac{1}{V^*_{s1} - V_{s1}} - \frac{1}{V^*_{s1}}\right) \qquad (22)$$

where V^*_{s1} = limiting upper value of V_{s1} for liquefaction occurrence; and a and b are curve fitting parameters. The first parenthetical term of (22) is based on a modified relationship between V_{s1} and CSR for constant average cyclic shear strain suggested by R. Dobry (personal communication to R. D. Andrus, 1996). The second parenthetical term is a hyperbola with a small value at low V_{s1}, and a very large value as V_{s1} approaches V^*_{s1}, a constant limiting velocity for liquefaction of soils.

CRR versus V_{s1} curves recommended for engineering practice by Andrus and Stokoe (2000) for magnitude 7.5 earthquakes and uncemented Holocene-age soils with various fines contents are reproduced in Fig. 9. Also plotted and presented in Fig. 9 are points calculated from liquefaction case history information for magnitude 5.9–8.3 earthquakes. The three curves shown were determined through an iterative process of varying the values of a and b until nearly all the points indicative of liquefaction were bounded by the curves with the least number of nonliquefaction points plotted in the liquefaction region. The final values of a and b used to draw the curves were 0.022 and 2.8, respectively. Values of V^*_{s1} were assumed to vary linearly from 200 m/s for soils with fines content of 35% to 215 m/s for soils with fines content of 5% or less.

The recommended curves shown in Fig. 9 are dashed above CRR of 0.35 to indicate that field-performance data are limited in that range. Also, they do not extend much below 100 m/s, because there are no field data to support extending them to the origin. The calculated CRR is 0.033 for a V_{s1} of 100 m/s. This minimal CRR value is generally consistent with intercept CRR values assumed for the CPT and SPT procedures. Eq. (22) can be scaled to other magnitude values through use of magnitude scaling factors. These factors are discussed in a later section of this paper.

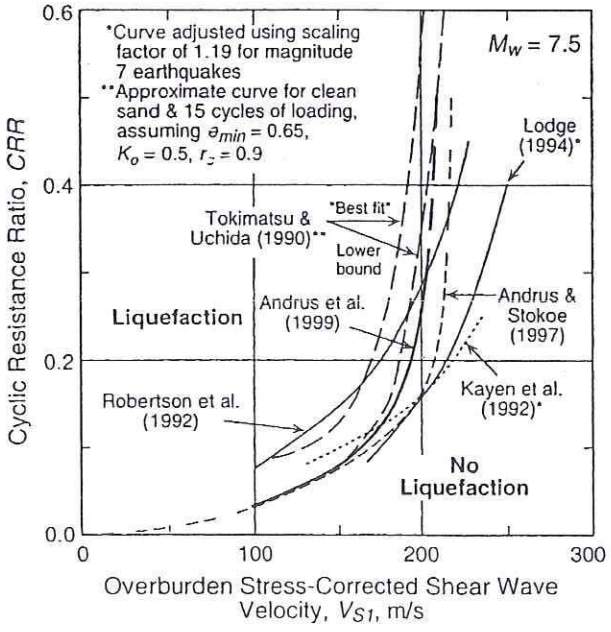


FIG. 8. Comparison of Seven Relationships between Liquefaction Resistance and Overburden Stress-Corrected Shear Wave Velocity for Granular Soils

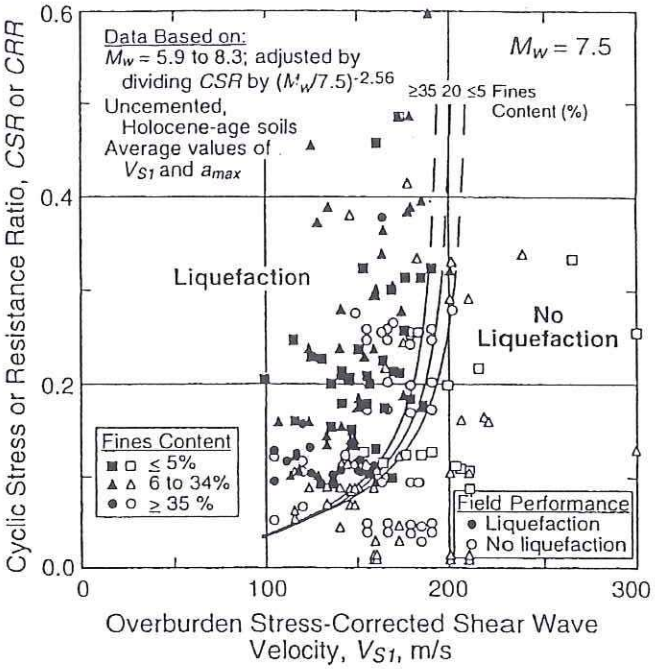


FIG. 9. Liquefaction Relationship Recommended for Clean, Uncemented Soils with Liquefaction Data from Compiled Case Histories (Reproduced from Andrus and Stokoe 2000)

BPT

Liquefaction resistance of nongravelly soils has been evaluated primarily through CPT and SPT, with occasional V_s measurements. CPT and SPT measurements, however, are not generally reliable in gravelly soils. Large gravel particles may interfere with the normal deformation of soil materials around the penetrometer and misleadingly increase penetration resistance. Several investigators have employed large-diameter penetrometers to surmount these difficulties; the Becker penetration test (BPT) in particular has become one of the more effectively and widely used larger tools. The BPT was developed in Canada in the late 1950s and consists of a 168-mm diameter, 3-m-long double-walled casing driven into the ground with a double-acting diesel-driven pile hammer. The hammer impacts are applied at the top of the casing and peneration is continuous. The Becker penetration resistance is

defined as the number of blows required to drive the casing through an increment of 300 mm.

The BPT has not been standardized, and several different types of equipment and procedures have been used. There are currently very few liquefaction sites from which BPT data have been obtained. Thus the BPT cannot be directly correlated with field behavior, but rather through estimating equivalent SPT N-values from BPT data and then applying evaluation procedures based on the SPT. This indirect method introduces substantial additional uncertainty into the calculated CRR.

To provide uniformity, Harder and Seed (1986) recommended newer AP-1000 drill rigs equipped with supercharged diesel hammers, 168-mm outside diameter casing, and a plugged bit. From several sites where both BPT and SPT tests were conducted in parallel soundings, Harder and Seed (1986) developed a preliminary correlation between Becker and standard penetration resistance [Fig. 10(a)]. Additional comparative data compiled since 1986 are plotted in Fig. 10(b). The original Harder and Seed correlation curve (solid line) is drawn in Fig. 10(b) along with dashed curves representing 20% over- and underpredictions of SPT blow counts. These plots indicate that SPT blow counts can be roughly estimated from BPT measurements. These plots indicate that although SPT blow counts can be roughly estimated from BPT measurements, there can be considerable uncertainty for calculating liquefaction resistance because the data scatter is greatest in the range of greatest importance [N-values of 0–30 blows/300 mm (ft)].

A major source of variation in BPT blow counts is deviations in hammer energy. Rather than measuring hammer energy directly, Harder and Seed (1986) monitored bounce-chamber pressures and found that uniform combustion conditions (e.g., full throttle with a supercharger) correlated rather well with variations in Becker blow count. From this information, Harder and Seed developed an energy correction procedure based on measured bounce-chamber pressure.

Direct measurement of transmitted hammer energy could provide a more theoretically rigorous correction for Becker hammer efficiency. Sy and Campanella (1994) and Sy et al. (1995) instrumented a small length of Becker casing with strain gauges and accelerometers to measure transferred energy. They analyzed the recorded data with a pile-driving analyzer to determine strain, force, acceleration, and velocity. The transferred energy was determined by time integration of force times velocity. They were able to verify many of the variations in hammer energy previously identified by Harder and Seed (1986), including effects of variable throttle settings and energy transmission efficiencies of various drill rigs. However, they were unable to reduce the amount of scatter and uncertainty in converting BPT blow counts to SPT blow counts. Because the Sy and Campanella procedure requires considerably more effort than monitoring of bounce-chamber pressure without producing greatly improved results, the workshop participants agreed that the bounce-chamber technique is adequate for routine practice.

Friction along the driven casing also influences penetration resistance. Harder and Seed (1986) did not directly evaluate the effect of casing friction; hence, the correlation in Fig. 10(b) intrinsically incorporates an unknown amount of casing friction. However, casing friction remains a concern for depths >30 m and for measurement of penetration resistance in soft soils underlying thick deposits of dense soil. Either of these circumstances could lead to greater casing friction than is intrinsically incorporated in the Harder and Seed correlation.

The following procedures are recommended for routine practice: (1) the BPT should be conducted with newer AP-1000 drill rigs equipped with supercharged diesel hammers to drive plugged 168-mm outside diameter casing; (2) bounce-chamber pressures should be monitored and adjustments made to measured BPT blow counts to account for variations in diesel hammer combustion efficiency—for most routine applications, correlations developed by Harder and Seed (1986) may be used for these adjustments; and (3) the influence of some casing friction is indirectly accounted for in the Harder and Seed BPT-SPT correlation. This correlation, however, has not been verified and should not be used for depths >30 m or for sites with thick dense deposits overlying loose sands or gravels. For these conditions, mudded boreholes may be needed to reduce casing friction, or specially developed local correlations or sophisticated wave-equation analyses may be applied to quantify frictional effects.

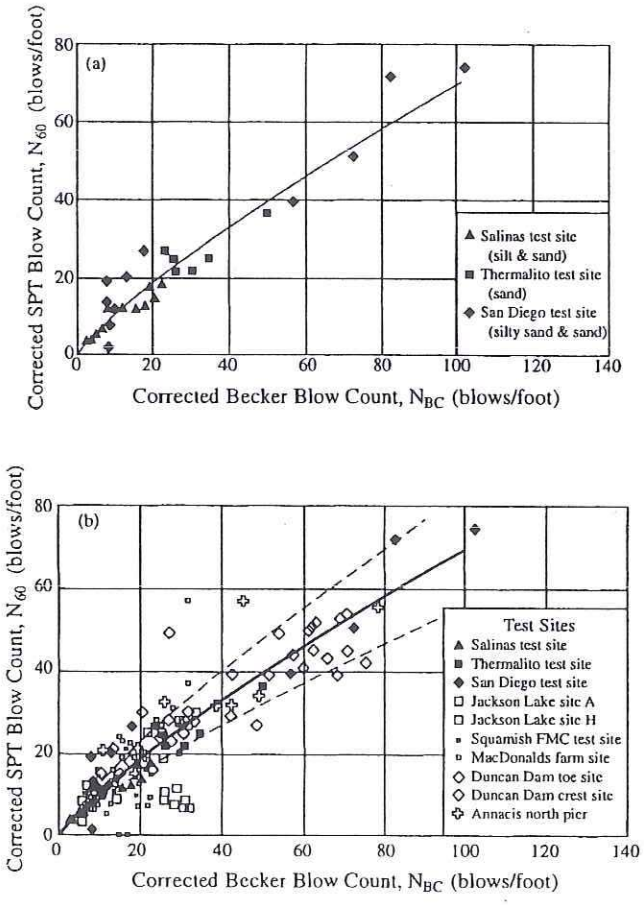


FIG. 10. Correlation between Corrected Becker Penetration Resistance N_{BC} and Corrected SPT Resistance N_{60}: (a) Harder and Seed (1986); (b) Data from Additional Sites (Reproduced from Harder 1997)

MAGNITUDE SCALING FACTORS (MSFs)

The clean-sand base or CRR curves in Figs. 2 (SPT), 4 (CPT), and 10 (V_{s1}) apply only to magnitude 7.5 earthquakes. To adjust the clean-sand curves to magnitudes smaller or larger than 7.5, Seed and Idriss (1982) introduced correction factors termed "magnitude scaling factors (MSFs)." These factors are used to scale the CRR base curves upward or downward on CRR versus $(N_1)_{60}$, q_{c1N}, or V_{s1} plots. Conversely, magnitude weighting factors, which are the inverse of magnitude scaling factors, may be applied to correct CSR for magnitude. Either correcting CRR via magnitude scaling factors, or correcting CSR via magnitude weighting factors, leads to the same final result. Because the original papers by Seed and Idriss were written in terms of magnitude scaling factors, the use of magnitude scaling factors is continued in this report.

To illustrate the influence of magnitude scaling factors on calculated hazard, the equation for factor of safety (FS) against liquefaction is written in terms of CRR, CSR, and MSF as follows:

$$FS = (CRR_{7.5}/CSR)MSF \quad (23)$$

where CSR = calculated cyclic stress ratio generated by the earthquake shaking; and $CRR_{7.5}$ = cyclic resistance ratio for magnitude 7.5 earthquakes. $CRR_{7.5}$ is determined from Fig. 2 or (4) for SPT data, Fig. 4 or (11) for CPT data, or Fig. 9 or (22) for V_{s1} data.

Seed and Idriss (1982) Scaling Factors

Because of the limited amount of field liquefaction data available in the 1970s, Seed and Idriss (1982) were unable to adequately constrain bounds between liquefaction and nonliquefaction regions on CRR plots for magnitudes other than 7.5. Consequently, they developed a set of MSF from average numbers of loading cycles for various earthquake magnitudes and laboratory test results. A representative curve developed by these investigators, showing the number of loading cycles required to generate liquefaction for a given CSR, is reproduced in Fig. 11. The average number of loading cycles for various magnitudes of earthquakes are also noted on the plot. The initial set of magnitude scaling factors was derived by dividing CSR values on the representative curve for the number of loading cycles corresponding to a given earthquake magnitude by the CSR for 15 loading cycles (equivalent to a magnitude 7.5 earthquake). These scaling factors are listed in column 2 of Table 3 and are plotted in Fig. 12. These MSFs have been routinely applied in engineering practice since their introduction in 1982.

Revised Idriss Scaling Factors

In preparing his H. B. Seed Memorial Lecture, I. M. Idriss reevaluated the data that he and the late Professor Seed used to calculate the original (1982) magnitude scaling factors. In so doing, Idriss replotted the data on a log-log plot and suggested that the data should plot as a straight line. He noted, however, that one outlying point had strongly influenced the original analysis, causing the original plot to be nonlinear and characterized by unduly low MSF values for magnitudes <7.5. Based on this reevaluation, Idriss defined a revised set of magnitude scaling factors listed in column 3 of Table 3 and plotted in Fig. 12. The revised MSFs are defined by the following equation:

$$MSF = 10^{2.24}/M_w^{2.56} \quad (24)$$

The workshop participants recommend these revised scaling factors as a lower bound for MSF values.

The revised scaling factors are significantly higher than the original scaling factors for magnitudes <7.5 and somewhat lower than the original factors for magnitudes >7.5. Relative to the original scaling factors, the revised factors lead to a reduced calculated liquefaction hazard for magnitudes <7.5, but increase calculated hazard for magnitudes >7.5.

Ambraseys (1988) Scaling Factors

Field performance data collected since the 1970s for magnitudes <7.5 indicate that the original Seed and Idriss (1982) scaling factors are overly conservative. For example, Ambraseys (1988) analyzed liquefaction data compiled through the mid-1980s and plotted calculated cyclic stress ratios for sites that did or did not liquefy versus $(N_1)_{60}$. From these plots, Ambraseys developed empirical exponential equations that define CRR as a function of $(N_1)_{60}$ and moment magnitude M_w. By holding the value of $(N_1)_{60}$ constant in the equations and taking the ratio of CRR determined for various magnitudes of earthquakes to the CRR for magnitude 7.5 earthquakes, Am-

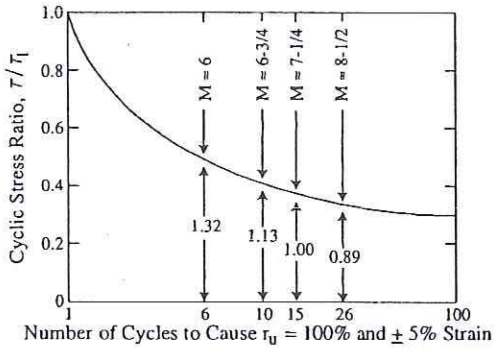


FIG. 11. Representative Relationship between CSR and Number of Cycles to Cause Liquefaction (Reproduced from Seed and Idriss 1982)

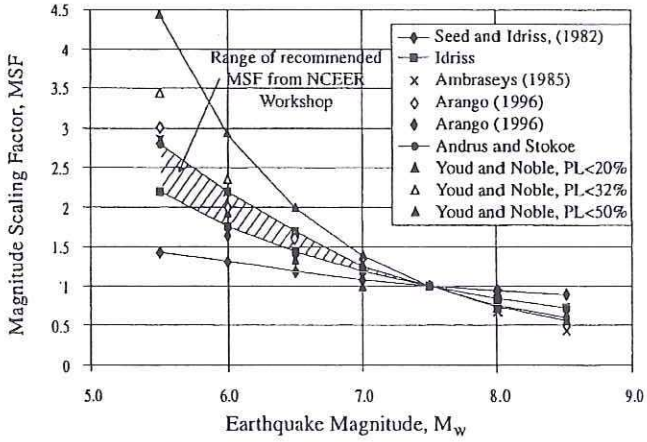


FIG. 12. Magnitude Scaling Factors Derived by Various Investigators (Reproduced from Youd and Noble 1997a)

TABLE 3. Magnitude Scaling Factor Values Defined by Various Investigators (Youd and Noble 1997a)

Magnitude, M (1)	Seed and Idriss (1982) (2)	Idriss[a] (3)	Ambraseys (1988) (4)	Arango (1996) Distance based (5)	Arango (1996) Energy based (6)	Andrus and Stokoe (1997) (7)	Youd and Noble (1997b) P_L < 20% (8)	Youd and Noble (1997b) P_L < 32% (9)	Youd and Noble (1997b) P_L < 50% (10)
5.5	1.43	2.20	2.86	3.00	2.20	2.8	2.86	3.42	4.44
6.0	1.32	1.76	2.20	2.00	1.65	2.1	1.93	2.35	2.92
6.5	1.19	1.44	1.69	1.60	1.40	1.6	1.34	1.66	1.99
7.0	1.08	1.19	1.30	1.25	1.10	1.25	1.00	1.20	1.39
7.5	1.00	1.00	1.00	1.00	1.00	1.00	—	—	1.00
8.0	0.94	0.84	0.67	0.75	0.85	0.8?	—	—	0.73?
8.5	0.89	0.72	0.44	—	—	0.65?	—	—	0.56?

Note: ? = Very uncertain values.
[a]1995 Seed Memorial Lecture, University of California at Berkeley (I. M. Idriss, personal communication to T. L. Youd, 1997).

braseys derived the magnitude scaling factors listed in column 4 of Table 3 and plotted in Fig. 12. For magnitudes <7.5, the MSFs suggested by Ambraseys are significantly larger than both the original factors developed by Seed and Idriss (column 2, Table 3) and the revised factors suggested by Idriss (column 3). Because they are based on observational data, these factors have validity for estimating liquefaction hazard; however, they have not been widely used in engineering practice.

For magnitudes >7.5, Ambraseys factors are significantly lower and much more conservative than the original (Seed and Idriss 1982) and Idriss's revised scaling factors. Because there are few data to constrain Ambraseys' scaling factors for magnitudes >7.5, they are not recommended for hazard evaluation for large earthquakes.

Arango (1996) Scaling Factors

Arango (1996) developed two sets of magnitude scaling factors. The first set (column 5, Table 3) is based on furthest observed liquefaction effects from the seismic energy source, the estimated average peak accelerations at those distant sites, and the seismic energy required to cause liquefaction. The second set (column 6, Table 3) was developed from energy concepts and the relationship derived by Seed and Idriss (1982) between numbers of significant stress cycles and earthquake magnitude. The MSFs listed in column 5 are similar in value (within about 10%) to the MSFs of Ambraseys (column 4), and the MSFs listed in column 6 are similar in value (within about 10%) to the revised MSFs proposed by Idriss (column 3).

Andrus and Stokoe (1997) Scaling Factors

From their studies of liquefaction resistance as a function of shear wave velocity V_s Andrus and Stokoe (1997) drew bounding curves and developed (22) for calculating CRR from V_s for magnitude 7.5 earthquakes. These investigators drew similar bounding curves for sites where surface effects of liquefaction were or were not observed for earthquakes with magnitudes of 6, 6.5, and 7. The positions of the CRR curves were visually adjusted on each graph until a best-fit bound was obtained. Magnitude scaling factors were then estimated by taking the ratio of CRR for a given magnitude to the CRR for magnitude 7.5 earthquakes. These MSFs are quantified by the following equation:

$$\text{MSF} = (M_w/7.5)^{-2.56} \tag{25}$$

MSFs for magnitudes <6 and >7.5 were extrapolated from this equation. The derived MSFs are listed in column 7 of Table 3, and plotted in Fig. 12. For magnitudes <7.5, the MSFs proposed by Andrus and Stokoe are rather close in value (within about 5%) to the MSFs proposed by Ambraseys. For magnitudes >7.5, the Andrus and Stokoe MSFs are slightly smaller than the revised MSFs proposed by Idriss.

Youd and Noble (1997a) Scaling Factors

Youd and Noble (1997a) used a probabilistic or logistic analysis to analyze case history data from sites where effects of liquefaction were or were not reported following past earthquakes. This analysis yielded the following equation, which was updated after publication of the NCEER proceedings (Youd and Idriss 1997):

$$\text{Logit}(P_L) = \ln(P_L/(1 - P_L)) = -7.0351 + 2.1738M_w - 0.2678(N_1)_{60cs} + 3.0265 \ln \text{CRR} \tag{26}$$

where P_L = probability that liquefaction occurred; $1 - P_L$ = probability that liquefaction did not occur; and $(N_1)_{60cs}$ = corrected equivalent clean-sand blow count. For magnitudes <7.5, Youd and Noble recommended direct application of this equation to calculate the CRR for a given probability of liquefaction. In lieu of direct application, Youd and Noble defined three sets of MSFs for use with the simplified procedure. These MSFs are for probabilities of liquefaction occurrence <20, 32, and 50%, respectively, and are defined by the following equations:

$$\text{Probability } P_L < 20\% \quad \text{MSF} = 10^{3.81}/M^{4.53} \text{ for } M_w < 7 \tag{27}$$

$$\text{Probability } P_L < 32\% \quad \text{MSF} = 10^{3.74}/M^{4.33} \text{ for } M_w < 7 \tag{28}$$

$$\text{Probability } P_L < 50\% \quad \text{MSF} = 10^{4.21}/M^{4.81} \text{ for } M_w < 7.75 \tag{29}$$

New Recommendation by Idriss

I. M. Idriss (TRB 1999) proposed a new set of MSFs that are compatible with, and are only to be used with, the magnitude-dependent r_d that he also proposed. These new MSFs have lower values than the revised MSFs listed in Table 3, but slightly higher values than the original Seed and Idriss (1982) MSFs. Because the proposed r_d and associated MSFs have not been published and the factors have not been independently verified, the workshop participants chose not to recommend the new r_d or MSFs at this time.

Recommendations for Engineering Practice

The workshop participants reviewed the MSFs listed in Table 3, and all but one (S. S. C. Liao) agree that the original factors were too conservative and that increased MSFs are warranted for engineering practice for magnitudes <7.5. Rather than recommending a single set of factors, the workshop participants suggest a range of MSFs from which the engineer is allowed to choose factors that are requisite with the acceptable risk for any given application. For magnitudes <7.5, the lower bound for the recommended range is the new MSF proposed by Idriss [column 3 in Table 3, or (23)]. The suggested upper bound is the MSF proposed by Andrus and Stokoe [column 7 in Table 3, or (26)]. The upper-bound values are consistent with MSFs suggested by Ambraseys (1988), Arango (1996), and Youd and Noble (1997a) for $P_L < 20\%$.

For magnitudes >7.5, the new factors recommended by Idriss [column 3 in Table 3; (25)] should be used for engineering practice. These new factors are smaller than the original Seed and Idriss (1982) factors, hence their application leads to increased calculated liquefaction hazard compared to the original factors. Because there are only a few well-documented liquefaction case histories for earthquakes with magnitudes >8, MSFs in that range are poorly constrained by field data. Thus the workshop participants agreed that the greater conservatism embodied in the revised MSF by Idriss (column 3, Table 3) should be recommended for engineering practice.

CORRECTIONS FOR HIGH OVERBURDEN STRESSES, STATIC SHEAR STRESSES, AND AGE OF DEPOSIT

Correction factors K_σ and K_α were developed by Seed (1983) to extrapolate the simplified procedure to larger overburden pressure and static shear stress conditions than those embodied in the case history data set from which the simplified procedure was derived. As noted previously, the simplified procedure was developed and validated only for level to gently sloping sites (low static shear stress) and depths less than about 15 m (low overburden pressures). Thus applications using K_σ and K_α are beyond routine practice and require specialized expertise. Because these factors were discussed at the workshop and some new information was developed, recommendations from those discussions are included here. These rec-

ommendations, however, apply mostly to liquefaction hazard analyses of embankment dams and other large structures. These factors are applied by extending (23) to include K_σ and K_α as follows:

$$FS = (CRR_{7.5}/CSR) \cdot MSF \cdot K_\sigma \cdot K_\alpha \quad (30)$$

K_σ Correction Factor

Cyclically loaded laboratory test data indicate that liquefaction resistance increases with increasing confining stress. The rate of increase, however, is nonlinear. To account for the nonlinearity between CRR and effective overburden pressure, Seed (1983) introduced the correction factor K_σ to extrapolate the simplified procedure to soil layers with overburden pressures >100 kPa. Cyclically loaded, isotropically consolidated triaxial compression tests on sand specimens were used to measure CRR for high-stress conditions and develop K_σ values. By taking the ratio of CRR for various confining pressures to the CRR determined for approximately 100 kPa (1 atm) Seed (1983) developed the original K_σ correction curve. Other investigators have added data and suggested modifications to better define K_σ for engineering practice. For example, Seed and Harder (1990) developed the clean-sand curve reproduced in Fig. 13. Hynes and Olsen (1999) compiled and analyzed an enlarged data set to provide guidance and formulate equations for selecting K_σ values (Fig. 14). The equation they derived for calculating K_σ is

$$K_\sigma = (\sigma'_{vo}/P_a)^{(f-1)} \quad (31)$$

where σ'_{vo}, effective overburden pressure; and P_a, atmospheric pressure, are measured in the same units; and f is an exponent that is a function of site conditions, including relative density, stress history, aging, and overconsolidation ratio. The workshop participants considered the work of previous investigators and recommend the following values for f (Fig. 15). For relative densities between 40 and 60%, $f = 0.7-0.8$; for relative densities between 60 and 80%, $f = 0.6-0.7$. Hynes and Olsen recommended these values as minimal or conservative estimates of K_σ for use in engineering practice for both clean and silty sands, and for gravels. The workshop participants concurred with this recommendation.

K_α Correction Factor for Sloping Ground

The liquefaction resistance of dilative soils (moderately dense to dense granular materials under low confining stress) increases with increased static shear stress. Conversely, the liquefaction resistance of contractive soils (loose soils and moderately dense soils under high confining stress) decreases with increased static shear stresses. To incorporate the effect of static shear stresses on liquefaction resistance, Seed (1983) introduced a correction factor K_α. To generate values for this factor, Seed normalized the static shear stress τ_{st} acting on a plane with respect to the effective vertical stress σ'_{vo} yielding a parameter α, where

$$\alpha = \tau_{st}/\sigma'_{vo} \quad (32)$$

Cyclically loaded triaxial compression tests were then used to empirically determine values of the correction factor K_α as a function of α.

For the NCEER workshop, Harder and Boulanger (1997) reviewed past publications, test results, and analyses of K_α. They noted that a wide range of K_α values have been proposed, indicating a lack of convergence and a need for continued research. The workshop participants agreed with this assessment. Although curves relating K_α to α have been published (Harder and Boulanger 1997), these curves should not be used

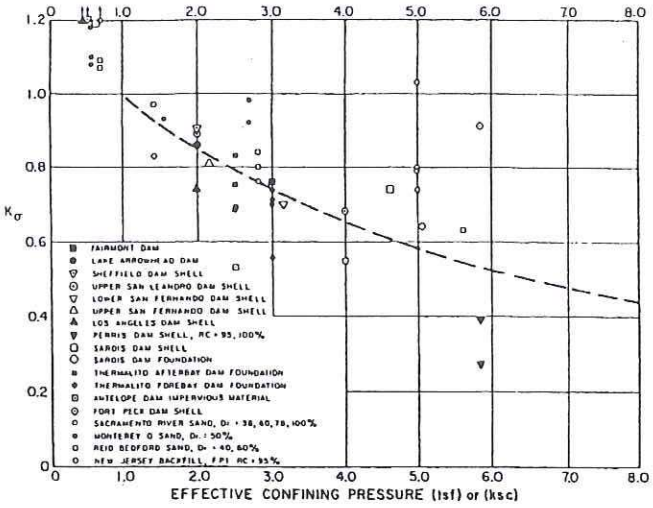


FIG. 13. K_σ-Values Determined by Various Investigators (Reproduced from Seed and Harder 1990)

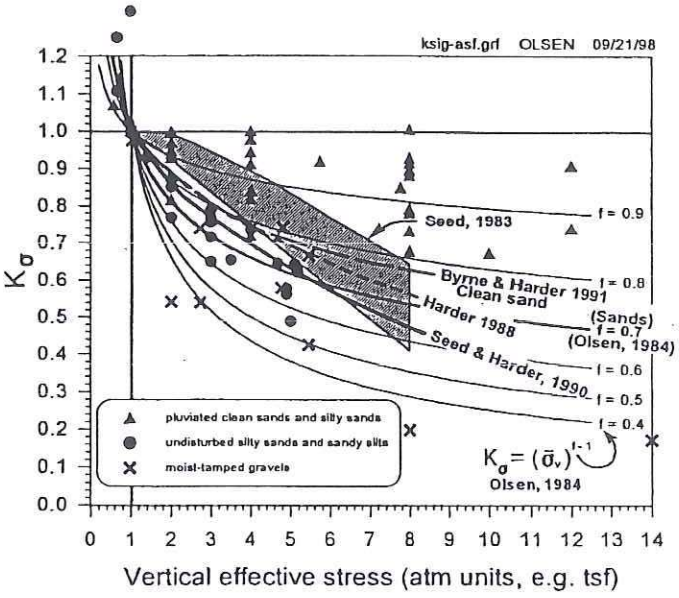


FIG. 14. Laboratory Data and Compiled K_σ Curves (Reproduced from Hynes and Olsen 1999)

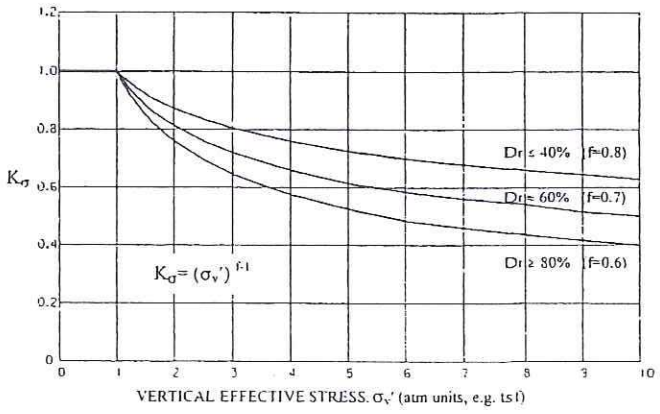


FIG. 15. Recommended Curves for Estimating K_α for Engineering Practice

by nonspecialists in geotechnical earthquake engineering or in routine engineering practice.

Influence of Age of Deposit

Several investigators have noted that liquefaction resistance of soils increases with age. For example, Seed (1979) observed significant increases in liquefaction resistance with aging of reconstituted sand specimens tested in the laboratory. Increases of as much as 25% in cyclic resistance ratio were noted between freshly constituted and 100-day-old specimens. Youd and Hoose (1977) and Youd and Perkins (1978) noted that liquefaction resistance increases markedly with geologic age. Sediments deposited within the past few thousand years are generally much more susceptible to liquefaction than older Holocene sediments; Pleistocene sediments are even more resistant; and pre-Pleistocene sediments are generally immune to liquefaction. Although qualitative time-dependent increases have been documented as noted above, few quantitative data have been collected. In addition, the factors causing increased liquefaction resistance with age are poorly understood. Consequently, verified correction factors for age have not been developed.

In the absence of quantitative correction factors, engineering judgment is required to estimate the liquefaction resistance of sediments more than a few thousand years old. For deeply buried sediments dated as more than a few thousand years old, some knowledgeable engineers have omitted application of the K_σ factor as partial compensation for the unquantified, but substantial increase of liquefaction resistance with age. For man-made structures, such as thick fills and embankment dams, aging effects are minimal, and corrections for age should not be applied in calculating liquefaction resistance.

SEISMIC FACTORS

Application of the simplified procedure for evaluating liquefaction resistance requires estimates of two ground motion parameters—earthquake magnitude and peak horizontal ground acceleration. These factors characterize duration and intensity of ground shaking, respectively. The workshop addressed the following questions with respect to selection of magnitude and peak acceleration values for liquefaction resistance analyses.

Earthquake Magnitude

Records from recent earthquakes, such as 1979 Imperial Valley, 1988 Armenia, 1989 Loma Prieta, 1994 Northridge, and 1995 Kobe, indicate that the relationship between duration and magnitude is rather uncertain and that factors other than magnitude also influence duration. For example, unilateral faulting, in which rupture begins at one end of the fault and propagates to the other, usually produces longer shaking duration for a given magnitude than bilateral funding, in which slip begins near the midpoint on the fault and propagates in both directions simultaneously. Duration also generally increases with distance from the seismic energy source and may vary with tectonic province, site conditions, and bedrock topography (basin effects).

Question: Should correction factors be developed to adjust duration of shaking to account for the influence of earthquake source mechanism, fault rupture mode, distance from the energy source, basin effects, etc.?

Answer: Faulting characteristics and variations in shaking duration are difficult to predict in advance of an earthquake event. The influence of distance generally is of secondary importance within the range of distances to which damaging liquefaction effects commonly develop. Basin effects are not yet sufficiently predictable to be adequately accounted for in engineering practice. Thus the workshop participants recommend continued use of the generally conservative relationship between magnitude and duration that is embodied in the simplified procedure.

Question: An important difference between eastern U.S. earthquakes and western U.S. earthquakes is that eastern ground motions are generally richer in high-frequency energy and thus could generate more significant stress cycles and equivalently longer durations than western earthquakes of the same magnitude. Is a correction needed to account for higher frequencies of motions generated by eastern U.S. earthquakes?

Answer: The high-frequency motions of eastern earthquakes are generally limited to near-field rock sites. High-frequency motions attenuate or are damped out rather quickly as they propagate through soil layers. This filtering action reduces the high-frequency energy at soil sites and thus reduces differences in numbers of significant loading cycles. Because liquefaction occurs only within soil strata, duration differences on soil sites between eastern and western earthquakes are not likely to be great. Without more instrumentally recorded data from which differences in ground motion characteristics can be quantified, there is little basis for the development of additional correction factors for eastern localities.

Another difference between eastern and western U.S. earthquakes is that strong ground motions generally propagate to greater distances in the east than in the west. By applying present state-of-the-art procedures for estimating peak ground acceleration at eastern sites, differences in amplitudes of ground motions between western and eastern earthquakes are properly taken into account.

Question: Which magnitude scale should be used for selection of earthquake magnitudes for liquefaction resistance analyses?

Answer: Seismologists commonly calculate earthquake magnitudes using five different scales: (1) local or Richter magnitude M_L; (2) surface-wave magnitude M_s; (3) short-period body-wave magnitude m_b; (4) long-period body-wave magnitude m_B; and (5) moment magnitude M_w. Moment magnitude, the scale most commonly used for engineering applications, is the scale preferred for calculation of liquefaction

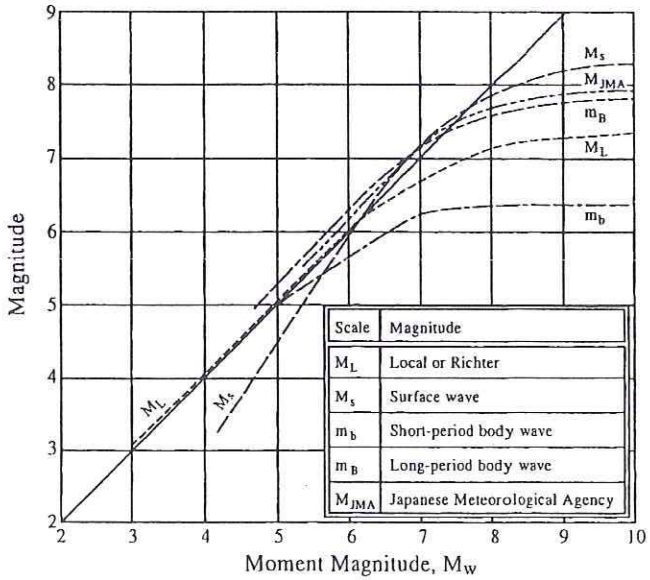


FIG. 16. Relationship between Moment M_w and Other Magnitude Scales (Reproduced from Heaton et al. Unpublished Report, 1982)

resistance. As Fig. 16 shows, magnitudes from other scales may be substituted directly for M_w within the following limitations—$M_L < 6$, $m_B < 7.5$, and $6 < M_s < 8$—m_b, a scale commonly used for eastern U.S. earthquakes, may be used for magnitudes between 5 and 6, provided m_b values are corrected to equivalent M_w values. The curves plotted in Fig. 16 may be used for this adjustment (Idriss 1985).

Peak Acceleration

In the simplified procedure, peak horizontal acceleration a_{max} is used to characterize the intensity of ground shaking. To provide guidance for estimation of a_{max}, the workshop addressed the following questions.

Question: What procedures are preferred for estimating a_{max} at potentially liquefiable sites?

Answer: The following methods, in order of preference, may be used for estimating a_{max}:

1) The preferred method for estimating a_{max} is through empirical correlations of a_{max} with earthquake magnitude, distance from the seismic energy source, and local site conditions. Several correlations have been published for estimating a_{max} for sites on bedrock or stiff to moderately stiff soils. Preliminary attenuation relationships have also been developed for a limited range of soft soil sites (Idriss 1991). Selection of an attenuation relationship should be based on such factors as region of the country, type of faulting, and site condition.

2) For soft sites and other soil profiles that are not compatible with available attenuation relationships, a_{max} may be estimated from local site response analyses. Computer programs such as SHAKE and DESRA may be used for these calculations (Schnabel et al. 1972; Finn et al. 1977). Input ground motions in the form of recorded accelerograms are preferable to synthetic records. Accelerograms derived from white noise should be avoided. A suite of plausible earthquake records should be used in the analysis, including as many as feasible from earthquakes with similar magnitudes, source distances, etc.

3) The third and least desirable method for estimating peak ground acceleration is through amplification ratios, such as those developed by Idriss (1990, 1991) and Seed et al. (1994). These factors use a multiplier or ratio by which bedrock outcrop motions are amplified to estimate surface motions at soil sites. Because amplification ratios are influenced by strain level, earthquake magnitude, and frequency content, caution and considerable engineering judgment are required in the application of these relationships.

Question: Which peak acceleration should be used: (1) the largest horizontal acceleration recorded on a three-component accelerogram; (2) the geometric mean (square root of the product) of the two maximum horizontal components; or (3) a vectorial combination of horizontal accelerations?

Answer: According to I. M. Idriss (oral discussion at NCEER workshop, 1996), where recorded motions were available, the larger of the two horizontal peak components of acceleration was used in the compilation of data used to derive the original simplified procedure. Where recorded values were not available, which was the circumstance for most sites, peak acceleration values were estimated from attenuation relationships based on the geometric mean of the two orthogonal peak horizontal accelerations. In nearly all instances where recorded motions were used, the peaks from the two horizontal records were approximately equal. Thus where a single peak was used, the peak and the geometric mean of the two peaks were about the same value. Based on this information, the workshop participants concurred that use of the geometric mean is consistent with the development of the procedure and is preferred for use in engineering practice. However, use of the larger of the two orthogonal peak accelerations yields a larger estimate of a_{max}, is conservative, and is allowable. Vectorial accelerations are seldom calculated and should not be used. Peak vertical accelerations are generally much smaller than peak horizontal accelerations and are ignored for calculation of liquefaction resistance.

Question: Liquefaction usually develops at soil sites where ground motion amplification may occur and where sediment may soften, reducing motions as excess pore pressure develop. How should investigators account for these factors in estimating peak acceleration?

Answer: The recommended procedure is to calculate or estimate the a_{max} that would occur at the site in the absence of increased pore pressure or the onset of liquefaction. That peak acceleration incorporates the influence of site amplification, but neglects the influence of excess pore-water pressure.

Question: Should high-frequency spikes (periods <0.1 s) in acceleration records be considered or ignored?

Answer: In general, short-duration, high-frequency acceleration spikes are too short in duration to generate significant instability or deformation of granular structures, and should be ignored. By using attenuation relationships for estimation of peak acceleration, as noted above, high-frequency spikes are essentially ignored because few high-frequency peaks are incorporated in databases from which attenuation the relationships were derived. Similarly, ground response analyses programs such as SHAKE and DESRA generally attenuate or filter out high-frequency spikes, reducing their influence. Where amplification ratios are used, engineering judgment should be used to determine which bedrock acceleration is to be amplified.

ENERGY-BASED CRITERIA AND PROBABILISTIC ANALYSES

The workshop considered two additional topics: (1) liquefaction resistance criteria based on seismic energy passing through a liquefiable layer (Kayen and Mitchell 1997; Youd et al. 1997), and probabilistic analyses of case history data (Liao et al. 1988; Youd and Noble 1997b). Although probabilistic or risk analyses have been made for some localities and critical facilities, the workshop participants concluded that probabilistic procedures are still under development and not sufficiently formulated for routine engineering practice. Similarly, new energy-based criteria need to be independently tested before recommendations can be made for general practice. The workshop participants recommend that research and development continue on both of these relatively new and potentially useful procedures.

CONCLUSIONS

The participants in the NCEER workshop reviewed the state-of-the-art for evaluating liquefaction resistance and recommend several augmentations to that procedure. Specific recommendations, including procedures and equations, are listed in each section of this summary paper. Consensus conclusions from the workshop are:

1. Four field tests are recommended for routine evaluation of liquefaction resistance—the cone penetration test (CPT), the standard penetration test (SPT), shear-wave velocity (V_s) measurements, and for gravelly sites the Becker penetration test (BPT). Criteria for each test were reviewed and revised to incorporate recent developments and to achieve consistency between resistances calculated from the various tests. Each test has its advantages and limitations (Table 1). the CPT provides the most detailed soil stratigraphy and robust field-data based liquefaction resistance curves now available. CPT testing

should always be accompanied by soil sampling for validation of soil type identification. The SPT has a longer record of application and provides disturbed soil samples from which fines content and other grain characteristics can be determined. Measured shear-wave velocities provide fundamental information on small-strain soil behavior that is useful beyond analyses of liquefaction resistance. V_s is also applicable at sites, such as landfills and gravelly sediments, where CPT and SPT soundings may not be possible or reliable. The BPT test is recommended only for gravelly sites and requires use of rough correlations between BPT and SPT, making the results less certain than other tests. Where possible, two or more test procedures should be applied to assure adequate definition of soil stratigraphy and a consistent evaluation of liquefaction resistance.

2. The magnitude scaling factors originally derived by Seed and Idriss (1982) are overly conservative for earthquakes with magnitudes <7.5. A range of scaling factors is recommended for engineering practice, the lower end of the range being the new MSF recommended by Idriss (column 3, Table 3), and the upper end of the range being the MSF suggested by Andrus and Stokoe (column 7, Table 3). These MSFs are defined by (25) and (26), respectively. For magnitudes >7.5, the new factors by Idriss (column 3, Table 3) should be used. These factors, which are more conservative than the original Seed and Idriss (1982) factors, should be applied.
3. The K_σ factors suggested by Seed and Harder (1990) appear to be overly conservative for some soils and field conditions. The workshop participants recommend K_σ values defined by the curves in Fig. 14 or (31). Because K_σ values are usually applied to depths greater than those verified for the simplified procedure, special expertise is generally required for their application.
4. Procedures for evaluation of liquefaction resistance beneath sloping ground or embankments (slopes greater than about 6%) have not been developed to a level allowable for routine use. Special expertise is required for evaluation of liquefaction resistance beneath sloping ground.
5. Moment magnitude M_w should be used for liquefaction resistance calculations. Magnitude, as used in the simplified procedure, is a measure of the duration of strong ground shaking. The present magnitude criteria are conservative and should not be corrected for source mechanism, style of faulting, distance from the energy source, subsurface bedrock topography (basin effect), or tectonic region (eastern versus western U.S. earthquakes).
6. The peak acceleration a_{max} applied in the procedure is the peak horizontal acceleration that would occur at ground surface in the absence of pore pressure increases or liquefaction. Attenuation relationships compatible with soil conditions at a site should be applied in estimating a_{max}. Relationships based on the geometric mean of the peak horizontal accelerations are preferred, but use of relationships based on peak horizontal acceleration is allowable and conservative. Where site conditions are incompatible with existing attenuation relationships, site-specific response calculations, using programs such as SHAKE or DESRA, should be used. The least preferable technique is application of amplification factors.

ACKNOWLEDGMENTS

Financial support for the January 1996 workshop was provided by the NCEER. Support for a second workshop in August 1998 was provided by both NCEER and the National Science Foundation. Brigham Young University graduate students Steven Noble, Samuel Gilstrap, and Curt Peterson, assisted in organizing and conducting the workshops.

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APPENDIX II. NOTATION

The following symbols are used in this paper:

a, b = curve fitting parameters for use with V_s criteria for evaluating liquefaction resistance;
a_{max} = peak horizontal acceleration at ground surface;
C_B = correction factor for borehole diameter;
C_E = correction factor for hammer energy;
C_N = correction factor for overburden pressure applied to SPT;
C_Q = correction factor for overburden pressure applied to CPT;
C_R = correction factor for drilling rod length;
C_S = correction factor for split spoon sampler without liners;
$CRR_{7.5}$ = cyclic resistance ratio for $M_w = 7.5$ earthquakes;
d_c = diameter of CPT tip;
F = normalized friction ratio;
f = exponent estimated from site conditions used in calculation of K_σ;
f_s = sleeve friction measured with CPT;
g = acceleration of gravity;
H = thickness of thin granular layer between softer sediment layers;
I_c = soil behavior type index for use with CPT liquefaction criteria;

K_c = correction factor for grain characteristics applied to CPT;
K_H = thin-layer correction factor for use with CPT;
K_α = correction factor for soil layers subjected to large static shear stresses;
K_σ = correction factor for soil layers subjected to large static normal stresses;
M_L = local or Richter magnitude of earthquake;
M_s = surface-wave magnitude of earthquake;
M_w = moment magnitude of earthquake;
m_B = long period body-wave magnitude of earthquake;
m_b = short period body-wave magnitude of earthquake;
N_m = measured standard penetration resistance;
$(N_1)_{60}$ = corrected standard penetration resistance;
$(N_1)_{60cs}$ = $(N_1)_{60}$ adjusted to equivalent clean-sand value;
n = exponent used in normalizing CPT resistance for overburden stress;
P_a = atmospheric pressure, approximately 100 kPa;
P_L = probability of liquefaction;
Q = normalized and dimensionless cone penetration resistance;
q_{c1N} = normalized cone penetration resistance;
$(q_{c1N})_{cs}$ = normalized cone penetration resistance adjusted to equivalent clean-sand value;
r_d = stress reduction coefficient to account for flexibility in soil profile;
V_s = measured shear-wave velocity;
V_{s1} = overburden-stress corrected shear-wave velocity;
V_{s1}^* = limiting upper value of V_{s1} for liquefaction occurrences;
z = depth below ground surface (m);
α, β = coefficients, that are functions of fines content, used to correct $(N_1)_{60}$ to $(N_1)_{60cs}$;
σ'_{vo} = effective overburden pressure;
τ_{av} = average horizontal shear stress acting on soil layer during shaking generated by given earthquake; and
τ_{st} = static shear stress acting on soil element due to gravitational forces.

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
DES Geotechnical Design																
10/18/2011	300	Betty Lee	1	Geotechnical Design Report	Page 6, section 4.2.1.3: "Documentation regarding placement of existing fills was not available for review". Please explain.	EMI did not review any document regarding placement of the existing fill. Also, it is unlikely that the as-graded geotechincal report for the existing embankment will be available because it was constructed in 1947.	C			EMI						
10/18/2011	301	Betty Lee	2	Geotechnical Design Report	Page 8, Geologic map: Legend is incomplete.	We will complete the legend.	A			EMI						
10/18/2011	302	Betty Lee	3	Geotechnical Design Report	What is the purpose of the many shallow borings (10ft deep)?	Shallow borings were drilled to obtain subsurface material for pavement design. Pavement design is presented in the Materials Report.	C			EMI						
10/18/2011	303	Betty Lee	4	Geotechnical Design Report	Page 22 and Appendix, Expansion and Settlement Potential: consolidation lab procedure appears incorrectly run. Pleas check ASTM manual.	The "undisturbed" consolidation test specimen is inserted into the air-tight consolidometer at field moisture. After the seating load is applied and as the vertical load increment reaches the approximate field overburden, the test specimen is inundated for 24 hours before the last sets of load increments are applied to complete the test. During the 24-hour inundation period, the dial gage is monitored to determine the vertical strain. This is a local southern California practice, and it is likely that the same inundation procedure is used by a majority of the local firms. We understand this process deviates slightly from the ASTM protocol, but the measured vertical strain data add more "value" to a consolidation test because: (1) the modified method determines "soil collapse" potential and magnitude of collapse. For example, if the collapsible soil layer is identified to be 10-foot thick and the measured vertical strain during inundation is 10%, then the compression (settlement) of the 10-foot thick collapsible soil layer is 0.1', and (2) for "expansive soils", the measured vertical strain provides a good qualitative indicator of the potential volume change characteristic of the tested soils when subjected to prolonged wetting at the overburden pressure. For example, if a soil specimen shows a significant swelling at the overburden pressure, the mitigations (such as increasing the footing pressure, removal of expansive soils and replacement with non-expansive soils, and designing an anchoring system) can be evaluated to minimize uplift movements. More importantly, we do not believe that the above inundation process will alter the characteristics of the axial strain versus log of vertical pressure curve, it merely shifts a portion of the curve upward (if soil is expanding) or downward (if soil is collapsing). As a result, the impact on the Compression Index value used in settlement calculations is minimal.	C			EMI						

I-880 Operational and Safety Improvements at 29^{the} and 23rd Avenue Overcrossings
65% Submittal

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
10/18/2011	304	Betty Lee	5	Geotechnical Design Report	Section 8.1.2.1 and Appendix C, Liquefication: What is the calculated factor of safety? Please clarify the two columns of "Resist. Cyclic Stress Ratio".	According to NCEER (1997), if the corrected blowcount is greater than 30 bpf, soil is non-liquefiable and a factor of safety cannot be computed for this case. Our analysis shows that the corrected blowcounts for the potentially liquefiable soil layers are greater than 35 bpf. So, we will not be able to provide a factor of safety. "RESIST. CYCLIC STRESS RATIO M=7.5" is $CRR_{7.5}$ and "RESIST. CYCLIC STRESS RATIO Overburd Corr Mag Corr" is CRR_r. The equations for $CRR_{7.5}$ and CRR_r are presented below. Each parameters are defined in the calculations sheets. $CRR_{7.5} = 1/(34-N_{160cs}) + N_{160cs}/135 + 50/(10N_{160cs}+45)^2 - 1/200$ $CRR_r = CRR_{7.5} \times C_m \times K_{sigma}$	C			EMI						
10/18/2011	305	Betty Lee	6	Geotechnical Design Report	Only 2 samples were analyzed for liquefaction. Are these representative of the entire project site?	The two borings analysed show presence of coarse-grained soils below the water table. All the other borings show few interbedded and thin coarse-grained soil layers or coarse-grained soils with high SPT blowcounts below water table. Even if these coarse-grained soil layers liquefy, the seismic settlement is expected to be less than 0.25 inch, which is not considered to be a design issue.	C			EMI						
10/18/2011	306	Betty Lee	7	Geotechnical Design Report	Page 26, slope Stability: What are the calculated safety factors?	The factor of safety values are at least 4.0 for static analysis and 2.0 for pseudo static analysis for embankment fills discussed in Page 26.	C			EMI						
10/18/2011	307	Betty Lee	8	Geotechnical Design Report	Slope stability analysis is needed also for short term temporary conditions (i.e. during construction).	The existing embankments will be raised and widened for construction of the 23rd Avenue and 29th Avenue. During construction (temporary conditions), the existing embankment will be cut and protected with temporary shoring. For this configuration and using the soil strength parameters of the onsite soils, the calculated factor of safety is greater than 1.5.	C			EMI						
10/18/2011	308	Betty Lee	9	Geotechnical Design Report	Page 27, Backfill requirements (i.e. gradation, etc.) must be in the Specifications.	RBF Consulting will include the backfill requirements for the embankment and MSE wall in the Specifications	C			EMI						
10/18/2011	309	Betty Lee	10	Geotechnical Design Report	Page 27, Section 8.3.2, Paragraph 4: does this refer to the future embankment fill? Please clarify.	The surficial stability analysis was performed to determine the surficial stability of 2H:1V future proposed slopes of the fill embankment for this project.	C			EMI						
10/18/2011	310	Betty Lee	11	Geotechnical Design Report	Page 28-30: Are these acceptable settlement magnitudes for these structures? What are the mitigation measures?	RBF Consulting will evaluate the acceptable settlement for these structures.	C			EMI						
10/18/2011	311	Betty Lee	12	Geotechnical Design Report	Page 28: Need to specify settlement monitoring program in GDR and Specifications.	RBF Consulting will evaluate settlement monitoring program, if needed.	C			EMI						

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
10/18/2011	312	Betty Lee	13	Geotechnical Design Report	Page 31: Please provide a table of all retaining walls (heights, locations, cut or fill wall).	The summary of the retaining wall pertinent data are presented in the Foundation Report for Retaining Wall. We will include the same table in this report.	A			EMI						
10/18/2011	313	Betty Lee	14	Geotechnical Design Report	Page 31: Culvert Foundations: Are these in locations of settlement? What are the magnitudes of settlement and mitigation measures?	During preparation of the GDR, we coordinated with the civil designers to determine which existing and proposed drainage and utility lines will be impacted by embankment fill placement. The civil designers identified four lines and calculated settlements of these four lines are presented in Table 8.3. The civil designers will evaluate these settlements and determine whether or not mitigations will be required.	C			EMI						
10/18/2011	314	Betty Lee	15	Geotechnical Design Report	What is the purpose of the infiltration basin?	It is actually a retention basin used to collect and store surface runoff during and after a rain storm. We will change the title of this section from Infiltration Basin to Retention Basin.	A			EMI						
10/18/2011	315	Betty Lee	16	Geotechnical Design Report	Page 34: Hazardous materials need be evaluation for this project (in separate report by environmental consultant).	Refered to RBF Consulting.	C			EMI						
10/18/2011	316	Betty Lee	17	Geotechnical Design Report	Page 36: How is the 30 day waiting period determined?	30 day waiting period requirement has been removed.	A			EMI						
10/18/2011	317	Betty Lee	18	Geotechnical Design Report	Page 36: Limits (lateral and depths) of over-excavation areas need to be on Plans.	RBF Consulting will add this information on the Plans.	C			EMI						
10/18/2011	318	Betty Lee	19	Geotechnical Design Report	Page 37: Settlement calculations of embankments should be in GDR.	We will extract the settlement analyses from Foundation Report for the Retaining Walls and include in this report.	A			EMI						
10/18/2011	319	Betty Lee	20	Geotechnical Design Report	Page 37: Need to calculate the magnitudes of settlement of the pipes.	The settlement calculation at critical locations are presented in Section 8.3.2.	C			EMI						
10/18/2011	320	Betty Lee	21	Geotechnical Design Report	Page 37: Why phi=37 degree, c=170 psf? Please explain how this is derived.	As presented in the Section 8.3.2, surficial stability analyses were performed using the infinite slope method. The soil strength parameters of phi=34 degrees and cohesion=170 psf were determined in order to obtain a Factor of Safety of 1.5.	C			EMI						

AGENCY COMMENT REVIEW AND RESPONSE QC FORM										COMMENT RESPONSE QC						
Date	Item No.	Reviewer	Reviewer Comment No.	Drawing or Page No.	Review Comments	Design Responses	Action	PM Concurs	Agency Concurs	Owner	Responsible Person	Redlines	CADD/ Revised	Back-Checked	QC	Comments
10/18/2011	321	Betty Lee	22	Geotechnical Design Report	Page 22: Expansion Potential: Were any expansion tests done? Please discuss impacts and mitigation measures for geotechnical elements in GDR. Please include discussion of impacts/mitigation measures relating to pavement in GDR also.	In "older" Caltrans projects, we assigned EI (Expansive Index) tests on subgrade for pavement design. But since July 2008, Caltrans HDM Topic 614.4 uses Plasticity Index (PI) to determine expansion potential of subgrade. Therefore, PI tests were performed (See Table 3 in Materials Report) in lieu of EI tests for pavement design. We did not perform EI tests because we were unable to identify any elements in this project which requires EI-values for design. This is because (1) based on the PI results and soil classification, we can already conclude that the onsite clayey soils have a medium to high expansion potential, (2) Select backfill is specified for the MSE walls and Caltrans Structure Backfill is recommended for Type-1 walls, and (3) lime treatment is recommended to stabilize pavement subgrade. Abutment backfill requirements should be included in the bridge foundation reports prepared by URS. We will summarize the lime treatment mitigation measure related to pavement in the GDR.	C			EMI						

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

LIMITED, NON-DESTRUCTIVE ASBESTOS AND LEAD-BASED PAINT SURVEY I-880/23RD AVENUE AND 29TH AVENUE OVERCROSSINGS AND IMMEDIATE SURROUNDING AREAS I-880 NORTH SAFETY IMPROVEMENT PROJECT OAKLAND, CALIFORNIA

PREPARED FOR:
Mr. Fred Kelley
AECOM Transportation
155 Grand Avenue
Oakland, California 94612

PREPARED BY:
Ninyo & Moore Geotechnical and Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612

March 4, 2009
Project No. 401145004

March 4, 2009
Project No. 401145004

Mr. Fred Kelley
AECOM Transportation
155 Grand Avenue
Oakland, California 94612

Subject: Limited, Non-Destructive Asbestos and Lead-Based Paint Survey
I-880/23rd Avenue and 29th Avenue Overcrossings and Immediate Surrounding Areas
I-880 North Safety Improvement Project
Oakland, California

Dear Mr. Kelley:

In accordance with your authorization to proceed, Ninyo & Moore has performed a limited, non-destructive asbestos and lead-based paint (LBP) survey of the 23rd Avenue and 29th Avenue over-crossings of Interstate (I) 880 and immediate surrounding areas in Oakland, California. The attached report presents our methodology, findings, opinions, and recommendations regarding our survey.

We appreciate the opportunity to be of service to you on this important project.

Sincerely,
NINYO & MOORE

William P. Larkin
Senior Project Environmental Scientist
Certified Asbestos Consultant (Cert. No. 99-2688)
DPH Certified Lead Inspector-Assessor/Project Monitor
(Cert. No. 5543)

Kris M. Larson, P.G.
Senior Environmental Geologist

WPL/KML/dhi

Distribution: (9) Addressee

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1. INTRODUCTION

In accordance with your request and authorization to proceed, Ninyo & Moore has performed a limited, non-destructive asbestos and lead-based paint (LBP) survey of the 23rd Avenue and 29th Avenue Overcrossings of Interstate 880 (I-880) and immediate surrounding areas in Oakland, California.

This report has been prepared in accordance with generally accepted environmental science and engineering practices. This report is based upon conditions at the project area at the time of the sampling activities and provides documentation of our findings and recommendations.

2. PURPOSE AND SCOPE OF SERVICES

The purpose of the limited, non-destructive asbestos and LBP survey was to evaluate the project area for the presence of asbestos-containing materials (ACMs) and LBPs. The Interstate I-880 Operation and Safety Improvements at 29th Avenue and 23rd Avenue Overcrossings Project is located at the existing I-880 interchanges with 29th Avenue and 23rd Avenue in Oakland, California. This survey was included within the scope of work for the I-880 North Safety Improvement Project.

The objective of the survey was to gain information regarding site conditions to assist in planning for proposed demolition/renovation activities of the 23rd Avenue and 29th Avenue Overcrossings and immediate surrounding areas. The survey activities consisted of walking in and around the areas where existing structures (overcrossing, etc.) and materials (street striping, etc.) may be affected by the proposed demolition/renovation activities and collecting samples of these materials. The sampling survey was limited to areas with lower (safer) traffic volumes. For example, the northern lanes of the 23rd Avenue Overcrossing did not contain a pedestrian sidewalk; therefore, no samples were collected there. However, materials and/or paint located on the southern lanes of the 23rd Avenue Overcrossing were accessible and samples of similar materials were collected there. Similarly, samples were collected within commercial and residential areas on the edge of the project area (Portwood Avenue, etc.) in order to include materials and/or paint that have a high likelihood to be affected by the proposed demolition/renovation activities.

Ninyo & Moore personnel performed the following services:

- Performance of a visual reconnaissance of the readily accessible areas of the project area to evaluate the possible presence of ACMs and LBPs.
- Collection of 20 paint chip samples and submittal of these paint chip samples to a certified independent laboratory for analysis of lead content.
- Collection of seven building material samples and submittal of these samples to a certified independent laboratory for analysis of asbestos content.
- Preparation of a sample location map showing sample locations.
- Preparation of this report summarizing our field activities, laboratory test results, findings, opinions, and recommendations.

3. SITE DESCRIPTION

The project area consists of the 23rd Avenue and 29th Avenue Overcrossings of I-880 and immediate surrounding areas in Oakland, California. The project is located at the existing I-880 interchanges with 29th Avenue and 23rd Avenue in the Oakland, California. The Alameda County Congestion Management Agency has sponsored the project and is the responsible agency for the project.

4. SAMPLE COLLECTION

On February 12, 2009, Ninyo & Moore personnel conducted a limited, non-destructive ACM and LBP survey of the project area. The surveys followed U.S. Environmental Protection Agency (USEPA) guidelines, within the limitations of the scope of this survey. The ACM and LBP surveys were performed by William P. Larkin, a California Certified Asbestos Consultant (Cert. No. 99-2688) and California Department of Public Health Certified Lead-Based Paint Inspector-Assessor/Project Monitor (Cert. No. 5543). The surveys consisted of collecting suspect ACMs and LBP samples from the overcrossing structures and surrounding areas utilizing non-destructive sampling techniques.

4.1. Asbestos Survey

A preliminary visual assessment and bulk-sampling survey of suspect ACMs was performed. Representative samples of suspect ACMs were collected after identification of homogeneous sampling areas (areas in which the materials are uniform in color, texture, construction or application date, and general appearance). Each homogeneous area was observed for material type, location, condition, and friability. Representative samples were collected from each area, except areas that were inaccessible, within the limitations of the survey. Samples were collected using United States Environmental Protection Agency (USEPA)-recommended sampling procedures. Suspect building materials which were sampled and analyzed for the presence of asbestos are presented in Table 1, and the locations where the bulk asbestos samples were collected are shown on Figure 2.

4.2. Paint Chip Survey

To properly assess the painted surfaces for both waste characterization and future contractor worker safety, bulk paint chip sampling was utilized. The survey was conducted in general accordance with the following regulations: 1) Title 17, California Code of Regulations, Division 1, Chapter 8, Accreditation Certification, and Work Practice in Lead Related Construction, Section 36000, and, 2) the United States Department of Housing and Urban Development's (HUD) Guidelines for the Evaluation and Control of Lead-based Paint Hazards in Housing, Chapter 7, Lead-based Paint Inspection.

5. LABORATORY ANALYSES AND RESULTS

The following sections describe the laboratory analyses and results for samples collected during the survey.

5.1. Asbestos Analysis

Seven (7) samples of suspect ACMs were collected and transferred to EMSL Analytical Laboratory (EMSL) in San Leandro, California. EMSL is an accredited laboratory in the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos fiber

analysis. The samples were analyzed using Polarized Light Microscopy with dispersion staining (PLM/Ds), for the presence and quantification of asbestos fibers, in general accordance with EPA Method 600/M4-82-020. The lower limit of reliable detection for asbestos using the PLM method is approximately 1% by volume. California regulations now define ACMs as those materials having an asbestos content of greater than one tenth of 1% (0.1%). Materials in which no asbestos was detected are defined in the laboratory report as "None detected." Materials containing asbestos, but in amounts less than 1% but greater than 0.1%, are defined as containing "trace" amounts. No asbestos was detected in any of the samples collected as part of this survey. Suspect materials sampled and the analytical results are summarized in Table 1. A copy of the laboratory analytical report and chain-of-custody record is presented in Appendix A.

5.2. Paint Analysis

After collection, the suspect LBP samples were transferred to EMSL for analysis of total lead content, in accordance with USEPA Test Method SW 846 3050B and 7420. EMSL is an American Industrial Hygiene Association accredited Environmental Lead Laboratory (AIHA ELLA). Currently, the USEPA stipulates what concentrations of lead in nonvolatile components of surface coatings or materials determine whether a material is considered to be LBP. The USEPA stipulates that materials containing an amount equal to or in excess of 1 milligram per square centimeter (1.0 mg/cm^2), or more than half of one percent (0.5%) by weight (or 5,000 milligrams per kilogram [mg/kg]), constitute a LBP. Coatings with reported lead concentrations less than 1.0 mg/cm^2 or 5,000 mg/kg would be considered lead-containing paint (LCP).

The U.S. Department of Housing and Urban Development (HUD)/USEPA guidelines for designating a painted surface as lead-containing is consistent with the State Department of Public Health Services (DPH). Paint that is chipping or peeling, or that may be removed from surfaces, and has a lead content greater than, or equal to, 1,000 mg/kg, would require handling as a California Title 22 hazardous waste. The analytical results associated with paint chip

samples collected from the project area are summarized in Table 2. Copies of the laboratory analytical report and chain-of-custody record are presented in Appendix C.

Twenty paint chip samples were collected and analyzed for this study. Three of the 20 paint chip samples contained lead at reported concentrations greater than 5,000 mg/kg (or 0.5% by weight). The lead concentrations associated with five of the 20 paint chip samples were reported by the analytical laboratory (EMSL) to be less than the associated reporting limit (<0.01 mg/kg). The reported lead concentrations of the other 12 paint chip samples ranged from <0.020 mg/kg to 0.31 mg/kg. Occupational Safety and Health Administration (OSHA) regulations apply whenever materials with any detectable amounts of lead are disturbed.

6. FINDINGS AND OPINIONS

The findings of this limited, non-destructive survey are based on our visual observations, limited analysis of suspect ACMs, and paint chip samples collected from within the project area.

6.1. Asbestos

Based on the reported analytical results associated with the suspect ACMs collected within the project area during this survey, no ACMs were reported.

6.2. Paint

Based on the analytical results of the paint chip samples collected during our survey, the three following painted surfaces contained concentrations of lead greater than, or equal to, 1.0 mg/cm^2, or greater than, or equal to, 0.5% by weight (5,000 mg/kg):

- Approximately 20 square feet of red paint on a curb, located at the corner of Portwood Avenue and East 10th Street. This paint was observed to be in poor condition.
- Approximately 10 square feet of white paint, located on a fire hydrant at the corner of Portwood Avenue and East 9th Street, observed to be intact.
- Approximately 40 square feet of light green paint, located on a light column located on the southern portion of the 23rd Avenue Overcrossing over I-880, observed to be intact.

As mentioned above, lead concentrations associated with five of the paint chip samples collected were reported to be less than the reporting limit. All of the other 12 paint chip samples contained concentrations of lead; ranging from <0.020 mg/kg to 0.31 mg/kg.

7. RECOMMENDATIONS

The following recommendations and precautions are provided:

- Destructive sampling techniques were not employed during this survey. Thus, there is a chance that additional suspect ACMs may be found during proposed renovations or demolition activities within the project area. Ninyo & Moore recommends that should additional suspect materials, not sampled or assessed in this report, be uncovered during renovation or demolition activities; (a) samples of suspect materials should be collected for laboratory analysis, and all activities which may impact the materials should cease until laboratory analysis, or; (b) the materials should be assumed to be hazardous and handled as such.

- The identified materials/components with lead-based or lead-containing paint should not be sawed, burned, ground into mulch, or reused, and based on their condition, should be disposed of in a properly licensed landfill. Demolition/renovation workers should be protected according to the provisions of 8 CCR 1532, "Lead in Construction." Prior to demolition, a licensed lead-based paint removal contractor should remove the lead-based paint that is chipping or peeling from its substrate. The substrate can then be disposed of as construction debris. The remaining lead waste should be tested in accordance with Title 22 waste characterization requirements. Based upon the results of these tests, the waste should be disposed of appropriately.

8. LIMITATIONS

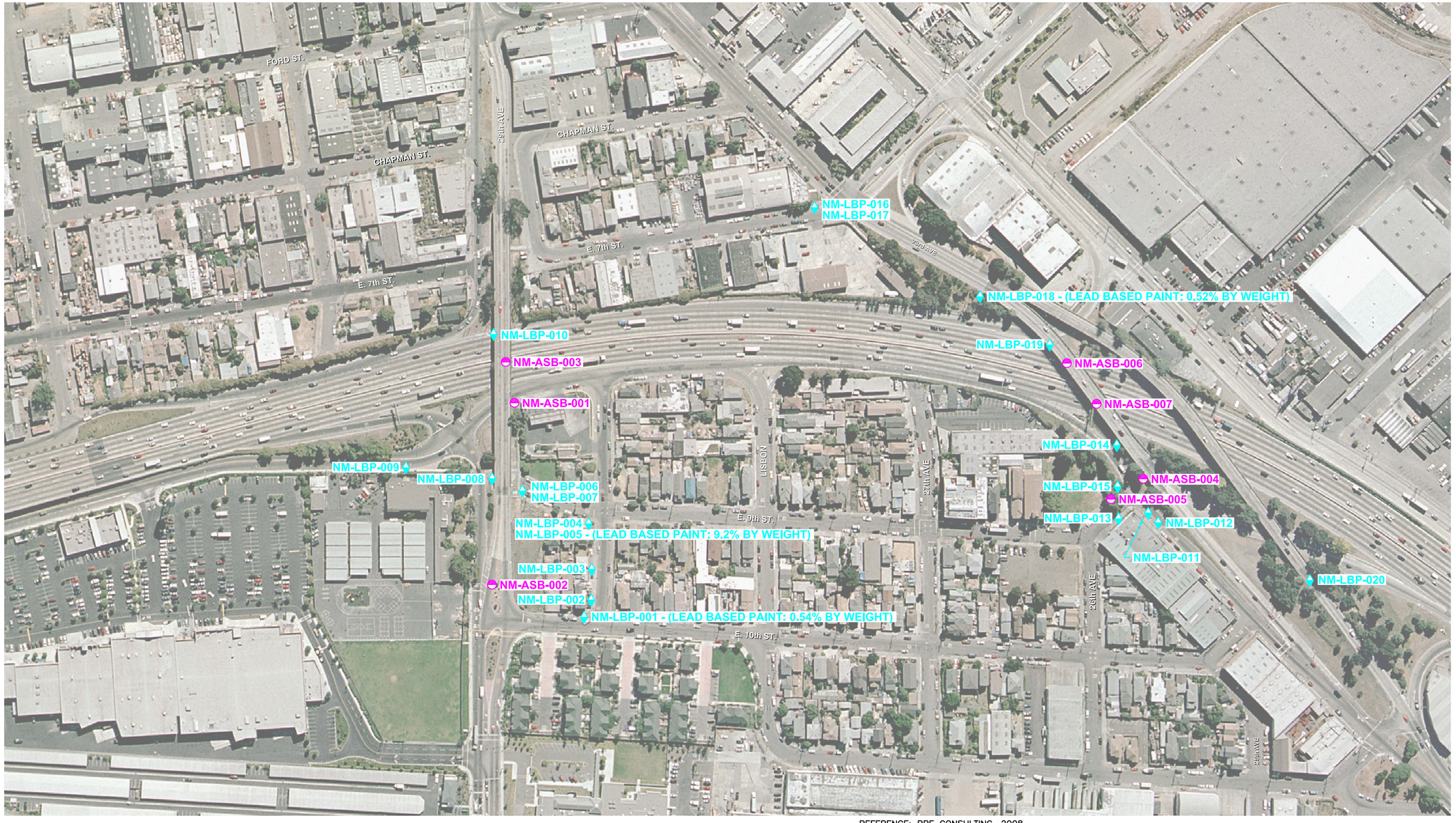
Ninyo & Moore's findings, opinions and recommendations regarding environmental conditions, as presented in this report, are based on limited sampling and chemical analysis. Further assessment of potential adverse environmental impacts may be accomplished by a more comprehensive assessment. The samples collected and used for testing, and the observations made, are believed to be representative of the area(s) evaluated. However, if additional suspect ACMs or lead-based paints are encountered during renovation or demolition activities, these materials should be sampled by qualified personnel, and analyzed for content prior to further disturbance. In addition, please note that quantities of ACMs and lead-based paints are approximate. These numbers should be confirmed prior to renovation or demolition activities.

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No other warranty, expressed or implied, is made regarding the professional opinions presented in this report. Variations in site conditions may exist and conditions not observed or described in this report may be encountered during subsequent activities. Please also note that this study did not include an evaluation of geotechnical conditions or potential geologic hazards.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document.

The environmental findings, opinions and recommendations contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and concentration of specific chemical or physical constituents in samples collected from the subject site. The testing and analyses have been conducted by an independent laboratory which is accredited by the U.S. EPA or certified by the State of California to conduct such tests. Ninyo & Moore has no involvement in, or control over, such testing and analysis. Ninyo & Moore, therefore, disclaims responsibility for any inaccuracy in such laboratory results.

Our findings, opinions and recommendations are based on an analysis of the observed site conditions. It should be understood that the conditions of a site can change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.



LEGEND

- APPROXIMATE LOCATION OF PAINT CHIP SAMPLE
- APPROXIMATE LOCATION OF SUSPECT ACM SAMPLE

N

APPROXIMATE SCALE IN FEET

0 200 400

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

REFERENCE: RBF CONSULTING, 2008.

Ninyo & Moore		ACM AND LBP SAMPLE LOCATION MAP	FIGURE
PROJECT NUMBER	DATE	I-880/23RD AND 29TH AVENUE OVERPASSES AND IMMEDIATE SURROUNDING AREA OAKLAND, CALIFORNIA	1
401145004	3/09		

Table 1 - Asbestos Survey Results

Sample No.	Bldg. No.	Material Location	Sample Description	Approximate Quantity (SF/LF/EA)	Friable Y/N	Condition	Asbestos Content
NM-ASB-001	N/A	29th Avenue Overcrossing Stairs - South	Interstitial Space Material	N/A	N/A	N/A	ND
NM-ASB-002	N/A	29th Avenue Overcrossing - Street Area - East	Reflector/Tar-Mastic	N/A	N/A	N/A	Reflector - ND Tar/Mastic - ND
NM-ASB-003	N/A	29th Avenue Overcrossing - Middle	Connective Material	N/A	N/A	N/A	ND
NM-ASB-004	N/A	23rd Avenue East Bound Wall - South Side	Interstitial Material	N/A	N/A	N/A	ND
NM-ASB-005	N/A	23rd Avenue Exit From 880	Tar on Asphalt Road Bed	N/A	N/A	N/A	ND
NM-ASB-006	N/A	23rd Avenue Overcrossing - Middle	Interstitial Material From Road Bed	N/A	N/A	N/A	ND
NM-ASB-007	N/A	23rd Avenue Overcrossing - Middle	Interstitial Material from Sidewalk Area	N/A	N/A	N/A	ND

NOTES:

ND = None detected

N/A = Not applicable/Not Available

Non-destructive sampling techniques were utilized during this sampling survey.

Table 2 - Lead-Based Paint Survey Results

Sample I.D.	Bldg. No.	Location	Lead-Containing Surface (LCS) (e.g., door, wall, frame)	Sample Description (Color / # of Layers / Substrate)	Condition	Estimate of Surface Area	Total Lead (% by weight)
NM-LBP-001	**N/A**	**Portwood/East 10th Street**	**Curb**	**Red/3/Concrete**	**Poor/Non-Intact**	**20 SF**	**0.54**
NM-LBP-002	N/A	Portwood/East 10th Street	Road	White/2/Asphalt	Poor/Non-Intact	20 SF	<0.010
NM-LBP-003	N/A	Portwood Street	Column	Green/2/Metal	Good/Intact	45 SF	<0.023
NM-LBP-004	N/A	Portwood/East 9th Street	Road	Yellow/2/Asphalt	Poor/Non-Intact	20 SF	0.25
NM-LBP-005	**N/A**	**Portwood/East 9th Street**	**Hydrant**	**White/2/Metal**	**Poor/Non-Intact**	**10 SF**	**9.2**
NM-LBP-006	N/A	Underneath 29th Avenue Overcrossing	Beam	Green/2/Steel	Good/Intact	500 SF	<0.020
NM-LBP-007	N/A	East 9th Street - Dead End	Bollard	Yellow/4/Metal	Poor/Non-Intact	10 SF	0.31
NM-LBP-008	N/A	29th Avenue/880 Intersection	Rail	White/2/Metal	Good/Intact	1,000 SF	0.021
NM-LBP-009	N/A	Frontage Road 880/South of 29th Ave.	Curb	Yellow/2/Concrete	Poor/Non-Intact	10 SF	0.082
NM-LBP-010	N/A	29th Avenue Overcrossing - West Entrance	Rail	Silver/2/Metal	Good/Intact	1,000 SF	0.17
NM-LBP-011	N/A	23rd Avenue - Near Off-Ramp	Curb	Red/2/Concrete	Poor/Non-Intact	20 SF	<0.010
NM-LBP-012	N/A	23rd Avenue Crosswalk	Street	White/2/Asphalt	Poor/Non-Intact	20 SF	<0.010
NM-LBP-013	N/A	26th Avenue/East 9th Street	Street	Yellow/2/Asphalt	Poor/Non-Intact	20 SF	0.07

Sample I.D.	Bldg. No.	Location	Lead-Containing Surface (LCS) (e.g., door, wall, frame)	Sample Description (Color / # of Layers / Substrate)	Condition	Estimate of Surface Area	Total Lead (% by weight)
NM-LBP-014	N/A	23rd Avenue Overcrossing - Underneath	Column	Beige/2/Metal	Good/Intact	40 SF	<0.029
NM-LBP-015	N/A	23rd Avenue Exit from 880	Column	Green/2/Metal	Good/Intact	40 SF	0.25
NM-LBP-016	N/A	23rd Avenue/East 7th Street	Curb	Red/2/Concrete	Poor/Non-Intact	20 SF	0.31
NM-LBP-017	N/A	23rd Avenue/East 7th Street	Street	White/2/Asphalt	Poor/Non-Intact	20 SF	<0.010
NM-LBP-018	**N/A**	**23rd Avenue Overcrossing - South**	**Column**	**Green/2/Metal**	**Good/Intact**	**40 SF**	**0.52**
NM-LBP-019	N/A	23rd Avenue Overcrossing - Middle	Rail	Gray/2/Metal	Good/Intact	1,000 SF	0.16
NM-LBP-020	N/A	23rd Avenue Overcrossing - Underneath	Column	Beige/2/Concrete	Good/Intact	1,000 SF	<0.010

NOTES:

Total lead analyzed in accordance with EPA Test Method 6010.

% by weight= Percent Lead by weight

SF = Square feet

Estimated quantities are not intended for use in bidding calculations.

Samples in **BOLD** denote lead-based paint.

APPENDIX A

ASBESTOS ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY RECORDS

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone: (510) 895-3675 Fax: (510) 895-3680 Email: milpitaslab@emsl.com

Attn: **Bill Larkin**
Ninyo & Moore
1956 Webster, Suite 400
Oakland, CA 94612

Fax: (510) 633-5646 Phone: (510) 633-5640
Project: **401145004, RBF/Cal Trans/880**

Customer ID: NOMO22
Customer PO: 401145004
Received: 02/12/09 1:40 PM
EMSL Order: 090901005

EMSL Proj:
Analysis Date: 2/12/2009
Report Date: 2/13/2009

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos				Asbestos
Sample	**Location**	**Appearance**	**%**	**Fibrous**	**%**	**Non-Fibrous**	**% Type**
NMASB-001, Interstitial material *090901005-0001*	29th Street, Overpass stairs South	Black Fibrous Heterogeneous	5%	Cellulose	95%	Non-fibrous (other)	**None Detected**
NMASB-002-A, Reflector *090901005-0002*	29th Strret, Overpass East street area	Gray Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
NMASB-002-B, Tar, mastic *090901005-0002A*	29th Strret, Overpass East street area	Black Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
NMASB-003, Connective material *090901005-0003*	29th Street, Overpass, Middle	Black Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
NMASB-004, Interstitial material *090901005-0004*	23rd Street, Eastbound wall, Southside	Black Fibrous Homogeneous	10%	Cellulose	90%	Non-fibrous (other)	**None Detected**
NMASB-005, Asphalt *090901005-0005*	23rd Street, exit from 880	Black Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
NMASB-006, Interstitial material *090901005-0006*	23rd Ave, Overpass, Middle	Black Fibrous Heterogeneous	15%	Cellulose	85%	Non-fibrous (other)	**None Detected**

Analyst(s)

Alan Tahran (8)

Baojia Ke, Laboratory Manager
or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.Samples received in good condition unless otherwise noted.

NVLAP Lab Code 101048-3

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone: (510) 895-3675 Fax: (510) 895-3680 Email: milpitaslab@emsl.com

Attn: **Bill Larkin**
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1956 Webster, Suite 400
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Fax: (510) 633-5646 Phone: (510) 633-5640
Project: **401145004, RBF/Cal Trans/880**

Customer ID: NOMO22
Customer PO: 401145004
Received: 02/12/09 1:40 PM
EMSL Order: 090901005

EMSL Proj:
Analysis Date: 2/12/2009
Report Date: 2/13/2009

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos				Asbestos	
Sample	**Location**	**Appearance**	**%**	**Fibrous**	**%**	**Non-Fibrous**	**%**	**Type**
NMASB-007, Interstitial material *090901005-0007*	23rd Ave, Overpass, Middle	Black Fibrous Heterogeneous	5%	Cellulose	95%	Non-fibrous (other)		**None Detected**

Analyst(s)

Alan Tahran (8)

Baojia Ke, Laboratory Manager
or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.Samples received in good condition unless otherwise noted.
NVLAP Lab Code 101048-3

THIS IS THE LAST PAGE OF THE REPORT.

ASBESTOS BULK SAMPLE DATA SHEET

24-hr TAT 90901005 1 of 1

Ninyo & Moore 1956 Webster Street, #400 Oakland, CA 94612 Tel: (510) 633-5640 Fax: (510) 633-5646	Project Name: RBF/CALTRANS/880 Project No.: 401145004 Project Manager: KML APN: Site Address: 880	Sampled By: WPL Sampled By: Sampled By: Date Sampled: 2/12/09	Laboratory: EMSL Tel: Fax: 895-3675

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time (24 hr)	Received By: (sign/print)	Laboratory
Dan Brethaver	Ninyo&Moore	2/12/09	1:40		emsl

LabID	Sample ID	Building Number	Sample Location	Sample Description	Quantity (SF/LF/EA)	Friable (Y/N)	Condition
	NMASB-001	N/A	29th St. Overpass Stairs/South	Interstitial Stucco Material			
	NMASB-002	N/A	29th St. Overpass/East Street AREA	Reflector/Tar-Mastic			
	NMASB-003	N/A	29th St Overpass - Middle	Connective Material			
	NMASB-004	N/A	23rd St. East Bound Wall South side	Interstitial Material			
	NMASB-005	N/A	23RD St. Exit from 880	Tar on Asphalt Roadbed			
	NMASB-006	N/A	23rd Ave Overpass Middle	Interstitial Material From ROADBED			
	NMASB-007	N/A	23rd Ave. Overpass - Middle	Interstitial Material from SIDEWALK AREA			

Asbestos Consultant

090901005

APPENDIX B

LEAD-BASED PAINT ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY RECORDS

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn: **ris Larson**
Ninyo & Moore
1956 Webster, Suite 400
Oakland, Ca 94612

Fax: (510) 633-5646 Phone: (510) 633-5640
Project: **RBF/Caltrans/ 880/ 401145004**

Customer ID: 32NOMO22
Customer PO:
Received: 02/13/09 9:00 AM
LA Testing Order: 320901520
LA Testing Proj:
Report Date: 2/13/2009

Lead in Paint Chips by Flame AAS (SW 846 3050B /7420)

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
NMLBP-01	*0001*	2/12/2009	2/13/2009	0.54 % wt
	Portwood/East 10th St.			
NMLBP-02	*0002*	2/12/2009	2/13/2009	<0.010 % wt
	Portwood/East 10th St.			
NMLBP-03	*0003*	2/12/2009	2/13/2009	<0.023 % wt
	Portwood/East 10th St.			
NMLBP-04	*0004*	2/12/2009	2/13/2009	0.25 % wt
	Portwood St.			
NMLBP-05	*0005*	2/12/2009	2/13/2009	9.2 % wt
	Portwood/East 9th St.			
NMLBP-06	*0006*	2/12/2009	2/13/2009	<0.020 % wt
	Portwood/East 9th St.			
NMLBP-07	*0007*	2/12/2009	2/13/2009	0.31 % wt
	East 9th St. Dead-end			
NMLBP-08	*0008*	2/12/2009	2/13/2009	0.021 % wt
	29th Ave/880 Intersection			
NMLBP-09	*0009*	2/12/2009	2/13/2009	0.082 % wt
	Frontage Rd: 880/south of 29th Ave			
NMLBP-10	*0010*	2/12/2009	2/13/2009	0.17 % wt
	29th overpass- entrance			
NMLBP-11	*0011*	2/12/2009	2/13/2009	<0.010 % wt
	23rd Ave. Near off-ramp			
NMLBP-12	*0012*	2/12/2009	2/13/2009	<0.010 % wt
	23rd Ave. crosswalk			

Derrick Tanner, Laboratory Manager
or other approved signatory

Reporting limit is 0.01 % wt. The C data associated with these sample results included in this report meet the method quality control requirements, unless specifically indicated otherwise. nless noted, results in this report are not blank corrected . This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities.

slight modifications to methods applied Samples received in good condition unless otherwise noted. uality Control Data associated with this sample set is within acceptable limits, unless otherwise noted

CA ELAP 2283, AIHA ELLAP 102814

Date Printed: 2/13/2009 2:36:46 PM

ChmSnglePrm/n C

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn: **ris Larson**
Ninyo & Moore
1956 Webster, Suite 400
Oakland, Ca 94612

Fax: (510) 633-5646 Phone: (510) 633-5640
Project: **RBF/Caltrans/ 880/ 401145004**

Customer ID: 32NOMO22
Customer PO:
Received: 02/13/09 9:00 AM
LA Testing Order: 320901520
LA Testing Proj:
Report Date: 2/13/2009

Lead in Paint Chips by Flame AAS (SW 846 3050B /7420)

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
NMLBP-13	*0013*	2/12/2009	2/13/2009	0.070 % wt
26th Ave E. 9th St.				
NMLBP-14	*0014*	2/12/2009	2/13/2009	<0.029 % wt
23rd overpass/underneath				
NMLBP-15	*0015*	2/12/2009	2/13/2009	0.25 % wt
23rd St exit from 880				
NMLBP-16	*0016*	2/12/2009	2/13/2009	0.31 % wt
23rd Ave/East 7th St.				
NMLBP-17	*0017*	2/12/2009	2/13/2009	<0.010 % wt
23rd Ave/East 7th St.				
NMLBP-18	*0018*	2/12/2009	2/13/2009	0.52 % wt
23rd Ave overpass-south				
NMLBP-19	*0019*	2/12/2009	2/13/2009	0.16 % wt
23rd Ave overpass-middle				
NMLBP-20	*0020*	2/12/2009	2/13/2009	<0.010 % wt
23rd Ave overpass-under N structure				

Derrick Tanner, Laboratory Manager
or other approved signatory

Reporting limit is 0.01 % wt. The C data associated with these sample results included in this report meet the method quality control requirements, unless specifically indicated otherwise. nless noted, results in this report are not blank corrected . This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities.

slight modifications to methods applied Samples received in good condition unless otherwise noted. uality Control Data associated with this sample set is within acceptable limits, unless otherwise noted

CA ELAP 2283, AIHA ELLAP 102814

Date Printed: 2/13/2009 2:36:47 PM

ChmSnglePrm/n C

320901520

24-hr TAT

1 of 2
~~2 of 2~~

Sheet ~~1 of~~

LEAD BASED PAINT BULK SAMPLE DATA SHEET

Ninyo & Moore 675 Hegenberger Road, Suite 220 Oakland, CA 94621 Tel: (510) 633-5640 Fax: (510) 633-5646	**Project Name:** RBF/CALTRANS/880 **Project No.:** 401145004 **Project Manager:** KMZ **APN:** **Site Address:** 880	**Sampled By:** WPL **Sampled By:** **Sampled By:** **Date Sampled:** 2/12/09	**Laboratory:** EMSL Tel: Fax:

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time (24 hr.)	Received By: (sign/print)	Laboratory
Daniel Bretthauer / Dan Brethauer	Ninyo&Moore	2/12/09	1:40		EMSL
/				/	

LabID	Sample ID	Building Number	Sample Location	Building Component	Sample Description (Color /# Layers /Substrate)	Estimated Surface Area	Condition
	NMLBP-001	N/A	Portwood/East 10th St.	Curb	Red/3/Concrete		
	NMLBP-002	N/A	Portwood/East 10th St.	ROAD	white/2/Asphalt		
	NMLBP-003	N/A	Portwood St.	column	Green/2/metal		
	NMLBP-004	N/A	Portwood/East 9th St.	ROAD	Yellow/2/Asphalt		
	NMLBP-005	N/A	Portwood/East 9th St	Hydrant	White/2/metal		
	NMLBP-006	N/A	Underneath 29th St Overpass	Beam	Green/2/steel		
	NMLBP-007	N/A	East 9th St. Dead-End	Bollard	Yellow/4/metal		
	NMLBP-008	N/A	29th Ave/880 Intersection	Rail	White/2/metal		
	NMLBP-009	N/A	Frontage Rd: 880/South of 29th Ave	Curb	Yellow/2/concrete		
	NM-LBP-010	N/A	29th overpass - W-entrance	Rail	Silver/2/metal		
	NMLBP-011	N/A	23rd Ave: Near Off-Ramp	Curb	Red/2/Concrete		
	NMLBP-012	N/A	23rd Ave. Crosswalk	Street	white/2/~~Concrete~~ ASPHALT		

32090152O

24-hr TAT

LEAD BASED PAINT BULK SAMPLE DATA SHEET

Sheet 1 of 2

Ninyo & Moore 675 Hegenberger Road, Suite 220 Oakland, CA 94621 Tel: (510) 633-5640 Fax: (510) 633-5646	Project Name: RBF/CALTRANS/880 Project No.: 401145004 Project Manager: KML APN: Site Address: 880	Sampled By: WPL Sampled By: Sampled By: Date Sampled: 2/12/09	Laboratory: EMSL Tel: Fax: 895-3675

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time (24 hr.)	Received By: (sign/print)	Laboratory
Daniel Bretthauer Dan Bretthauer	Ninyo&Moore	2/13/09	1:40	[signature]	emsl

LabID	Sample ID	Building Number	Sample Location	Building Component	Sample Description (Color # Layers /Substrate)	Estimated Surface Area	Condition
	NMLBP-013	N/A	26th Ave & E. 9th St	Street	Yellow/2/Asphalt		
	NMLBP-014	N/A	23rd Overpass/underneath	column	Beige/2/Concrete		
	NMLBP-015	N/A	23rd St Exit from 880	column	Green/2/metal		
	NMLBP-016	N/A	23rd Ave/East 7th St.	Curb	Red/2/Concrete		
	NMLBP-017	N/A	23rd Ave/East 7th St	Street	White/2/Asphalt		
	NMLBP-018	N/A	23rd Ave Overpass - South	Light Column	Green/2/metal		
	NMLBP-019	N/A	23rd Ave. Overpass Middle	RAIL	Gray/2/metal		
	NMLBP-20	N/A	23rd Ave Overpass - under N stairwell	Column	Beige/2/Concrete		

32090152O

APPENDIX C

CERTIFICATIONS

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

~~William P Larkin~~
Name

Certification No. ~~99-2688~~

Expires on ~~12/08/09~~

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

State of California Department of Public Health

Lead-Related Construction Certificate	Certificate Type	Expiration Date
	Inspector/Assessor	**07/03/2010**
	Project Monitor	**07/03/2010**

15977

William P. Larkin ID #: **5543**

APPENDIX D

PHOTOGRAPHS OF SAMPLE LOCATIONS

Photograph No. 1: **White paint sample collected from a traffic guard rail located at the entrance to I-880 from East 9th Street.**

Photograph No. 2: **Yellow curb paint sample collected from East 9th Street, just south of the 29th Avenue Overpass.**

Photograph No. 3: **Suspect asbestos material sample collected from 29th Avenue roadbed, just east of 29th Avenue Overpass.**

Photograph No. 4: **Interstitial/connective material sample collected from the 29th Avenue Overpass.**

Photograph No. 5: **Silver paint sample collected from railing on 29th Avenue Overpass.**

Photograph No. 6: **Red curb paint sample collected from exit area off I-880 exit, just south of 23rd Avenue Overpass.**

Photograph No. 7: **White road paint sample collected from exit area off of I-880 exit, just south of 23rd Avenue Overpass.**

Photograph No. 8: **Red curb paint sample collected at intersection of Portwood Avenue and East 10th Street.**

Photograph No. 9: **White road paint sample collected at intersection of Portwood Avenue and East 10th Street.**

Photograph No. 10: **Green paint sample collected from a light column on Portwood Avenue.**

Photograph No. 11: **Yellow paint sample collected from the intersection of Portwood Avenue and East 9th Street.**

Photograph No. 12: **White paint sample collected from a fire hydrant at the intersection of Portwood Avenue and East 9th Street.**

Photograph No. 13: Light green paint sample collected from underneath the 29th Street Overpass.

Photograph No. 14: Yellow paint sample collected from a traffic bollard located at a dead-end on East 9th Street, just north of the 29th Avenue Overpass.

Photograph No. 15: **Interstitial/connective material sample collected from the wall of the southern ramp of the 23rd Avenue Overpass.**

Photograph No. 16: **Yellow road paint sample collected from the intersection of 26th Avenue and East 9th Street, just east of the I-880 exit.**

Photograph No. 17: Beige paint collected from a concrete support column located underneath the 23rd Avenue Overpass, just off I-880.

Photograph No. 18: Tar collected from the roadbed just off the I-880 exit to 23rd Avenue.

Photograph No. 19: **Green paint sample collected from a light column on the southern ramp of the 23rd Avenue Overpass.**

Photograph No. 20: **Gray paint sample collected from railing on the 23rd Avenue Overpass.**

Photograph No. 21: Interstitial/connective material sample collected from the sidewalk of the southern ramp of the 23rd Avenue Overpass.

Photograph No. 22: Interstitial/connective material collected from the roadbed of the southern ramp of the 23rd Avenue Overpass.

APPENDIX E

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH NOTIFICATION FORM 8552

State of California—Health and Human Services Agency | California Department of Public Health

LEAD HAZARD EVALUATION REPORT

Section 1 — Date of Lead Hazard Evaluation 2/12/09

Section 2 — Type of Lead Hazard Evaluation (Check one box only)

☒ Lead Inspection ☐ Risk assessment ☐ Clearance Inspection ☐ Other (specify) _____

Section 3 — Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
I-880 and 23rd St and 29th Street	Oakland	Alameda	94612

Construction date (year) of structure	Type of structure (check one box only)
unknown	☐ Multi-unit building ☐ School or daycare ☐ Single family dwelling ☒ Other (specify) Freeway Overpasses

Section 4 — Owner of Structure (if business/agency, list contact person)

Name	Telephone number
California Dept. of Transportation	510/286-4444

Address [number, street, apartment (if applicable)]	City	State	Zip Code
111 Grand Avenue	Oakland	CA	94612

Section 5 — Results of Lead Hazard Evaluation (check all that apply)

☐ No lead-based paint detected. ☒ Lead-based paint detected.

☐ No lead hazards detected. ☐ Lead hazards detected.

Section 6 — Individual Conducting Lead Hazard Evaluation

Name	Telephone number
William P. Larkin	510/633-5640

Address [number, street, apartment (if applicable)]	City	State	Zip Code
1956 Webster St., #400	Oakland	CA	94612

CDPH certification number	Signature	Date
5543	William P. Larkin	2/15/09

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

Section 7 — Attachments

A. A foundation diagram or sketch of the structure indicating the specifc locations of each lead hazard or presence of lead-based paint;
B. Each testing method, device, and sampling procedure used;
C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

CDPH 8552 (6/07)

STATE OF CALIFORNIA
ARNOLD SCHWARZENEGGER, Governc

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
MINING AND TUNNELING UNIT HEADQUARTERS
1367 E. LASSEN AVENUE, SUITE B-4
CHICO, CA 95973
(530) 895-6938 FAX (530) 895-6941

June 1, 2010

Subject: Jurisdiction at Vertically Bored Construction Shafts

To Whom It May Concern:

In response to several California Appeals Board decisions, the Cal/OSHA Mining and Tunneling Unit has modified the application of jurisdiction which applies to vertically-bored construction shafts. Until Title 8 is permanently changed, the following interim-policy shall be in effect:

1. Vertically-bored construction shafts less than 20-feet deep, whether men are inside or not, will fall under the jurisdiction of the Construction Safety Orders (CSOs) and other applicable provisions of Title 8.

2. Vertically-bored construction shafts deeper than 20-feet, where men do not enter the shaft, will fall under the jurisdiction of the CSOs (no Classification, Pre-Job, Gas Tester, or Safety Representative is required) and other applicable provisions of Title 8.

3. Vertically-bored construction shafts deeper than 20-feet, where men enter the shaft to perform work, will fall under the jurisdiction of the Tunnel Safety Orders and other applicable provisions of Title 8.

All construction shaft inspections by Cal/OSHA personnel will be performed with these jurisdictional constraints in mind. If there are any questions regarding this interim policy, please contact an M&T Senior Engineer or myself.

Very truly yours,

Stephen C. Hart
Principal Safety Engineer
DOSH Mining and Tunneling Unit

cc. All M&T Senior Engineers

PRELIMINARY SITE INVESTIGATION AND AERIALLY DEPOSITED LEAD REPORT ADDENDUM INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS AT 29TH AVENUE AND 23RD AVENUE OVERCROSSINGS OAKLAND, CALIFORNIA

PREPARED FOR:
Ms. Jennifer Harmon
RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612

July 13, 2012
Project No. 401791001

July 13, 2012
Project No. 401971001

Jennifer Harmon, P.E.
Senior Associate
RBF Consulting
500 Ygnacio Valley Road, Suite 270
Walnut Creek, California 94596

Subject: Preliminary Site Investigation and Aerially Deposited Lead Report Addendum
Interstate 880 Operational and Safety Improvements at
29th Avenue and 23rd Avenue Overcrossings
Oakland, California

Dear Ms. Harmon:

Ninyo & Moore has prepared this Preliminary Site Investigation (PSI) and Aerially Deposited Lead (ADL) Report Addendum to address comments received from CalTrans on Ninyo & Moore's PSI and ADL Report dated July 7, 2009, and also to document the recent additional soil and groundwater investigation activities performed at multiple sites located near I-880 and the 23rd Avenue Overcrossing in Oakland, California.

Ninyo & Moore appreciates the opportunity to be of service to RBF Consulting on this project.

Sincerely,
NINYO & MOORE

Cem R. Atabek
Project Environmental Engineer

Kris M. Larson, PG
Principal Environmental Geologist

CRA/KML/csj

Distribution: (1) Addressee

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Appendix B – Boring Logs
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Appendix D – Revised Data Tables from PSI & ADL Report
Appendix E – 95 % UCLs for Compounds Exceeding ESLs
Appendix F – ADL Statistical Analysis Results from PSI & ADL Report

1. INTRODUCTION

Ninyo & Moore was retained by RBF Consulting to address comments received from Caltrans on Ninyo & Moore's PSI and ADL Report dated July 7, 2009, and also to perform additional soil and groundwater investigation activities at multiple sites near the 23rd Avenue Overcrossing of Interstate 880 (I-880) as part of the North Safety Improvements Project. The soil and groundwater investigation activities were performed to address a request from Caltrans to characterize additional areas where soil removal and possible dewatering will be performed during construction activities.

2. SITE DESCRIPTION AND BACKGROUND

The I-880 North Safety Improvements at the 23rd Avenue Overcrossing is located at the existing 23rd Avenue Overcrossing of I-880 in the City of Oakland, California. The sites where recent soil and groundwater investigation activities were performed are located at the intersection of East 12th Street and 22nd Avenue, the intersection of 23rd Avenue and Kennedy Street, and at I-880 and the 23rd Avenue Overcrossing (Figure 1).

Previous soil and groundwater investigation activities were performed by Ninyo & Moore for the I-880 North Safety Improvement Project at the 23rd Avenue and 29th Avenue Overcrossings. The results of the previous investigations are documented in Ninyo & Moore's Preliminary Site Investigation and Aerially Deposited Lead Report, dated July 7, 2009.

3. RESPONSE TO CALTRANS COMMENTS ON THE PSI & ADL REPORT DATED DECEMBER 10, 2009

Comments on Ninyo & Moore's PSI & ADL Report dated July 7, 2009, were provided by Caltrans to RBF consulting in an email dated March 1, 2012, which was forwarded to Ninyo & Moore by RBF Consulting on the same day. The following sections provide responses to the comments provided by Caltrans.

3.1. Comment Regarding the Use of Environmental Screening Levels (ESLs)

Ninyo & Moore compared previous analytical results to the San Francisco Regional Water Quality Control Board (SFRWQCB) Environmental Screening Levels (ESLs) for Commercial/Industrial Worker Direct Exposure (ESLs Table K-2) to evaluate potential exposure risks for construction workers. Caltrans requested that soil analytical results also be compared to the ESLs Table A-2 for Commercial Land Use to evaluate whether soil could be reused within the Caltrans Right of Way (ROW). The tables from the PSI & ADL Report have been revised to include values from the ESLs in Table A-2 for comparison. Concentrations of constituents exceeding the Table A-2 ESLs include arsenic, lead, nickel, and total petroleum hydrocarbons as gasoline (TPHg), as diesel (TPHd), and as motor oil (TPHmo). Caltrans requested that 95 % upper confidence limits (UCLs) be calculated for compounds with at least one concentrations exceeding the Commercial Land Use ESLs. The constituents with concentrations exceeding the Table A-2 ESLs are discussed further in the following sections.

3.1.1. Arsenic

The concentrations of arsenic detected on site are within the range of naturally occurring background concentrations of arsenic typically detected throughout the region, therefore a 95% UCL for arsenic was not calculated.

3.1.2. Lead

Concentrations of lead exceeding the ESL were evaluated together with the ADL data set as discussed in Section 3.4 below and presented in Appendix F.

3.1.3. Nickel

The detected concentrations of nickel, which exceed the Commercial Land Use ESL of 150 mg/kg, were detected in samples collected from 5 feet below ground surface (bgs) in borings SB-2 (174 mg/kg), SB-24 (166 mg/kg), SB-28 (191 mg/kg), and SB-32 (155 mg/kg). RBF Consulting indicated that these borings are located in areas where no

soil removal will be performed or where only shallow soil removal (less than 5 feet bgs) will be performed; therefore 95% UCLs were not calculated for nickel.

3.1.4. TPH Compounds

The detected concentrations of TPH compounds, which exceed the Commercial Land Use ESLs of 2,500 mg/kg for TPHmo and 83 mg/kg for TPHd and TPHg, were detected in samples SB-10 @ 0.5 (TPH mo at 3,100 mg/kg), SB-22 @ 0.5 (TPHd at 150 mg/kg and TPHg at 1,900 mg/kg), and SB-34 @ 0.5 (TPHd at 470 mg/kg). RBF Consulting indicated that boring SB-34 is located in an area where no soil removal will be performed, therefore the impacts from TPHd in this boring are not evaluated further. RBF Consulting indicated that boring SB-10 is located in an area where PG&E will be installing underground utilities, which will be performed separately from the removal of soil associated with road work. Because boring SB-10 is the only boring located in this area where PG&E will be removing soil, a 95% UCL cannot be calculated for TPHd due to the limited data set. Additional sampling of soil removed during PG&E utility work in this area should be performed to evaluate whether the soil can be re-used.

Boring SB-22 is located within the Zone 2 waste stream area as presented on Figure 5 of the PSI and ADL Report. 95% UCLs for concentrations of TPHd and TPHg within the Zone 2 waste stream area were calculated as presented in Appendix E. Data from 5 feet bgs from borings located within close proximity to the planned sound wall where deeper soil will be removed for pile installation were included in the 95% UCL calculation. Half of the laboratory detection limit was used as the value for samples with non-detectable concentrations. The data sets for TPHd and TPHg within the Zone 2 are highly skewed because TPHd and TPHg were non-detect with the exception of the concentrations in sample SB-22 @ 0.5. ProUCL indicated that the data sets are not parametric and could not provide recommendations for 95% UCLs using several of the nonparametric models. ProUCL recommended using the 95% Chebyshev (Mean, Sd) UCL of approximately 17 mg/kg for TPHd, which is well below the ESL, and recommended using the 99% Chebyshev (Mean, Sd) UCL of approximately 444 mg/kg for

TPHg, which exceeds the ESL. The 99% Chebyshev (Mean, Sd) UCL was recommended due to the uncertainty associated with having a single value, which is much higher than all other values. The 95% Chebyshev (Mean, Sd) UCL for TPHg was indicated to be approximately 212 mg/kg, which also exceeds the ESL.

Based on the 95% UCL results for TPHg in the Zone 2 waste stream, it is recommended that shallow soil (from 0 to 2 feet bgs) in the area of boring SB-22 be handled separately from soil from other areas within the Zone 2 waste stream area. The shallow soil from the area of boring SB-22 should be re-sampled at the time of construction to further evaluate whether the soil can be re-used.

3.2. Comment Regarding the Age of Data

Caltrans indicated that most landfills require soil data to be collected within the past 18 months for soil profiling, and that the PSI & ADL data for this site is over 3-years old. RBF Consulting has indicated that additional waste profiling samples would be collected at the time of construction to satisfy this requirement for landfills.

3.3. Comment Regarding the Lack of Groundwater in Borings

Section 6.5 of the PSI & ADL Report indicates that soil borings were left open to a depth of 15 feet bgs at SB-7, SB-20, and SB-37 for a period of 1 to 3 days, and groundwater was not observed in the borings at any time while the borings remained open. All other borings were left open for less than 24 hours.

3.4. Comment Regarding Combining of Lead Data Sets from PSI and ADL

The lead data from ADL borings and PSI borings within the various soil removal waste stream zones were combined for statistical analysis and evaluation as presented in Appendix G of the PSI & ADL Report, which has been included as Appendix F of this Addendum.

3.5. Comment Regarding Filtering of Groundwater Samples for Metals Analysis

Groundwater samples were filtered prior to collection in containers preserved with nitric acid and were analyzed for dissolved metals.

3.6. Comment Regarding Nickel in Groundwater Exceeding the ESL

The last sentence in Section 10, Page 22, should read "Since groundwater samples did not exceed ESLs with the exception of nickel in the groundwater sample collected from boring SB-16, groundwater results are not depicted on a separate figure."

3.7. Comment Regarding Groundwater Discharge Options

Groundwater from construction related dewatering activities can potentially be discharged to storm drains, surface water or sanitary sewer, or used for dust control. Prior to being discharged or used for dust control, groundwater should be pumped into a holding tank and re-sampled to evaluate potential options for discharge or dust control.

Groundwater which is impacted with petroleum hydrocarbons can potentially be discharged to storm drains according to the general waste discharge requirements set forth by the San Francisco Regional Water Quality Control Board (SFRWQCB) Order Number R2-2006-0075. Additionally, for discharges to a storm drain associated with construction activity, a National Pollutant Discharge Elimination System (NPDES) general permit shall be obtained according to the Water Quality Order 99-08-DWQ.

Should groundwater from construction related dewatering activities be discharged to surface waters, a permit shall be obtained according to the SFRWQCB Order Number R8-2007-0008 and NPDES Number CAG918001.

The concentrations of dissolved metals, TPH compounds, and VOCs detected in groundwater samples from borings SB-7, SB-16 and SB-20 are below the East Bay Municipal Utility District (EBMUD) discharge limits. Therefore, groundwater from

construction related dewatering activities performed in the areas of these borings could be discharged to a local sanitary sewer system in accordance with EBMUD guidelines.

Based on the concentrations of dissolved metals, TPH compounds, and VOCs detected in groundwater samples from borings SB-7 and SB-20, groundwater from construction related dewatering activities performed in the areas of borings SB-7 and SB-20 could be used for dust control, however it is possible that groundwater from construction related dewatering activities performed in the areas of boring SB-16 may not be used for dust control based on the impacts from nickel detected in the groundwater samples from this boring. Groundwater may be used for dust control if constituents of concern are below drinking water ESLs.

3.8. Comment Regarding Correlation Coefficients and Lead Statistical Analysis

Based on additional discussions between Caltrans and RBF Consulting, ADL sampling in order to supplement the previous ADL data sets, which had low correlation coefficients between total lead and STLC or TCLP lead, was not requested by RBF Consulting. RBF Consulting has indicated that all ADL-impacted soil will be off-hauled for disposal and not re-used on-site, and that additional waste characterization sampling will be performed to fulfill landfill requirements as discussed in Section 3.2 above.

4. ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION ACTIVITIES

The additional soil and groundwater investigation activities performed by Ninyo & Moore included pre-field activities and field activities. The following sections describe the scope of work performed by Ninyo & Moore.

4.1. Pre-Field Activities

Pre-field activities include permitting and health and safety planning.

4.1.1. Permitting

Prior to performing field activities, Ninyo & Moore obtained drilling permits from the Alameda County Public Works Agency. Ninyo & Moore also obtained excavation, traffic control, and obstruction permits from the City of Oakland. A California Department of Transportation (CalTrans) encroachment permit was previously obtained by the Alameda County Congestion Management Agency (ACCMA) for work to be performed in the CalTrans Right of Way (ROW). Copies of these permits are included in Appendix A.

4.1.2. Site Specific Health and Safety Plan

Prior to performing field activities a Site Specific Health and Safety Plan (SSHSP) was prepared by Ninyo & Moore. A copy of the SSHSP was kept on site at all times during field activities. The contents of the SSHSP were discussed with on site personnel prior to the start of each day of field activities, and on site personnel were required to sign the SSHSP to acknowledge their understanding of the provisions of the SSHSP.

4.2. Field Activities

Field activities included utility clearance and soil and groundwater sampling activities.

4.2.1. Utility Clearance

On June 15, 2012, Ninyo & Moore marked the planned boring locations with white paint and notified Underground Service Alert (USA) of the planned drilling activities. On June 19, 2012 Ninyo & Moore retained Precision Locating, a private utility locating company, to perform utility clearance at the planned boring locations.

4.2.2. Soil and Groundwater Sampling

On June 20 and 21, 2012, Ninyo & Moore performed soil and groundwater sampling activities at the various site locations (Figure 1). Borings B-52, and B-55 through B-57 were advanced on June 20, 2012. Boring B-52 was located at the northwest corner of the intersection of 22nd Avenue and East 12th Street (Figure 2), and Borings B-55

through B-57 were located at the intersection of 23rd Avenue and Kennedy Street (Figure 3). Borings B-53 and B-54 were advanced on June 21, 2012. Boring B-53 was located on the east side of I-880 beneath the 23 Avenue Overcrossing, and Boring B-54 was located on the west side of I-880 near the 23 Avenue Overcrossing (Figure 4). Boring locations were recorded using a handheld global positioning system (GPS) device. The GPS coordinates are presented in Table 1.

Borings were advanced to approximately 5 feet bgs using a hand auger for utility clearance purposes, and were advanced below 5 feet bgs using a direct push drill rig. Physical signs of impacts such as photoionization detector (PID) meter readings, staining, or odors were not observed in any of the soil borings, therefore soil samples were collected at the pre-designated depths of approximately 1.5-2.0, 5.0-5.5, and 9.5-10.0 feet bgs in each boring. Soil samples were collected from approximately 1.5-2.0 feet by transferring soil from the hand auger into laboratory supplied glass jars, and deeper soil samples were collected by cutting the acetate liners of the drill rods at the desired depths and capping the liners with Teflon tape and plastic end caps. Downhole equipment was decontaminated between boring locations using a steam cleaner.

Boring B-52 was advanced to approximately 19 feet bgs, however groundwater was not encountered in this boring. Borings SB-55 through SB-57 were advanced to approximately 15 feet bgs. Groundwater was encountered at approximately 7 and 11 feet bgs in Borings SB-55 and SB-56, respectively, and groundwater was not encountered in boring SB-57.

Boring SB-53 was advanced to approximately 44 feet bgs and groundwater was first encountered at approximately 43 feet bgs and measured to rise to approximately 11 feet bgs approximately 15 minutes after it was first encountered. Boring SB-54 was advanced to approximately 45 feet bgs and groundwater was first encountered at approximately 44 feet bgs and measured to rise to approximately 35 feet bgs approximately 45 minutes after it was first encountered.

Groundwater samples were collected from Borings SB-53 through SB-56 through new 1-inch diameter screened PVC casing using a peristaltic pump with new tubing or a new disposable bailer. The peristaltic pump was operated at low speed and groundwater was carefully decanted from the bailers into the appropriate laboratory supplied sample containers to minimize the disturbance of groundwater.

Soil and groundwater samples were labeled, placed in protective sleeves as necessary, placed in zip-lock type plastic bags, and stored in a cooler on ice for transportation to the analytical laboratory under chain of custody procedures.

4.2.3. Laboratory Analysis

Soil and groundwater samples were analyzed for TPHg, TPHd, and TPHmo using EPA Method 8015M; volatile organic compounds (VOCs) using EPA Method 8260B; and Title 22 Metals using EPA Method 6010B. Silica gel cleanup was performed on samples prior to analysis of TPHd and TPHmo. Groundwater samples for analysis of metals were filtered and preserved by the laboratory prior to analysis of dissolved metals.

4.2.4. Soil Description

Soil cores were inspected and screened in the field using a PID meter to evaluate the presence of organic vapors in the soil cores and PID readings were recorded on borings logs. The lithology observed in the soil cores was classified in accordance with the Unified Soil Classification System (USCS) and recorded on boring logs. Fill material consisting of sandy and clayey gravel was encountered from the ground surface to approximately 4 feet bgs in Boring SB-54, and fill material consisting of well graded sand was encountered beneath the concrete pavement of Boring SB-56, extending to approximately 2 feet bgs. Native clayey soil was encountered at the ground surface of Boring SB-53, and beneath the pavement of Borings SB-52, SB-55, and SB-57. Native silty soil was encountered beneath the fill material in Borings SB-54 and SB-56. Deeper native soils generally consisted of alternating layers of silts, sands, and clays, with zones of more gravelly soils encountered in some borings. Borings SB-53 and SB-54

were advanced deeper in search of groundwater, which was encountered in a zone of gravel observed at approximately 43 feet bgs in Boring SB-53, and in a zone of sand observed at approximately 43 feet bgs in Boring SB-54. Copies of borings logs are included in Appendix B.

4.2.5. Site Restoration and Investigation Derived Waste (IDW)

Soil borings were backfilled with Portland cement grout in accordance with Alameda County guidelines. Investigation derived waste (IDW), including soil cuttings and decontamination rinsate water, was contained in 5-gallon buckets which were transported to Ninyo & Moore's laboratory for temporary storage. The IDW was placed in 55-gallon drums and will be disposed of at an appropriate facility following waste profile acceptance.

5. ANALYTICAL RESULTS

Analytical results for soil and groundwater samples are summarized in Tables 2 and 3, and discussed in the following sections. Analytical results for Title 22 Metals are presented in Table 2, and analytical results for TPH compounds and VOCs are presented in Table 3. A copy of the laboratory analytical report is included in Appendix C. Analytical results for soil are compared to the San Francisco Regional Water Quality Control Board (SFRWQCB) Environmental Screening Levels (ESLs) for Commercial/Industrial Direct Exposure (ESLs Table K-2) and the ESLs for Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource (Table A-2). Analytical results for groundwater are compared to ESLs for Groundwater as Drinking Water (Table F-1a) and analytical results for metals in groundwater are also compared to the California Primary Maximum Contaminant Levels (MCLs).

5.1. Title 22 Metals in Soil

Analytical results for Title 22 metals revealed detectable concentrations of nine metals in all recently collected soil samples including arsenic (ranging from 1.1 milligrams per kilogram [mg/kg] to 7.1 mg/kg), barium (ranging from 80 mg/kg to 200 mg/kg), chromium (ranging

from 20 mg/kg to 69 mg/kg), cobalt (ranging from 2.6 mg/kg to 23 mg/kg), copper (ranging from 7.8 mg/kg to 30 mg/kg), lead (ranging from 2.7 mg/kg to 41 mg/kg), nickel (ranging from 2.6 mg/kg to 23 mg/kg), vanadium (ranging from 17 mg/kg to 44 mg/kg), and zinc (ranging from 15 mg/kg to 77 mg/kg). Mercury was detected in several soil samples at concentrations ranging from 0.11 mg/kg to 0.26 mg/kg, and molybdenum was detected in only one soil sample (SB-52-9.5-10.0) at a concentration of 1.2 mg/kg. Concentrations of other metals analyzed (antimony, beryllium, cadmium, selenium, silver, and thallium) were not detected in the recently collected soil samples.

Arsenic was the only metal detected at concentrations exceeding its ESL of 1.6 mg/kg, however the detected concentrations of arsenic are consistent with naturally occurring background concentrations typically detected throughout the region.

Chromium was detected at concentrations exceeding 50 mg/kg in soil samples SB-52-1.5-2.0, SB-53-5.0-5.5, SB-55-5.0-5.5, SB-56-5.0-5.5, SB-56-9.5-10.0, SB-57-5.0-5.5, and SB-57-9.5-10.0. As required by landfills, these samples were analyzed using the Waste Extraction Test (WET) to evaluate whether soluble chromium exceeds the chromium Solubility Threshold Limit Concentration (STLC) of 5 milligrams per liter (mg/L), which would classify the soil as hazardous waste. Soluble chromium was not detected in any of the samples analyzed.

5.2. Title 22 Metals in Groundwater

Concentrations of dissolved metals were detected in recently collected groundwater samples, including the following:

- Barium was detected in all groundwater samples at concentrations ranging from 0.07 and 0.27 mg/L, which are below the ESL and MCL of 1 mg/L.
- Chromium was detected at concentrations of 0.005 mg/L and 0.006 mg/L in groundwater samples SB-55-GW and SB-56-GW, respectively, which are below the ESL and MCL of 0.05 mg/L.
- Cobalt was detected at a concentration of 0.005 mg/L in groundwater sample SB-56-GW, which slightly exceeds the ESL of 0.003 mg/L.

- Copper was detected in all groundwater samples at concentrations ranging from 0.01 mg/L to 0.02 mg/L, which are below the MCL of 1.3 mg/L, however exceed the ESL of 0.0031 mg/L.

- Molybdenum was detected at concentrations of 0.006 mg/L, 0.02 mg/L and 0.01 mg/L in groundwater samples SB-54-GW, SB-55-GW, and SB-56-GW, respectively, which are below the ESL of 0.035 mg/L.

- Nickel was detected at concentrations of 0.007 mg/L and 0.01 mg/L in groundwater samples SB-55-GW and SB-56-GW, respectively, which are below the MCL of 0.1 mg/L, however it exceeds the ESL of 0.0082 mg/L in sample SB-56-GW.

- Vanadium was detected in all groundwater samples at concentrations ranging from 0.005 mg/L to 0.01 mg/L, which are below the ESL of 0.015 mg/L.

- Zinc was detected in all groundwater samples at concentrations ranging from 0.05 mg/L to 0.23 mg/L, which are below the MCL of 5 mg/L, however it exceeds the ESL of 0.081 mg/L in samples SB-55-GW and SB-56-GW.

Concentrations of other metals analyzed (antimony, arsenic, beryllium, cadmium, lead, selenium, silver, thallium, and mercury) were not detected in the recently collected groundwater samples.

5.3. TPH Compounds in soil

Relatively minor concentrations of TPHd (ranging from 1.3 to 25 mg/kg) and TPHmo (ranging from 2.0 to 67 mg/kg) were detected in many of the recently collected soil samples. Concentrations of TPHg were not detected in the recently collected soil samples. None of the detected concentrations of TPH compounds in recently collected soil samples exceeded ESLs.

5.4. TPH Compounds in Groundwater

Concentrations of TPHd (0.10 mg/L), TPHmo (0.14 mg/L), and TPHg (0.07 mg/L) were detected in groundwater sample SB-55-GW. Concentrations of TPH compounds were not detected in the other recently collected groundwater samples. For sample SB-55-GW, the concentration of TPHd is equal to the ESL of 0.10 mg/L, the concentration of TPHmo

slightly exceeds the ESL 0.10 mg/L, and the concentration of TPHg is below the ESL 0.10 mg/L.

5.5. VOCs in Soil

Toluene was detected at concentrations of 8.3 µg/kg, 6.6 µg/kg, and 5.0 µg/kg in soil samples SB-55-9.5-10.0, SB-56-1.5-2.0, and SB-57-1.5-2.0, respectively, which are below the ESL of 2,900 µg/kg. Carbon disulfide was detected at a concentration of 5.4 µg/kg in soil sample SB-56-1.5-2.0. There is no ESL for carbon disulfide for comparison. No other concentrations of VOCs were detected in the recently collected soil samples.

5.6. VOCs in Groundwater

Methyl-tert-butyl-ether (MTBE) was detected at a concentration of 38 micrograms per liter (µg/L) in groundwater sample SB-55-GW, exceeding the ESL of 5 µg/L. 1,2-Dichloroethane and di-isopropyl ether (DIPE) were detected at concentrations of 3.2 µg/L and 2.9 µg/L, respectively, in groundwater sample SB-56-GW. The detected concentration of 1,2-Dichloroethane exceeds the ESL of 0.5 µg/L, and there is no ESL for DIPE for comparison. No other concentrations of VOCs were detected in the recently collected groundwater samples.

6. CONCLUSION

The following sections present our conclusions regarding the recent soil and groundwater investigation.

6.1. Soil

The detected concentrations of metals in recently collected soil samples are generally consistent with naturally occurring background concentrations of metals commonly detected throughout the region, and only minor concentrations of TPHd, TPHmo, toluene, and carbon disulfide were detected in soil samples collected. Based on the analytical results for the recently collected soil samples as discussed above, soil from the areas sampled would be

characterized as non-hazardous waste for disposal purposes and would be suitable for re-use within the Caltrans right of way.

6.2. Groundwater

Relatively minor concentrations of metals were detected in all recently collected groundwater samples. Relatively minor impacts from TPH compounds and MTBE were detected in groundwater sample SB-55-GW, and relatively minor impacts from 1,2- Dichloroethane and DIPE were detected in groundwater sample SB-56-GW. The concentrations of dissolved metals, TPH compounds, and VOCs detected in the recently collected groundwater samples are below the East Bay Municipal Utility District (EBMUD) discharge limits. Based on these results, groundwater from construction related dewatering activities performed in the areas sampled could be discharged to a local sanitary sewer system in accordance with EBMUD guidelines. Groundwater from construction related dewatering activities performed in the areas Borings SB-53 and SB-54 could also be used for dust control, however it is possible that groundwater from construction related dewatering activities performed in the areas of Borings SB-55 and SB-56 may not be usable for dust control based on the impacts from TPH compounds and VOCs detected in the groundwater samples from these borings.

Groundwater from construction related dewatering activities could also potentially be discharged to storm drains or surface water as discussed in Section 3.7 above. Prior to being discharged or used for dust control, groundwater should be pumped into a holding tank and re-sampled to evaluate potential options for discharge or dust control. Groundwater may be used for dust control if constituents of concern are below drinking water ESLs.

7. LIMITATIONS

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Variations in site conditions

may exist and conditions not observed or described in this report may be encountered during subsequent activities. Please also note that this study did not include an evaluation of geotechnical conditions or potential geologic hazards.

Ninyo & Moore's opinions and recommendations regarding environmental conditions, as presented in this report, are based on limited subsurface assessment and chemical analysis. Further assessment of potential adverse environmental impacts from past on-site and/or nearby use of hazardous materials may be accomplished by a more comprehensive assessment. The samples collected and used for testing, and the observations made, are believed to be representative of the area(s) evaluated; however, conditions can vary significantly between sampling locations. Variations in soil and/or groundwater conditions will exist beyond the points explored in this evaluation.

The environmental interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and concentration of specific chemical or physical constituents in samples collected from the subject site. The testing and analyses have been conducted by an independent laboratory which is certified by the State of California to conduct such tests. Ninyo & Moore has no involvement in, or control over, such testing and analysis. Ninyo & Moore, therefore, disclaims responsibility for any inaccuracy in such laboratory results.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

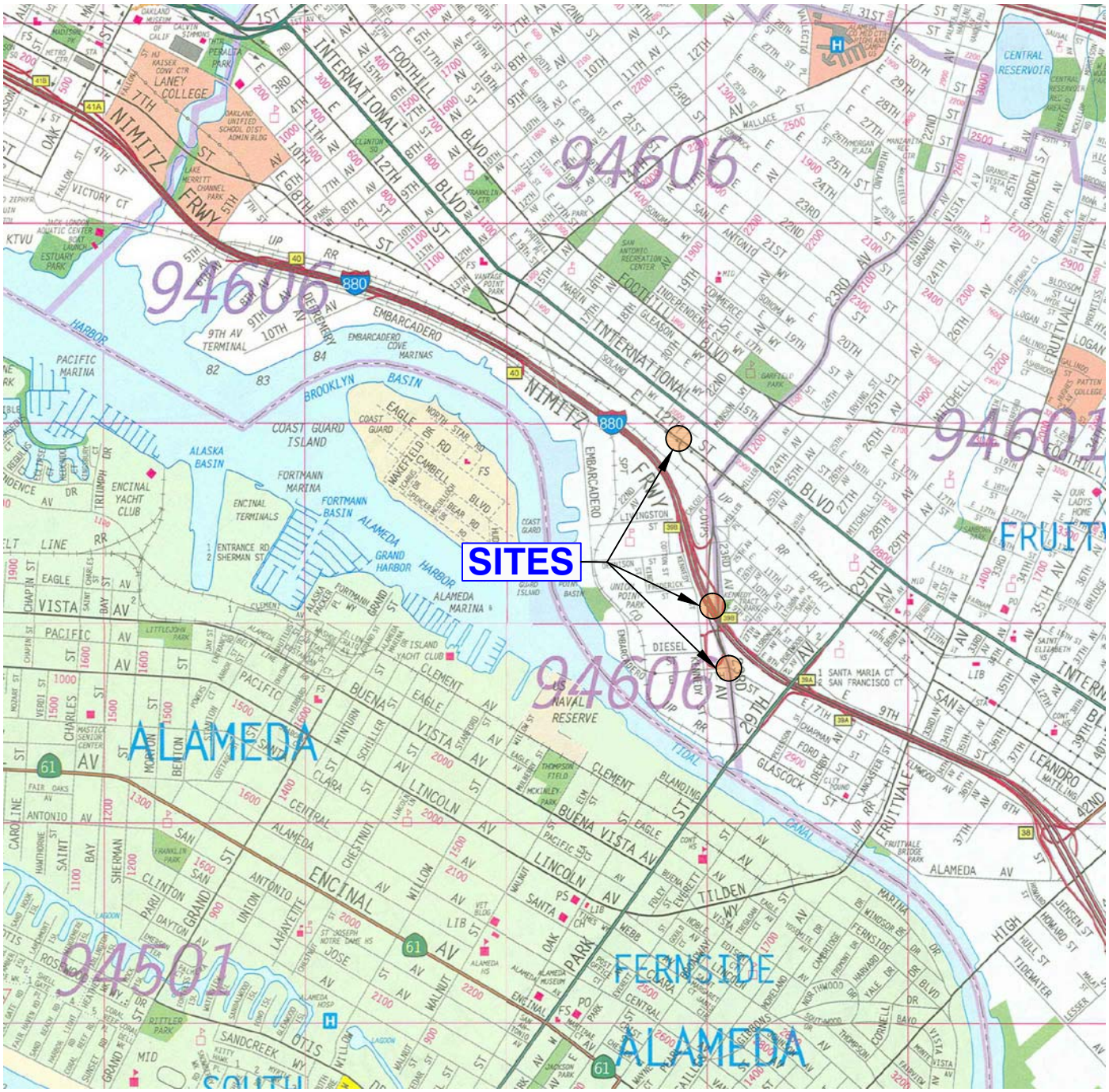
This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore

should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document.

This report is intended exclusively for use by RBF Consulting. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than those noted is undertaken at said parties' sole risk.

8. REFERENCES

Ninyo & Moore, 2009, Preliminary Site Investigation and Aerially Deposited Lead Report, Interstate 880 Operational and Safety Improvements at 29th Avenue and 23rd Avenue Overcrossings, Oakland, California: dated July 7.



REFERENCE: METRO AREAS OF ALAMEDA, CONTRA COSTA, MARIN, SAN FRANCISCO, SAN MATEO, AND SANTA CLARA COUNTIES, THOMAS GUIDE, 2008.

N

SCALE IN FEET

0 2,000 4,000

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore	SITE LOCATIONS	FIGURE
PROJECT NO. 401971001 / DATE 7/12	SOIL GROUNDWATER INVESTIGATION 23rd AVENUE OVERCROSSING OAKLAND, CALIFORNIA	1

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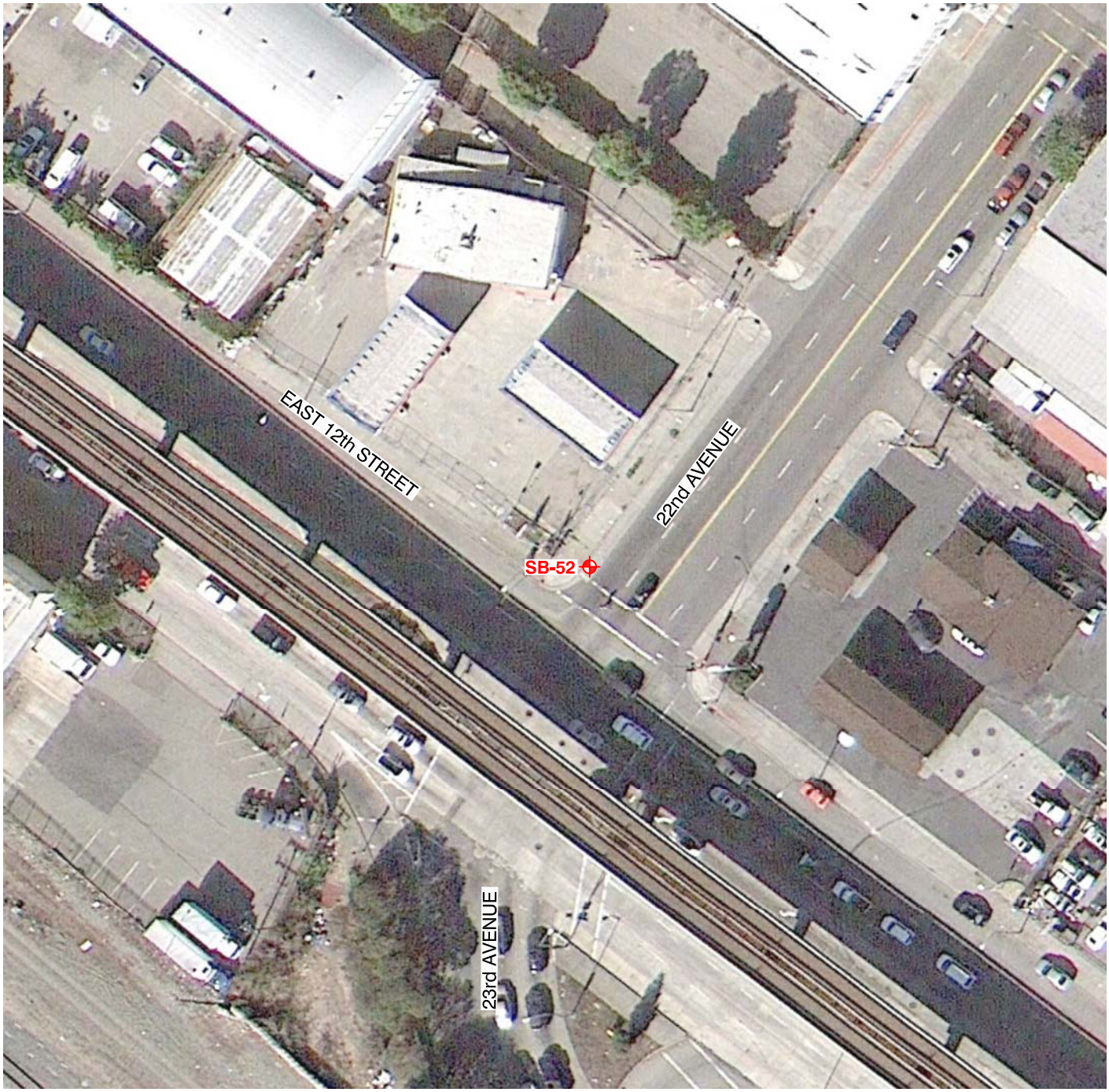


REFERENCE: GOOGLE EARTH IMAGERY, 2011.

N

SCALE IN FEET

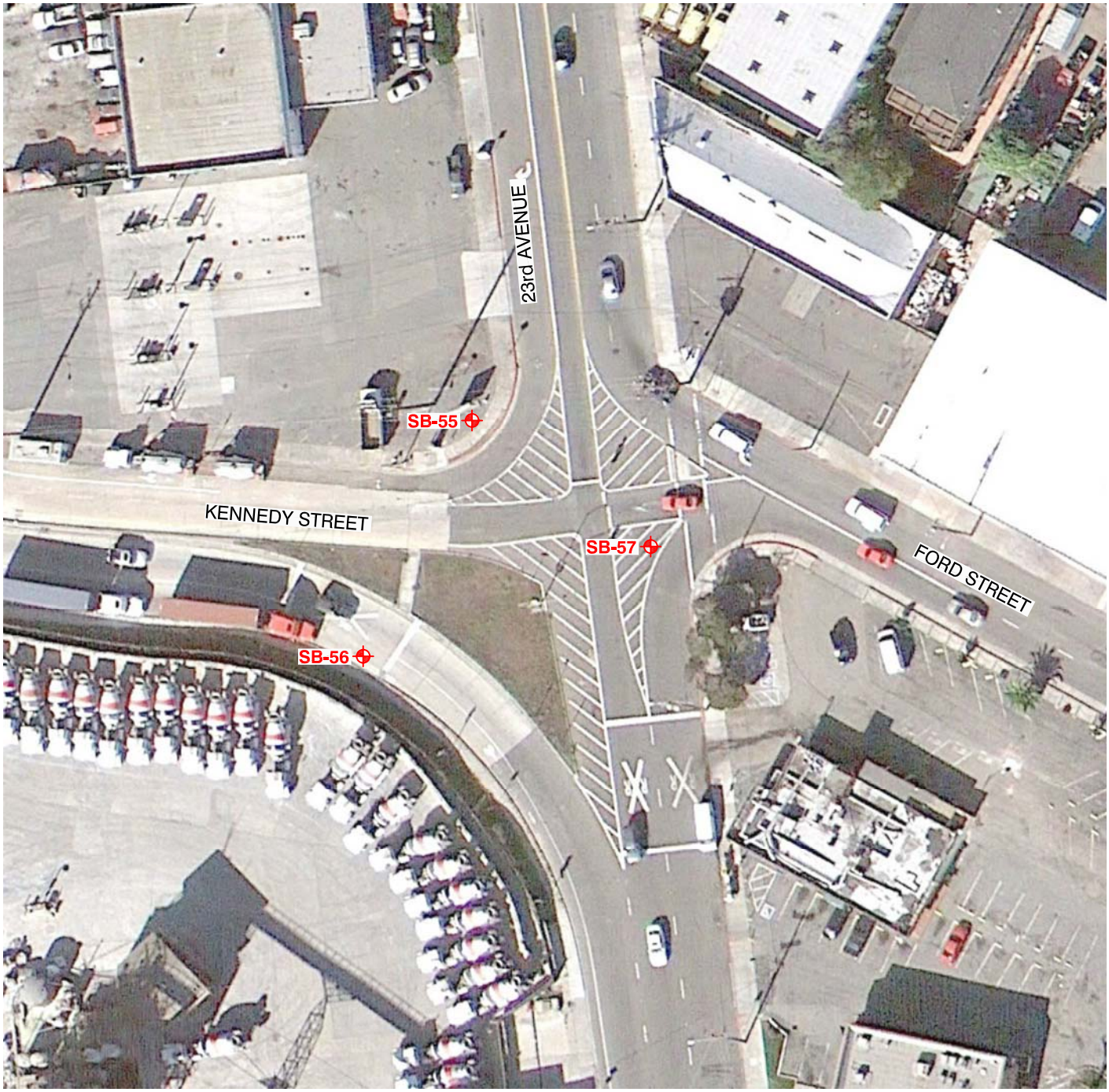
0 60 120

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND	
SB-52	JUNE 2012 BORING LOCATION

Ninyo & Moore		BORING LOCATION AT EAST 12th STREET AND 22nd AVENUE	FIGURE
PROJECT NO.	DATE	SOIL GROUNDWATER INVESTIGATION 23rd AVENUE OVERCROSSING OAKLAND, CALIFORNIA	2
401971001	6/12		

401971001-FIG2.dwg, Jun 28, 2012, 4:49pm, SN



REFERENCE: GOOGLE EARTH IMAGERY, 2011.

N

SCALE IN FEET

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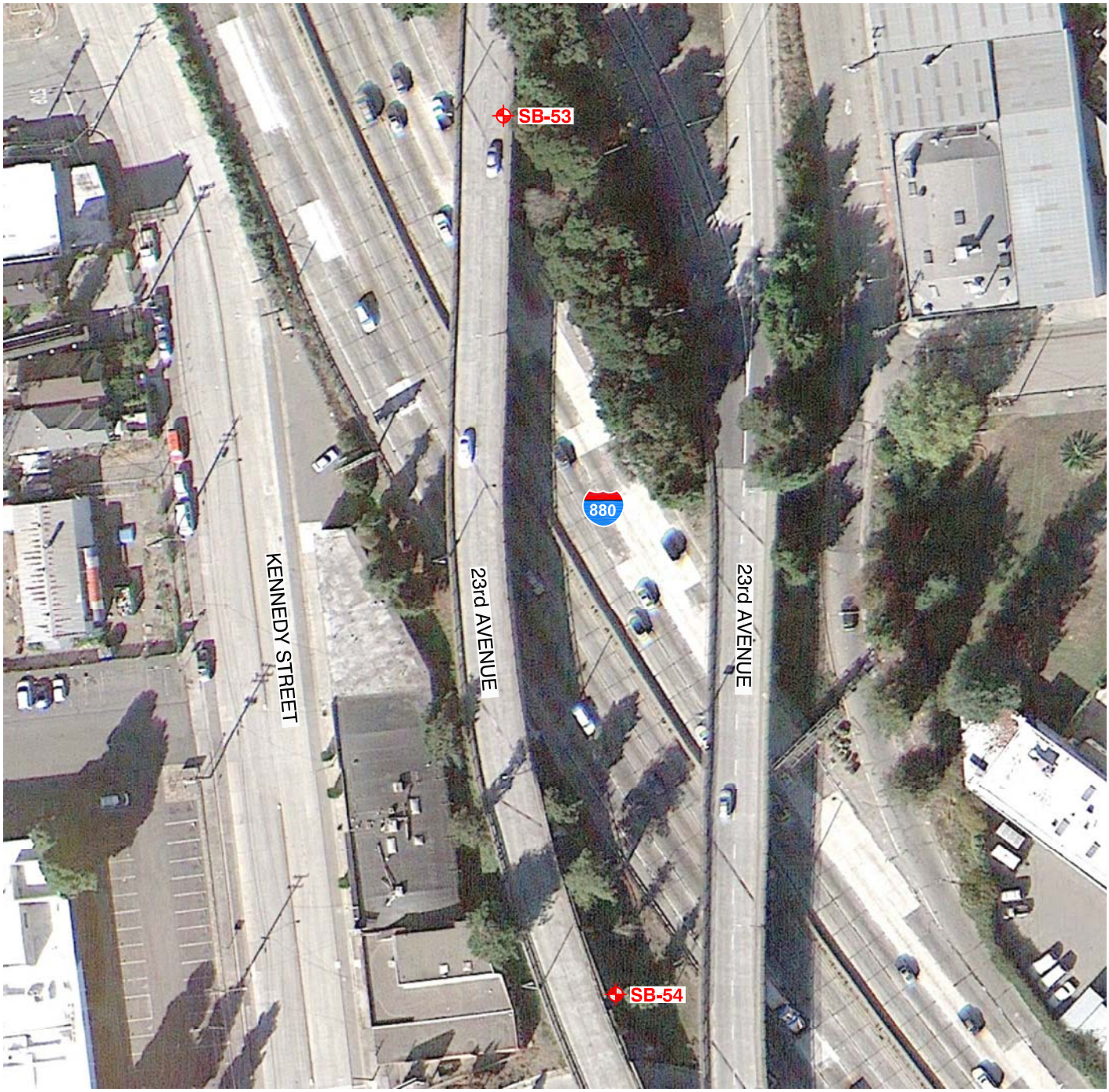
NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND	
SB-57	JUNE 2012 BORING LOCATION

Ninyo & Moore		BORING LOCATIONS AT 23rd AVENUE AND KENNEDY STREET	FIGURE
PROJECT NO.	DATE	SOIL GROUNDWATER INVESTIGATION 23rd AVENUE OVERCROSSING OAKLAND, CALIFORNIA	3
401971001	6/12		

401971001-FIG3.dwg, Jun 28, 2012, 4:50pm, SN



REFERENCE: GOOGLE EARTH IMAGERY, 2011.

N

SCALE IN FEET

0 80 160

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND	
SB-54	JUNE 2012 BORING LOCATION

Ninyo & Moore	BORING LOCATIONS AT I-880 AND 23rd AVENUE OVERCROSSING	FIGURE
PROJECT NO. 401971001 / DATE 6/12	SOIL GROUNDWATER INVESTIGATION 23rd AVENUE OVERCROSSING OAKLAND, CALIFORNIA	4

401971001-FIG4.dwg, Jun 28, 2012, 4:51pm, SN

Table 1 - GPS COORDINATES OF BORING LOCATIONS
Coordinates measured in decimal degrees on 6/20/12 & 6/21/12

Boring ID	Latitude	Longitude
SB-52	37.783927°	-122.238610°
SB-53	37.778390°	-122.237236°
SB-54	37.777122°	-122.237034°
SB-55	37.773839°	-122.236137°
SB-56	37.773579°	-122.236291°
SB-57	37.773698°	-122.235892°

TABLE 2 - ANALYTICAL RESULTS FOR TITLE 22 METALS

Sampling ID	Sample Date	Sample Depth (feet bgs)	Title 22 Metals																	
			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury	Soluble Chromium (mg/L)
			Soil Sample Analytical Results (mg/kg)																	
SB-52-1.5-2.0	6/20/2012	1.5-2.0	ND<2.0	4.6	180	ND<1.0	ND<1.0	53	12	24	8.3	ND<1.0	83	ND<1.0	ND<1.0	ND<1.0	37	51	ND<0.10	ND<1.0
SB-52-5.0-5.5	6/20/2012	5.0-5.5	ND<2.0	2.2	160	ND<1.0	ND<1.0	26	7.8	7.8	4.9	ND<1.0	24	ND<1.0	ND<1.0	ND<1.0	29	15	ND<0.10	NA
SB-52-9.5-10.0	6/20/2012	9.5-10.0	ND<2.0	1.1	80	ND<1.0	ND<1.0	30	2.9	8.9	2.7	1.2	39	ND<1.0	ND<1.0	ND<1.0	17	14	ND<0.10	NA
SB-53-1.5-2.0	6/21/2012	1.5-2.0	ND<2.0	5.1	200	ND<1.0	ND<1.0	44	12	30	38	ND<1.0	60	ND<1.0	ND<1.0	ND<1.0	35	67	0.17	NA
SB-53-5.0-5.5	6/21/2012	5.0-5.5	ND<2.0	3.8	120	ND<1.0	ND<1.0	53	8.7	19	6.6	ND<1.0	72	ND<1.0	ND<1.0	ND<1.0	32	40	ND<0.10	ND<1.0
SB-53-9.5-10.0	6/21/2012	9.5-10.0	ND<2.0	3.9	130	ND<1.0	ND<1.0	46	11	20	5.8	ND<1.0	74	ND<1.0	ND<1.0	ND<1.0	33	40	0.11	NA
SB-54-1.5-2.0	6/21/2012	1.5-2.0	ND<2.0	4.3	130	ND<1.0	ND<1.0	29	9.5	25	41	ND<1.0	44	ND<1.0	ND<1.0	ND<1.0	41	77	0.13	NA
SB-54-5.0-5.5	6/21/2012	5.0-5.5	ND<2.0	1.2	89	ND<1.0	ND<1.0	49	3.8	13	5.5	ND<1.0	52	ND<1.0	ND<1.0	ND<1.0	24	30	0.11	NA
SB-54-9.5-10.0	6/21/2012	9.5-10.0	ND<2.0	1.8	95	ND<1.0	ND<1.0	34	2.6	11	5.2	ND<1.0	23	ND<1.0	ND<1.0	ND<1.0	22	24	ND<0.10	NA
SB-55-1.5-2.0	6/20/2012	1.5-2.0	ND<2.0	4.2	150	ND<1.0	ND<1.0	37	9.6	18	25	ND<1.0	45	ND<1.0	ND<1.0	ND<1.0	31	36	ND<0.10	NA
SB-55-5.0-5.5	6/20/2012	5.0-5.5	ND<2.0	2.6	96	ND<1.0	ND<1.0	54	4.8	14	5.3	ND<1.0	97	ND<1.0	ND<1.0	ND<1.0	28	27	0.14	ND<1.0
SB-55-9.5-10.0	6/20/2012	9.5-10.0	ND<2.0	7.1	120	ND<1.0	ND<1.0	32	6.6	18	4.7	ND<1.0	55	ND<1.0	ND<1.0	ND<1.0	34	35	0.26	NA
SB-56-1.5-2.0	6/20/2012	1.5-2.0	ND<2.0	2.5	100	ND<1.0	ND<1.0	20	7.3	24	16	ND<1.0	24	ND<1.0	ND<1.0	ND<1.0	38	43	ND<0.10	NA
SB-56-5.0-5.5	6/20/2012	5.0-5.5	ND<2.0	3.0	160	ND<1.0	ND<1.0	52	23	13	6.8	ND<1.0	97	ND<1.0	ND<1.0	ND<1.0	32	28	ND<0.10	ND<1.0
SB-56-9.5-10.0	6/20/2012	9.5-10.0	ND<2.0	5.4	110	ND<1.0	ND<1.0	69	12	16	5.5	ND<1.0	94	ND<1.0	ND<1.0	ND<1.0	37	31	0.12	ND<1.0
SB-57-1.5-2.0	6/20/2012	1.5-2.0	ND<2.0	1.9	160	ND<1.0	ND<1.0	41	8.6	18	6.8	ND<1.0	44	ND<1.0	ND<1.0	ND<1.0	34	28	ND<0.10	NA
SB-57-5.0-5.5	6/20/2012	5.0-5.5	ND<2.0	4.8	130	ND<1.0	ND<1.0	53	13	19	7.1	ND<1.0	100	ND<1.0	ND<1.0	ND<1.0	44	33	ND<0.10	ND<1.0
SB-57-9.5-10.0	6/20/2012	9.5-10.0	ND<2.0	2.0	97	ND<1.0	ND<1.0	58	9.0	14	4.5	ND<1.0	57	ND<1.0	ND<1.0	ND<1.0	26	32	ND<0.10	ND<1.0
C/I Direct Exposure ESL			**82**	**1.6**	**34,000**	**390**	**7.4**	**310,000***	**1,900**	**82,000**	**750**	**1,000**	**3,400**	**1,000**	**1,000**	**16**	**200**	**610,000**	**18**	**NA**
Commerical/Industrial ESL			**40**	**1.6**	**1,500**	**8**	**7.4**	**750***	**80**	**230**	**750**	**40**	**150**	**10**	**40**	**16**	**200**	**600**	**10**	**NA**
			Groundwater Sample Analytical Results (mg/L)																	
SB-53-GW	6/21/2012	NA	ND<0.005	ND<0.01	0.07	ND<0.003	ND<0.003	ND<0.003	ND<0.003	0.01	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<0.003	ND<0.02	0.009	0.07	ND<0.0002	NA
SB-54-GW	6/21/2012	NA	ND<0.005	ND<0.01	0.27	ND<0.003	ND<0.003	ND<0.003	ND<0.003	0.01	ND<0.005	0.006	ND<0.005	ND<0.01	ND<0.003	ND<0.02	0.01	0.05	ND<0.0002	NA
SB-55-GW	6/20/2012	NA	ND<0.005	ND<0.01	0.11	ND<0.003	ND<0.003	0.005	ND<0.003	0.01	ND<0.005	0.02	0.007	ND<0.01	ND<0.003	ND<0.02	0.01	0.23	ND<0.0002	NA
SB-56-GW	6/20/2012	NA	ND<0.005	ND<0.01	0.09	ND<0.003	ND<0.003	0.006	0.005	0.02	ND<0.005	0.01	0.01	ND<0.01	ND<0.003	ND<0.02	0.005	0.16	ND<0.0002	NA
MCLs			**0.006**	**0.05**	**1**	**0.004**	**0.005**	**0.05**	**NA**	**1.3**	**0.015**	**NA**	**0.1**	**0.05**	**NA**	**0.002**	**NA**	**5**	**0.002**	**NA**
ESLs			**0.006**	**0.036**	**1**	**0.00053**	**0.00025**	**0.05**	**0.003**	**0.0031**	**0.0025**	**0.035**	**0.0082**	**0.005**	**0.00019**	**0.002**	**0.015**	**0.081**	**0.000025**	**NA**

Notes:
Title 22 Metals analyzed by EPA Method 6010B/7470A/7471A
Soluble Chromium analyzed by EPA Waste Extraction Test (WET) and Method 6010B
mg/kg – milligrams per kilogram
mg/L – milligrams per liter
C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource
* indicates Chromium III ESL used as there is no ESL established for total chromium
MCLs = California Primary Maximum Contaminant Levels
ESLs = San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels: Table F-1a - Groundwater Screening Levels - Where Groundwater is a Current or Potential Source of Drinking Water (Revised May 2008)
bgs – below ground surface
NA - not analyzed or not applicable
ND<X – not detected (concentrations is below the laboratory detection limit of X)

TABLE 3 - ANALYTICAL RESULTS FOR TPH AND VOCs

Sample ID	Sample Date	Sample Depth (feet bgs)	TPH			VOCs					
			TPHd	TPHmo	TPHg	Toluene	Carbon Disulfide	MTBE	1,2-Dichloroethane	Di-isopropyl Ether	All Other VOCs
			Soil Sample Analytical Results (mg/kg)			Soil Sample Analytical Results (µg/kg)					
SB-52-1.5-2.0	6/20/2012	1.5-2.0	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-52-5.0-5.5	6/20/2012	5.0-5.5	1.3	2.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-52-9.5-10.0	6/20/2012	9.5-10.0	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-53-1.5-2.0	6/21/2012	1.5-2.0	3.7	11	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-53-5.0-5.5	6/21/2012	5.0-5.5	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-53-9.5-10.0	6/21/2012	9.5-10.0	2.1	3.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-54-1.5-2.0	6/21/2012	1.5-2.0	25	67	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-54-5.0-5.5	6/21/2012	5.0-5.5	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-54-9.5-10.0	6/21/2012	9.5-10.0	4.0	6.5	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-55-1.5-2.0	6/20/2012	1.5-2.0	10	42	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-55-5.0-5.5	6/20/2012	5.0-5.5	2.6	2.8	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-55-9.5-10.0	6/20/2012	9.5-10.0	6.1	5.5	ND<1.0	8.3	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-56-1.5-2.0	6/20/2012	1.5-2.0	15	39	ND<1.0	6.6	5.4	ND<5.0	ND<5.0	NA	ND
SB-56-5.0-5.5	6/20/2012	5.0-5.5	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-56-9.5-10.0	6/20/2012	9.5-10.0	1.4	2.6	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-57-1.5-2.0	6/20/2012	1.5-2.0	2.2	8.7	ND<1.0	5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-57-5.0-5.5	6/20/2012	5.0-5.5	4.0	4.9	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
SB-57-9.5-10.0	6/20/2012	9.5-10.0	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	NA	ND
C/I Direct Exposure ESL			**450**	**3,700**	**450**	**210,000**	**NA**	**NA**	**NA**	**NA**	**NA**
Commerical/Industrial ESL			**83**	**2,500**	**83**	**2.,900**	**NA**	**NA**	**NA**	**NA**	**NA**
Sample ID	**Sample Date**		**Groundwater Sample Analytical Results (mg/L)**			**Groundwater Sample Analytical Results (µg/L)**					
SB-53-GW	6/21/2012		ND<0.05	ND<0.05	ND<0.05	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<0.50	ND
SB-54-GW	6/21/2012		ND<0.05	ND<0.05	ND<0.05	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<0.50	ND
SB-55-GW	6/20/2012		0.10	0.14	0.07	ND<0.50	ND<1.0	38	ND<0.50	ND<0.50	ND
SB-56-GW	6/20/2012		ND<0.05	ND<0.05	ND<0.05	ND<0.50	ND<1.0	ND<0.50	3.2	2.9	ND
ESLs			**0.1**	**0.1**	**0.1**	**NA**	**NA**	**5**	**0.5**	**NA**	**NA**

Notes:
TPH – Total Petroleum Hydrocarbons as diesel, motor oil, and gasoline by EPA Method 8015B (modified)
VOCs – Volatile Organic Compounds by EPA Method 8260B
MTBE - methyl-tert-butyl-ether
C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource
ESLs = San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels: Table F-1a - Groundwater Screening Levels - Where Groundwater is a Current or Potential Source of Drinking Water (Revised May 2008)
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
µg/l – micrograms per liter
µg/kg – micrograms per kilogram
bgs – below ground surface
ND – non detect (detection limits vary, see lab report)
ND<X – not detected (concentrations is below the laboratory detection limit of X)
NA – not analyzed or not applicable

APPENDIX A

PERMITS

Alameda County Public Works Agency - Water Resources Well Permit

399 Elmhurst Street
Hayward, CA 94544-1395
Telephone: (510)670-6633 Fax:(510)782-1939

Application Approved on: 06/15/2012 By jamesy

Permit Numbers: W2012-0411
Permits Valid from 06/20/2012 to 06/26/2012

Application Id: 1339713525194 **City of Project Site:** Oakland
Site Location: City of Oakland right-of-ways: at corner of 23rd Avenue and Kennedy Street, and at corner of 22nd Avenue and East 12th Street.
Project Start Date: 06/20/2012 **Completion Date:** 06/26/2012
Assigned Inspector: Contact Steve Miller at (510) 670-5517 or stevem@acpwa.org

Applicant: Ninyo & Moore Environmental Consultants - Jake Wilson
1956 Webster Street, #400, Oakland, CA 94612 **Phone:** 510-633-5640

Property Owner: City of Oakland
1 Frank H. Ogawa Plaza, Oakland, CA 94612 **Phone:** 510-444-2489

Client: RBF Consulting RBF Consulting
500 Ygnacio Valley Road, Walnut Creek, CA 94596 **Phone:** 925-906-1460

Receipt Number:
Total Due: $265.00
Total Amount Paid: $0.00
Payment Type: EXMPT **PAYMENT EXEMPT**

Works Requesting Permits:

Borehole(s) for Investigation-Contamination Study - 4 Boreholes
Driller: Cascade Drilling - Lic #: 938110 - Method: DP **Work Total: $265.00**

Specifications

Permit Number	Issued Dt	Expire Dt	# Boreholes	Hole Diam	Max Depth
W2012-0411	06/15/2012	09/18/2012	4	4.00 in.	15.00 ft

Specific Work Permit Conditions

1. Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings. All cuttings remaining or unused shall be containerized and hauled off site. The containers shall be clearly labeled to the ownership of the container and labeled hazardous or non-hazardous.

2. Boreholes shall not be left open for a period of more than 24 hours. All boreholes left open more than 24 hours will need approval from Alameda County Public Works Agency, Water Resources Section. All boreholes shall be backfilled according to permit destruction requirements and all concrete material and asphalt material shall be to Caltrans Spec or County/City Codes. No borehole(s) shall be left in a manner to act as a conduit at any time.

3. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, properly damage, personal injury and wrongful death.

4. Prior to any drilling activities, it shall be the applicant's responsibility to contact and coordinate an Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits or agreements required for that Federal, State, County or City, and follow all City or County Ordinances. No work shall begin until all the permits and requirements have been approved or obtained. It shall also be the applicants responsibilities to provide to the Cities or to Alameda County an Traffic Safety Plan for any lane closures or detours planned. No work shall begin until all the

permits and requirements have been approved or obtained.

5. Applicant shall contact Steve Miller for an inspection time at (510) 670-5517 or email to stevem@acpwa.org at least five (5) working days prior to starting, once the permit has been approved. Confirm the scheduled date(s) at least 24 hours prior to drilling.

6. Copy of approved drilling permit must be on site at all times. Failure to present or show proof of the approved permit application on site shall result in a fine of $500.00.

7. Prior to any drilling activities onto any public right-of-ways, it shall be the applicants responsibilities to contact and coordinate a Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits required for that City or to the County and follow all City or County Ordinances. It shall also be the applicants responsibilities to provide to the Cities or to Alameda County a Traffic Safety Plan for any lane closures or detours planned. No work shall begin until all the permits and requirements have been approved or obtained.

8. Permit is valid only for the purpose specified herein. No changes in construction procedures, as described on this permit application. Boreholes shall not be converted to monitoring wells, without a permit application process.

Alameda County Public Works Agency - Water Resources Well Permit

399 Elmhurst Street
Hayward, CA 94544-1395
Telephone: (510)670-6633 Fax:(510)782-1939

Application Approved on: 06/15/2012 By jamesy

Permit Numbers: W2012-0412
Permits Valid from 06/21/2012 to 06/26/2012

Application Id: 1339715463321 **City of Project Site:** Oakland
Site Location: Caltrans right-of-way beneath 23rd Avenue Overpass (at I-880).
Project Start Date: 06/21/2012 **Completion Date:** 06/26/2012
Assigned Inspector: Contact Steve Miller at (510) 670-5517 or stevem@acpwa.org

Applicant: Ninyo & Moore Environmental Consultants - Jake Wilson
1956 Webster Street, #400, Oakland, CA 94612 **Phone:** 510-633-5640

Property Owner: California Department of Transporation- Caltrans
111 Grand Avenue, 6th Floor, Oakland, CA 94523 **Phone:** --

Client: RBF Consulting RBF Consulting
500 Ygnacio Valley Road, Suite 270, Walnut Creek, CA 94596 **Phone:** 925-906-1460

Receipt Number:
Total Due: $265.00
Total Amount Paid: $0.00
Payment Type: EXMPT **PAYMENT EXEMPT**

Works Requesting Permits:

Borehole(s) for Investigation-Contamination Study - 2 Boreholes
Driller: Cascade Drilling - Lic #: 938110 - Method: DP **Work Total: $265.00**

Specifications

Permit Number	Issued Dt	Expire Dt	# Boreholes	Hole Diam	Max Depth
W2012-0412	06/15/2012	09/19/2012	2	4.00 in.	40.00 ft

Specific Work Permit Conditions

1. Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings. All cuttings remaining or unused shall be containerized and hauled off site. The containers shall be clearly labeled to the ownership of the container and labeled hazardous or non-hazardous.

2. Boreholes shall not be left open for a period of more than 24 hours. All boreholes left open more than 24 hours will need approval from Alameda County Public Works Agency, Water Resources Section. All boreholes shall be backfilled according to permit destruction requirements and all concrete material and asphalt material shall be to Caltrans Spec or County/City Codes. No borehole(s) shall be left in a manner to act as a conduit at any time.

3. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, properly damage, personal injury and wrongful death.

4. Prior to any drilling activities, it shall be the applicant's responsibility to contact and coordinate an Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits or agreements required for that Federal, State, County or City, and follow all City or County Ordinances. No work shall begin until all the permits and requirements have been approved or obtained. It shall also be the applicants responsibilities to provide to the Cities or to Alameda County an Traffic Safety Plan for any lane closures or detours planned. No work shall begin until all the

permits and requirements have been approved or obtained.

5. Applicant shall contact Steve Miller for an inspection time at (510) 670-5517 or email to stevem@acpwa.org at least five (5) working days prior to starting, once the permit has been approved. Confirm the scheduled date(s) at least 24 hours prior to drilling.

6. Copy of approved drilling permit must be on site at all times. Failure to present or show proof of the approved permit application on site shall result in a fine of $500.00.

7. Permit is valid only for the purpose specified herein. No changes in construction procedures, as described on this permit application. Boreholes shall not be converted to monitoring wells, without a permit application process.

RBF CONSULTING

November 22, 2010 JN 35-101088

Mr. Bahman Zarechian
Caltrans Permit Office
111 Grand Avenue, 6th Floor
Oakland, CA 94523

Subject: I-880 / 29th Avenue / 23rd Avenue Interchanges
Encroachment Permit Request

Dear Bahman:

RBF Consulting is managing the final Plans, Specifications, and Estimates (PS&E) for the I-880 Operational and Safety Improvements at 29th Avenue and 23rd Avenue Overcrossings for the Alameda County Congestion Management Agency (CMA).

In order to coordinate our efforts involved in the PS&E, we would like to add the new consultants involved on the project to our existing encroachment permit. Attached, is the letter from CMA designating RBF Consulting and other consultants as authorized agents of CMA.

For reference, also included is the previous encroachment permit number 0408-NSV1545 that CMA was issued for site survey, geotechnical testing, and utility potholing. This permit has been extended to June 30, 2012.

Please contact me at (925) 906-1460 to discuss any comments or questions on the request to add additional consultants to the authorized agents of CMA.

Sincerely,
RBF Consulting

Jennifer Harmon, P.E.
Senior Associate

ALAMEDA COUNTY
CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 • OAKLAND, CA 94612 • PHONE: (510) 836-2560 • FAX: (510) 836-2185
E-MAIL: mail@accma.ca.gov • WEB SITE: accma.ca.gov

November 19, 2010 JN 35-100463

Mr. Bahman Zarechian
Caltrans Permit Office
111 Grand Avenue, 6th Floor
Oakland, CA 94523

Subject: Encroachment Permit Letter of Authorization

Dear Mr. Zarechian:

The Alameda County Congestion Management Agency / Alameda County Transportation Commission is currently directing the final Plans, Specifications, and Estimates for the I-880 Operational and Safety Improvements at 29th Avenue and 23rd Avenue Overcrossings. This letter is to designate the following consultants as authorized agents of the Alameda County Congestion Management Agency / Alameda County Transportation Commission:

RBF Consulting – Engineering, Planning, and Surveying
Jennifer Harmon/ Garrett Gritz
500 Ygnacio Valley Road, Suite 270, Walnut Creek, CA 94596
(925) 906-1460, fax (925) 906-1465

WMH Corporation – Engineering
Sean Charles/ Tim Lee
555 12th Street, Suite 1900, Oakland, CA 94607
(510) 698-6300, fax (510) 444-2450

URS Corporation – Structures
Walt LaFranchi/ Syed Kazmi
1333 Broadway, Suite 800, Oakland, CA 94612
(916) 784-3900, fax (916) 784-0211

Earth Mechanics, Inc. – Geotechnical Engineering Consultants
Lino Cheang/ Pedro Espinosa
7750 Pardee Lane, Suite 120, Oakland, California 94621
(714) 751-3826/ (510) 562-8833, fax (510) 562-8858

Haygood and Associates – Landscape Architecture
Leah Haygood
1496B Solano Avenue, Albany, CA 97064
(510) 527-6343, fax (510) 527-2808

Sincerely,

Matt Todd
Manager of Programming

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

ENCROACHMENT PERMIT RIDER

TR-0122

Collected by	Permit No. (Original)
	0408-NSV1545
Rider Fee Paid	Dist/Co/Rte/PM
	04-ALA-880 28.4/29.2
Date	Rider Number
March 10, 2010	0410-NRT0521

TO: Alameda County Congestion Manag. Agency
1333 Broadway, Suite 220
Oakland, CA 94612

Attn: Mr. Frank Furger
Phone: (510) 836-2560

, **PERMITTEE**

In compliance with your request of March 9, 2010, and in reference to your project to perform site survey, and Cone Penetration Test (CPT) on State Highway 04-Ala-880, Post Miles 28.4/29.2, under 29th Avenue Overcrossing and 23rd Avenue Bridge, in the City of Oakland, in conjunction with I-880 Operational and Safety Improvements project at 29th Avenue and 23rd Avenue.

We are hereby amending the above numbered encroachment permit as follows:

Date of completion extended to: June 30, 2012.

Additional provision to your permit: Permission is granted to locate utility lines by potholing in conjunction with your permit.

Except as amended, all other terms and provisions of the original permit shall remain in effect.

AM
cc: BK, SM
Traffic Management Center-J. Richardson
DTM-P. Chan
0408-NSV1545

APPROVED:

BIJAN SARTIPI, District Director

BY:

for **MICHAEL D. CONDIE, District Permit Engineer**

CITY OF OAKLAND • Department of Planning, Building and Neighborhood Preservation
250 Frank H. Ogawa Plaza, [illegible] Floor, Oakland, CA 94612 • Phone (510) 238 [illegible]43 • Fax (510) 238-2263

Applications for which no permit is issued within 180 days shall expire by limitation. No refund more than 180 days after expiration or final.

Appl# X1201156 Job Site 401 23RD AV Parcel# 019 -0073-008-05

Descr Soil boring(s) at n/w & s/w corners of Kennedy St/23rd Ave Permit Issued 06/18/12
Impact on traffic lane per TSD-12-0111.
Call PWA INSPECTION prior to start: 510-238-3651. 4th FLOOR.
Work Type EXCAVATION-PRIVATE P

USA # Util Co. Job # Acctg#:
Util Fund #:

	Applcnt	Phone#	Lic#	--License Classes--
Owner	CP HOLDING CO LLC			
Contractor	NINYO & MOORE GEOTECHNICAL CON	X (858)576-1000	697063	A
Arch/Engr				
Agent				

Applic Addr 5710 RUFFIN ROAD, SAN DIEGO, CA, 92123-101

$436.05 FEES TO BE PAID AT ISSUANCE

$71.00 Applic	$309.00 Permit
$.00 Process	$36.10 Rec Mgmt
$.00 Gen Plan	$.00 Invstg
$.00 Other	$19.95 Tech Enh

JOB SITE

Permit Issued By G Date: _____

Finaled By _____ Date: _____

ADDRESS:

DIST:

CITY OF OAKLAND

PAID
6/18/12 mh

CITY OF OAKLAND • Department of Planning, Building and Neighborhood Preservation
250 Frank H. Ogawa Plaza, 2nd Floor, Oakland, CA 94612 • Phone (510) 238-3443 • Fax (510) 238-2263

Applications for which no permit is issued within 180 days shall expire by limitation. No refund more than 180 days after expiration or final.

Appl# X1201157 Job Site 2828 FORD ST Parcel# 019 -0079-019-03

Descr Soil boring(s) at s/e intersection of Ford St/23rd Ave. See location map. Call PWA INSPECTION prior to start: 510-238-3651. 4th FLOOR — Permit Issued 06/18/12

Work Type EXCAVATION-PRIVATE P

USA # Util Co. Job # Acctg#:
Util Fund #:

		Applcnt	Phone#	Lic#	--License Classes--
Owner	STRAUS THOMAS E & PATRICIA A T				
Contractor	NINYO & MOORE GEOTECHNICAL CON	X	(858)576-1000	697063	A
Arch/Engr					
Agent					

Applic Addr 5710 RUFFIN ROAD, SAN DIEGO, CA, 92123-101

$436.05 FEES TO BE PAID AT ISSUANCE

$71.00	Applic	$309.00	Permit
$.00	Process	$36.10	Rec Mgmt
$.00	Gen Plan	$.00	Invstg
$.00	Other	$19.95	Tech Enh

JOB SITE

Permit Issued By _____ Date: _____

Finaled By _____ Date: _____

ADDRESS:

DIST:

CITY OF OAKLAND

PAID
6/19/12

CITY OF OAKLAND • Department of Planning, Building and Neighborhood Preservation
250 Frank H. Ogawa Plaza, [illegible] Floor, Oakland, CA 94612 • Phone (510) 238 [illegible]43 • Fax (510) 238-2263

Applications for which no permit is issued within 180 days shall expire by limitation. No refund more than 180 days after expiration or final.

Appl# X1201158 Job Site 2142 E 12TH ST Parcel# 020 -0108-002-03

Descr Soil boring(s) at n/w corner of E 12th St/22nd Ave. See location map.
Call PWA INSPECTION prior to start: 510-238-3651. 4th FLOOR
Permit Issued 06/18/12

Work Type EXCAVATION-PRIVATE P

USA # Util Co. Job # Acctg#:
Util Fund #:

		Applcnt	Phone#	Lic#	--License Classes--
Owner	REED OSCAR Z				
Contractor	NINYO & MOORE GEOTECHNICAL CON	X	(858)576-1000	697063	A
Arch/Engr					
Agent					

Applic Addr 5710 RUFFIN ROAD, SAN DIEGO, CA, 92123-101

JOB SITE

$436.05 FEES TO BE PAID AT ISSUANCE

$71.00	Applic	$309.00	Permit
$.00	Process	$36.10	Rec Mgmt
$.00	Gen Plan	$.00	Invstg
$.00	Other	$19.95	Tech Enh

Permit Issued By _____ Date: _____

Finaled By _____ Date: _____

ADDRESS:

DIST:

CITY OF OAKLAND

PAID
6/18/12

CITY OF OAKLAND • Department of Planning, Building and Neighborhood Preservation
250 Frank H. Ogawa Plaza, 2nd Floor, Oakland, CA 94612 • Phone (510) 238-3443 • Fax (510) 238-2263

Applications for which no permit is issued within 180 days shall expire by limitation. No refund more than 180 days after expiration or final.

Appl# OB120534 Job Site 2828 FORD ST Parcel# 019 -0079-019-03

Per TSD-12-0111 allow work area within painted island area in intersection of 23rd Ave & Ford St. All other areas NO FEE ref: X1201156, X1201158 & X1201157.

Permit Issued 06/18/12

Nbr of days: 1 Linear feet: 25
Effective: 06/20/12 Expiration: 06/20/12

SHORT TERM NON-METERED

		Applcnt	Phone#	Lic#	--License Classes--
Owner	STRAUS THOMAS E & PATRICIA A T				
Contractor	NINYO & MOORE GEOTECHNICAL CON	X	(858)576-1000	697063	A
Arch/Engr					
Agent					

Applic Addr 5710 RUFFIN ROAD, SAN DIEGO, CA, 92123-101

$101.56 FEES TO BE PAID AT FILING		$.00 FEES TO BE PAID AT ISSUANCE
$71.00 Applic	$17.50 Permit	
$.00 Process	$8.41 Rec Mgmt	
$.00 Gen Plan	$.00 Invstg	
$.00 Other	$4.65 Tech Enh	

JOB SITE

TCP needs to be approved by Transportation Services every 30 days or whenever deviated from the previously approved plan.

ADDRESS:

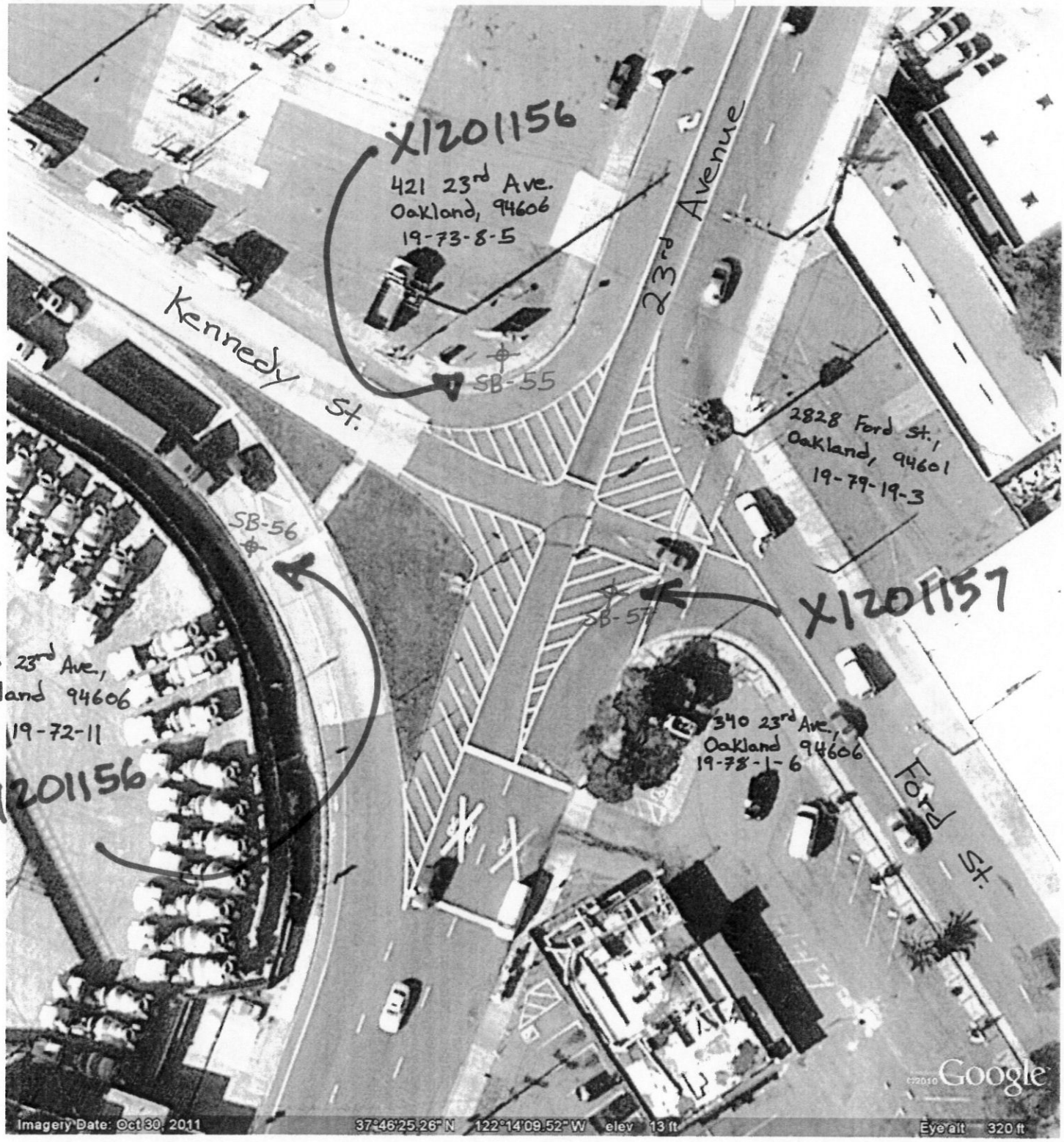
Applicant: _____ _____

Issued by: _____ _____

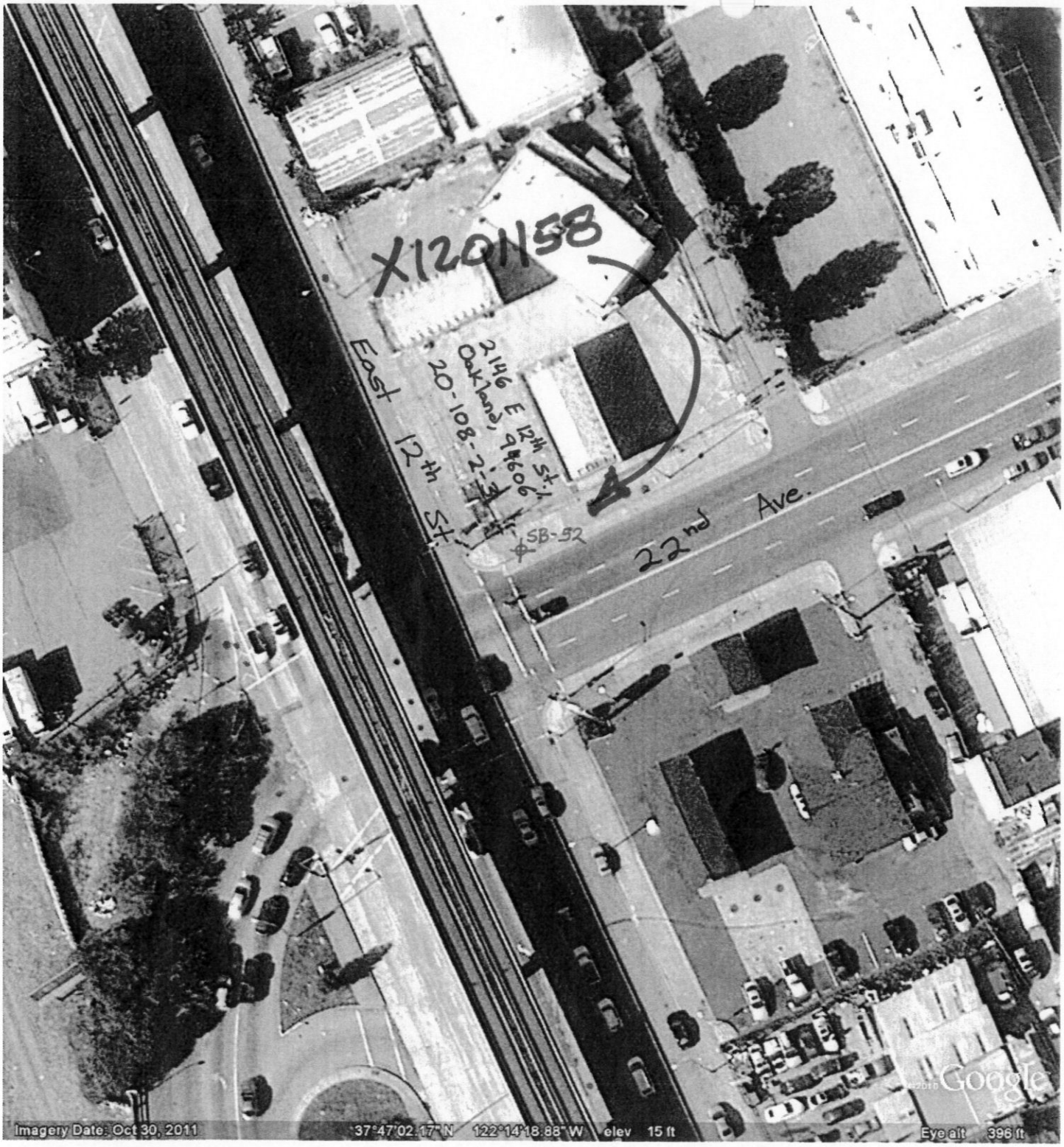
DIST:

CITY OF OAKLAND

PAID 6/19/12


X1201156
421 23rd Ave.
Oakland, 94606
19-73-8-5
Kennedy St.
23rd Avenue
SB-55
2828 Ford St.
Oakland, 94601
19-79-19-3
SB-56
SB-57
X1201157
333 23rd Ave,
Oakland 94606
19-72-11
X1201156
340 23rd Ave.,
Oakland 94606
19-78-1-6
Ford St.
Google
Imagery Date: Oct 30, 2011
37°46'25.26" N 122°14'09.52" W elev 13 ft
Eye alt 320 ft

DAY #1 1 space


X1201158
2146 E 12th St.
Oakland, 94606
20-108-2-13
East 12th St.
SB-52
22nd Ave.
Imagery Date: Oct 30, 2011
37°47'02.17" N 122°14'18.88" W elev 15 ft
Eye alt 396 ft
Google

DAY # 2

1 space

SPECIAL PROVISION 7-10.1 TRAFFIC REQUIREMENTS

Project Name: _____
Project Number: TSD 12-0111__
Reviewed By: B.Chang
Date: 6/15/2012_
Permit good from__6/18/2012_
to____7/18/2012___

ADD NEW SUBSECTION TO READ:
SP 7-10.1.4 Vehicular Traffic

Attention is directed to Section 7-10. Public Convenience and Safety, of the City of Oakland Standard Specification for Public Works Construction, 2006 Edition (Include this paragraph for p-jobs, excavation permits or obstruction permits).

The Contractor shall conduct its work in such a manner as to provide public convenience and safety and according to the provisions in this subsection. The provisions shall not be modified or altered without written approval from the Engineer.

Standard traffic control devices shall be placed at the construction zone according to the latest edition of the Work Area Traffic Control Handbook or Manual on Uniform Traffic Control Devices (MUTCD), Chapter 6 – "Traffic Controls for Construction and Maintenance Work Zone," or as directed by the Engineer.

All trenches and excavations in any public street or roadway shall be back filled and opened to traffic, or covered with suitable steel plates securely placed and opened to traffic at all times except during actual construction operations unless otherwise permitted by the Engineer.

Each section of work shall be completed or temporarily paved and open to traffic in not more than 5 days after commencing work unless otherwise permitted in writing by the Engineer.

Where construction encroaches into the sidewalk area, a minimum of 5 ½ feet of unobstructed sidewalk shall be maintained at all times for pedestrian use. Pedestrian barricades, shelter, and detour signs per Caltrans standards may be required.

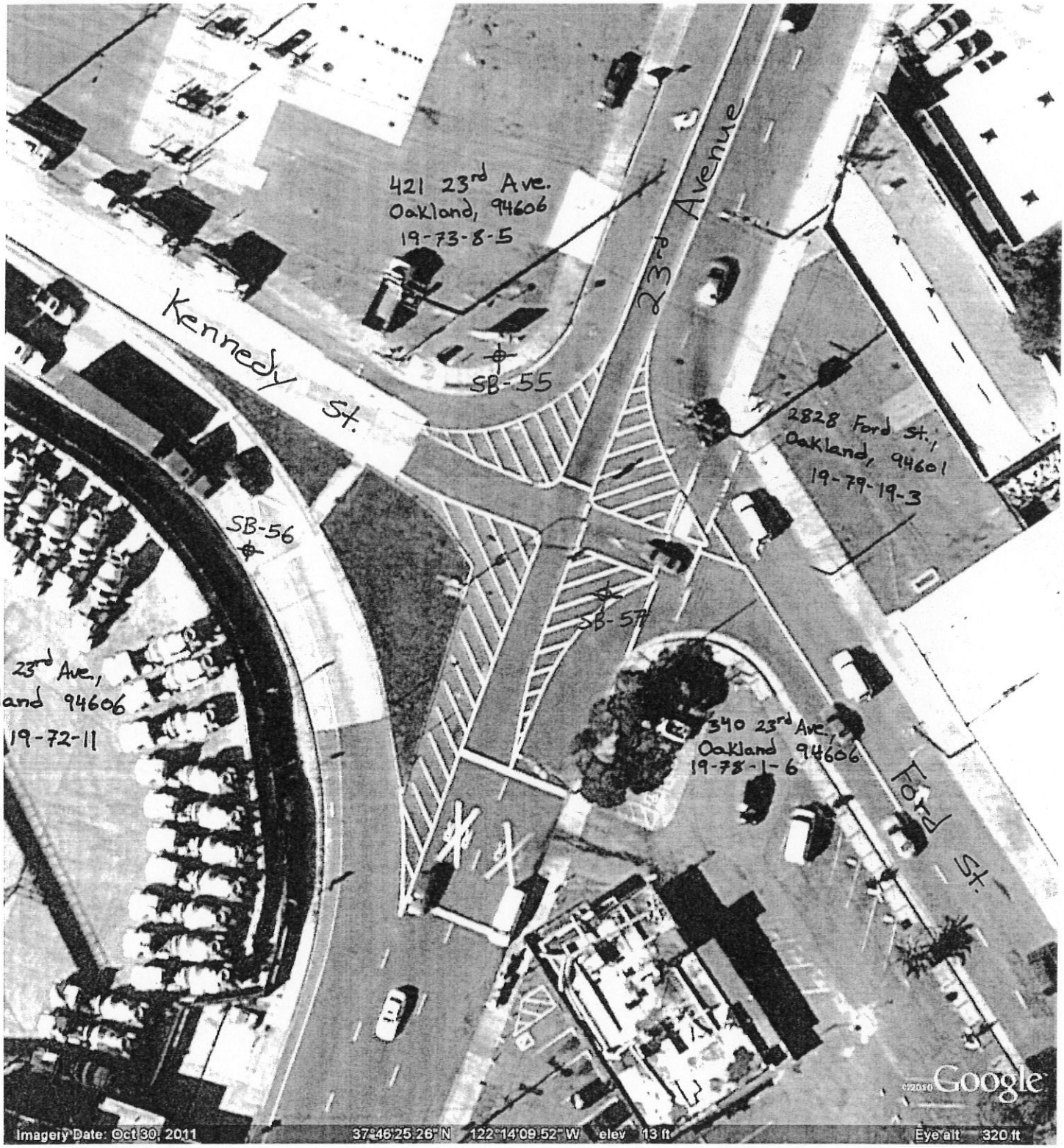
The contractor shall conduct its operation in such a manner as to leave the following traffic lanes unobstructed and in a condition satisfactory for vehicular travel during the Obstruction Period. At all times traffic lanes will be restricted and reopened to travel. Emergency access shall be provided at all times.

Street Name Limits	**Obstruction Period**	**North Bound**	**South Bound**	**East Bound**	**West Bound**
23rd Ave intersection at Kennedy St	Mon. – Fri. 8am – 5pm	N/A	Shoulder Closure	N/A	N/A
Work to only be performed in the painted island (painted median) not to affect travel lanes. All other locations of work located on private property.					

The Contractor Shall Also include all check item:

1. ☐ Design a construction traffic control plan and submit (2) copies to the Engineer for approval prior to starting any work.
2. ☒ Replace all signs, pavement markings, and traffic detector loops damaged or removed due to construction within 3 days of completion of work or the final pavement lift.
3. ☒ Provide advance notice to Oakland Police at (510) 777-3333 (24-hrs) and Oakland Fire at (510) 238-3331 (2-rhs) when a single lane of traffic or less is provided on any street.
4. ☒ Provide 72-hour advance notice to AC Transit at (510) 891-4750 when affecting a bus stop.
5. ☒ For Caltrans roadways, ramps, or maintained facilities, the Contractor shall obtain appropriate permits and notify the Traffic Management Center 24 hours in advance of any work.
6. ☒ Flagger control is required. Certified Flagger is required.
7. ☐ Pedestrian walkway by K-rail, Canopy or Plywood is required. (See detour plan)
8. ☒ Pedestrian traffic shall be maintained and guided through the project at all times.
9. ☒ Provide advance notice to Business and Residence within 72-hours.
10. ☒ Allow all traffic movement at intersection.

Nothing specified herein shall prohibit emergency work and/or repair necessary to ensure public health and safety.



Contractor bound
to work area located
inside painted island
for well location SB-57
All other locations on private property.

APPROVED: Bert Clay 6/15/2012
Transportation Services Division
CITY OF OAKLAND TSD 12-0111

CITY OF OAKLAND

Public Works Agency • 250 Frank H. Ogawa Plaza • Suite 4344 • Oakland, California 94612-2033
Transportation Services Division

Office (510) 238-3466
FAX (510) 238-7415
TDD (510) 839-6451

Traffic Engineering Services Analysis Fee Invoice

Date: June 15, 2012

TSD Invoice # : 12-0111

To: Jake Wilson
Company: Ninyo and Moore
Address: 1956 Webster St #400, Oakland CA 94612
Phone: 510-343-3000

Created/Received By: Bert Chang

Location	Description of Work	Project Name / Permit #	# of Hours *
23rd Ave intersection at Kennedy St	Environmental Teting in Median		1

Total Hours		**1**
TSD Service Rate	**$**	**123.00**
Total Fee	**$**	**123.00**

* - minimum 1 hour service

FOR CITY USE ONLY	
Cost Center No.	W045
Organization No.	30264
Account No.	45119
Fund No.	1750

Cc: Rosalie

APPENDIX B

BORING LOGS

DATE DRILLED 6/20/2012 BORING NO. SB-52

GROUND ELEVATION 15' ± MSL SHEET 1 OF 2

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								CONCRETE: Approximately 6 inches thick.
					0		CL	ALLUVIUM: Black, moist, stiff, CLAY.
					0			
					0			
							SM	Olive brown, moist, dense, silty SAND.
5					0			
					0			
					0			
							GC	Olive brown, moist, dense, clayey GRAVEL.
					0			
10					0			
					0			
							ML	Light olive brown, moist, stiff, SILT.
					0			
15					0			
					0			
								Final boring depth = 19 feet bgs.
20								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/20/2012 BORING NO. SB-52

GROUND ELEVATION 15' ± MSL SHEET 2 OF 2

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Groundwater not encountered during drilling. Tremie grouted with Portland cement on 6/20/12.
25								
30								
35								
40								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/21/2012 BORING NO. SB-53

GROUND ELEVATION 19' ± MSL SHEET 1 OF 3

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0					0		CL	ALLUVIUM: Black, moist, soft, CLAY.
					0			
					0			
							SM	Olive brown, moist, dense, silty SAND.
5					0			
					0			
					0			
10			▼				SW	Olive brown, moist, dense, SAND.
					0			
					0			
							CL	Olive brown, moist, soft, CLAY.
					0			
15					0			
					0			
							SW	Olive brown, moist, dense, SAND.
20					0			

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/21/2012 BORING NO. SB-53

GROUND ELEVATION 19' ± MSL SHEET 2 OF 3

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20						0		SW	
						0		SM	Olive brown, moist, dense, silty SAND.
25						0			
30						0		ML	Light olive brown, moist, stiff, SILT.
35						0			
40						0			

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/21/2012 BORING NO. SB-53

GROUND ELEVATION 19' ± MSL SHEET 3 OF 3

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40					0		ML	
			▽		0		GW	Olive brown, wet, loose, sandy GRAVEL.
								Final boring depth = 44 feet bgs.
45								Groundwater encountered at approximately 43 feet bgs and measured at approximately 11 feet bgs 15 minutes after first encountered.
								Tremie grouted with Portland cement on 6/21/12.
50								
55								
60								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/21/2012 BORING NO. SB-54

GROUND ELEVATION 19' ± MSL SHEET 1 OF 3

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0					0		GW	FILL: Pale brown, dry, loose, sandy GRAVEL.
					0		GC	Dark brown, moist, dense, clayey GRAVEL.
					0			
					0		ML	ALLUVIUM: Dark greenish gray, moist, soft, SILT.
5					0			
					0			
10					0			
					0		SP	Olive brown, moist, dense, SAND.
15					0			
					0			Trace gravel.
					0		CL	Light gray, moist, soft, CLAY.
20								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/21/2012 BORING NO. SB-54

GROUND ELEVATION 19' ± MSL SHEET 2 OF 3

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20					0		CL	
							SM	Light gray, moist, dense, silty SAND.
25					0			
					0			
							CL	Olive brown, moist, hard, CLAY.
30					0			
35			▼		0			
40					0			

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/21/2012 BORING NO. SB-54

GROUND ELEVATION 19' ± MSL SHEET 3 OF 3

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40					0		CL	
			▽				SP	Yellowish brown, wet, loose, SAND.
45					0			Final boring depth = 45 feet bgs. Groundwater encountered at approximately 44 feet bgs and measured at approximately 35 feet bgs 45 minutes after first encountered. Tremie grouted with Portland cement on 6/21/12.
50								
55								
60								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/20/2012 BORING NO. SB-55

GROUND ELEVATION 13' ± MSL SHEET 1 OF 1

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								ASPHALT: Approximately 12 inches thick.
					0		CL	ALLUVIUM: Black, moist, soft, CLAY; trace gravel.
					0			
					0			
5					0			
			▽				GW	Olive brown, wet, loose, sandy GRAVEL.
					0			
10					0			
							CL	Light brown, wet, stiff, CLAY.
					0			
					0			
15								Final boring depth = 15 feet bgs.
								Groundwater encountered at approximately 7 feet bgs.
								Tremie grouted with Portland cement on 6/20/12.
20								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/20/2012 BORING NO. SB-56

GROUND ELEVATION 13' ± MSL SHEET 1 OF 1

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								CONCRETE: Approximately 6 inches thick.
					0		SW	FILL: Pale brown, dry, loose, well-graded SAND.
					0			
							ML	ALLUVIUM: Dark brown, moist, stiff, SILT; trace gravel.
					0			
5					0			
							SM	Light olive brown, moist, medium dense, silty SAND.
					0			
					0			
					0			
10								
			▽				SP	Light olive brown, wet, dense, SAND.
					0			
					0			
							CL	Light olive brown, wet, stiff, CLAY.
					0			
15								Final boring depth = 15 feet bgs. Groundwater encountered at approximately 11 feet bgs. Tremie grouted with Portland cement on 6/20/12.
20								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

DATE DRILLED 6/20/2012 BORING NO. SB-57

GROUND ELEVATION 13' ± MSL SHEET 1 OF 1

METHOD OF DRILLING DIRECT PUSH

DRIVE WEIGHT _____ DROP _____

SAMPLED BY JJW LOGGED BY JJW REVIEWED BY KML

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	PID READING (PPM)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								ASPHALT: Approximately 12 inches thick.
					0		CL	ALLUVIUM: Black, moist, stiff, CLAY.
					0			
5					0			
					0			
10					0			
					0		SM	Olive brown, moist, dense, silty SAND.
					0			
15								Final boring depth = 15 feet bgs. Groundwater not encountered during drilling. Tremie grouted with Portland cement on 6/20/12.
20								

Ninyo & Moore

BORING LOG

I-880/23RD AVENUE OVERCROSSING
OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401971001	6/12	

KEY TO SYMBOLS

Symbol Description

Strata symbols

asphalt/concrete

Low plasticity clay

silty sand (Qaf, Qal)

Sandy gravelly clay to clayey gravel.

Silt

Well graded sand

Well graded gravel

Poorly graded sand

Misc. Symbols

Groundwater encountered during drilling.

Static water level measured on indicated date.

Soil Samplers

Push Probe

APPENDIX C

LABORATORY REPORTS

ADVANCED TECHNOLOGY LABORATORIES

June 28, 2012

ELAP No.: 1838
NELAP No.: 02107CA
CSDLAC No.: 10196
ORELAP No.: CA300003
TCEQ No.: T104704502

Cem Atabek
Ninyo & Moore
1956 Webster Street, Suite 400
Oakland, CA 94612
Tel: (510) 772-7418
Fax:(510) 633-5646

Re: ATL Work Order Number : 1202282

Client Reference : RBF I-880/23rd Ave, 401971001

Enclosed are the results for sample(s) received on June 21, 2012 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and its absence renders the report invalid. The report cannot be reproduced without written permission from the client and Advanced Technology Laboratories.

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB-52-1.5-2.0	1202282-01	Soil	6/20/12 13:00	6/21/12 8:06
SB-52-5.0-5.5	1202282-02	Soil	6/20/12 13:10	6/21/12 8:06
SB-52-9.5-10.0	1202282-03	Soil	6/20/12 13:20	6/21/12 8:06
SB-55-1.5-2.0	1202282-04	Soil	6/20/12 11:10	6/21/12 8:06
SB-55-5.0-5.5	1202282-05	Soil	6/20/12 11:30	6/21/12 8:06
SB-55-9.5-10.0	1202282-06	Soil	6/20/12 11:40	6/21/12 8:06
SB-56-1.5-2.0	1202282-07	Soil	6/20/12 8:40	6/21/12 8:06
SB-56-5.0-5.5	1202282-08	Soil	6/20/12 8:45	6/21/12 8:06
SB-56-9.5-10.0	1202282-09	Soil	6/20/12 8:50	6/21/12 8:06
SB-57-1.5-2.0	1202282-10	Soil	6/20/12 10:20	6/21/12 8:06
SB-57-5.0-5.5	1202282-11	Soil	6/20/12 10:30	6/21/12 8:06
SB-57-9.5-10.0	1202282-12	Soil	6/20/12 10:40	6/21/12 8:06
SB-55-GW	1202282-13	Groundwater	6/20/12 12:30	6/21/12 8:06
SB-56-GW	1202282-14	Groundwater	6/20/12 9:50	6/21/12 8:06

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-52-1.5-2.0

Lab ID: 1202282-01

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Arsenic	**4.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Barium	**180**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Chromium	**53**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Cobalt	**12**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Copper	**24**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Lead	**8.3**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Nickel	**83**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Vanadium	**37**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	
Zinc	**51**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:48	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:37	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 12:21	
Surrogate: 4-Bromofluorobenzene	*91.6 %*		*69 - 158*		B2F0626	06/22/2012	*06/22/12 12:21*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 19:58	
ORO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 19:58	
Surrogate: p-Terphenyl	*70.1 %*		*39 - 123*		B2F0688	06/26/2012	*06/26/12 19:58*	

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Client Sample ID SB-52-1.5-2.0

Lab ID: 1202282-01

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
2-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
4-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Benzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Bromobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Bromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Bromodichloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Bromoform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Bromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Carbon disulfide	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Carbon tetrachloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Chlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Chloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Chloroform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Chloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	

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Client Sample ID SB-52-1.5-2.0

Lab ID: 1202282-01

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Dibromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Dibromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Ethyl Acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Ethyl Ether	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Ethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Freon-113	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Isopropylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
m,p-Xylene	ND	10	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Methylene chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
MTBE	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
n-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
n-Propylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Naphthalene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
o-Xylene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
sec-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Styrene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
tert-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Tetrachloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Toluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Trichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Vinyl acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Vinyl chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 16:28	
Surrogate: 1,2-Dichloroethane-d4	*102 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 16:28*	
Surrogate: 4-Bromofluorobenzene	*95.9 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 16:28*	
Surrogate: Dibromofluoromethane	*93.4 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 16:28*	
Surrogate: Toluene-d8	*97.6 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 16:28*	

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Client Sample ID SB-52-5.0-5.5

Lab ID: 1202282-02

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Arsenic	**2.2**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Barium	**160**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:57	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Chromium	**26**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Cobalt	**7.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Copper	**7.8**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Lead	**4.9**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Nickel	**24**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Vanadium	**29**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	
Zinc	**15**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 14:58	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:39	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 14:10	
Surrogate: 4-Bromofluorobenzene	*95.8 %*		*69 - 158*		B2F0626	06/22/2012	*06/22/12 14:10*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**1.3**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 20:15	
ORO	**2.0**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 20:15	
Surrogate: p-Terphenyl	*76.8 %*		*39 - 123*		B2F0688	06/26/2012	*06/26/12 20:15*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-52-5.0-5.5

Lab ID: 1202282-02

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
2-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
4-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Benzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Bromobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Bromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Bromodichloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Bromoform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Bromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Carbon disulfide	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Carbon tetrachloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Chlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Chloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Chloroform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Chloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	

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Lab ID: 1202282-02

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Dibromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Dibromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Ethyl Acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Ethyl Ether	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Ethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Freon-113	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Isopropylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
m,p-Xylene	ND	10	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Methylene chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
MTBE	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
n-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
n-Propylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Naphthalene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
o-Xylene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
sec-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Styrene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
tert-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Tetrachloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Toluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Trichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Vinyl acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Vinyl chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:20	
Surrogate: 1,2-Dichloroethane-d4	*106 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:20*	
Surrogate: 4-Bromofluorobenzene	*94.2 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:20*	
Surrogate: Dibromofluoromethane	*93.2 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:20*	
Surrogate: Toluene-d8	*99.2 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:20*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-52-9.5-10.0

Lab ID: 1202282-03

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Arsenic	**1.1**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Barium	**80**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:01	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Chromium	**30**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Cobalt	**2.9**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Copper	**8.9**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Lead	**2.7**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Molybdenum	**1.2**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Nickel	**39**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Vanadium	**17**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	
Zinc	**14**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:02	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:41	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 14:25	
Surrogate: 4-Bromofluorobenzene	*95.6 %*	*69 - 158*			B2F0626	06/22/2012	*06/22/12 14:25*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 20:31	
ORO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 20:31	
Surrogate: p-Terphenyl	*62.7 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 20:31*	

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1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-52-9.5-10.0

Lab ID: 1202282-03

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
2-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
4-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Benzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Bromobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Bromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Bromodichloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Bromoform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Bromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Carbon disulfide	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Carbon tetrachloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Chlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Chloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Chloroform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Chloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Client Sample ID SB-52-9.5-10.0

Lab ID: 1202282-03

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Dibromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Dibromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Ethyl Acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Ethyl Ether	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Ethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Freon-113	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Isopropylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
m,p-Xylene	ND	10	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Methylene chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
MTBE	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
n-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
n-Propylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Naphthalene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
o-Xylene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
sec-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Styrene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
tert-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Tetrachloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Toluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Trichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Vinyl acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Vinyl chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:37	
Surrogate: 1,2-Dichloroethane-d4	*93.7 %*		*70 - 130*		B2F0623	06/22/2012	*06/22/12 17:37*	
Surrogate: 4-Bromofluorobenzene	*96.6 %*		*70 - 130*		B2F0623	06/22/2012	*06/22/12 17:37*	
Surrogate: Dibromofluoromethane	*91.1 %*		*70 - 130*		B2F0623	06/22/2012	*06/22/12 17:37*	
Surrogate: Toluene-d8	*103 %*		*70 - 130*		B2F0623	06/22/2012	*06/22/12 17:37*	

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Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-1.5-2.0

Lab ID: 1202282-04

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Arsenic	**4.2**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Barium	**150**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Chromium	**37**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Cobalt	**9.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Copper	**18**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Lead	**25**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Nickel	**45**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Vanadium	**31**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	
Zinc	**36**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:05	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:43	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 14:41	
Surrogate: 4-Bromofluorobenzene	*98.5 %*		*69 - 158*		B2F0626	06/22/2012	*06/22/12 14:41*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**10**	1.0	NA	1	B2F0688	06/26/2012	06/27/12 00:10	
ORO	**42**	1.0	NA	1	B2F0688	06/26/2012	06/27/12 00:10	
Surrogate: p-Terphenyl	*61.6 %*		*39 - 123*		B2F0688	06/26/2012	*06/27/12 00:10*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-1.5-2.0

Lab ID: 1202282-04

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
2-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
4-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Benzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Bromobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Bromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Bromodichloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Bromoform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Bromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Carbon disulfide	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Carbon tetrachloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Chlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Chloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Chloroform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Chloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-1.5-2.0

Lab ID: 1202282-04

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Dibromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Dibromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Ethyl Acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Ethyl Ether	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Ethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Freon-113	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Isopropylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
m,p-Xylene	ND	10	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Methylene chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
MTBE	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
n-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
n-Propylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Naphthalene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
o-Xylene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
sec-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Styrene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
tert-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Tetrachloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Toluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Trichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Vinyl acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Vinyl chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 17:54	
Surrogate: 1,2-Dichloroethane-d4	*100 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:54*	
Surrogate: 4-Bromofluorobenzene	*96.7 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:54*	
Surrogate: Dibromofluoromethane	*94.8 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:54*	
Surrogate: Toluene-d8	*98.5 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 17:54*	

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1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-5.0-5.5

Lab ID: 1202282-05

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Arsenic	**2.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Barium	**96**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Chromium	**54**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Cobalt	**4.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Copper	**14**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Lead	**5.3**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Nickel	**97**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Vanadium	**28**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	
Zinc	**27**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:08	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.14**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:45	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 14:57	
Surrogate: 4-Bromofluorobenzene	*94.7 %*	*69 - 158*			B2F0626	06/22/2012	*06/22/12 14:57*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**2.6**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 20:49	
ORO	**2.8**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 20:49	
Surrogate: p-Terphenyl	*93.7 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 20:49*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-5.0-5.5

Lab ID: 1202282-05

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Carbon disulfide	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-5.0-5.5

Lab ID: 1202282-05

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Toluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:11	
Surrogate: 1,2-Dichloroethane-d4	*101 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:11*	
Surrogate: 4-Bromofluorobenzene	*98.3 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:11*	
Surrogate: Dibromofluoromethane	*95.6 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:11*	
Surrogate: Toluene-d8	*94.2 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:11*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-9.5-10.0

Lab ID: 1202282-06

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Arsenic	**7.1**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Barium	**120**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:11	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Chromium	**32**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Cobalt	**6.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Copper	**18**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Lead	**4.7**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Nickel	**55**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Vanadium	**34**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	
Zinc	**35**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:12	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.26**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:51	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 15:12	
Surrogate: 4-Bromofluorobenzene	*96.9 %*		*69 - 158*		B2F0626	06/22/2012	*06/22/12 15:12*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**6.1**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:05	
ORO	**5.5**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:05	
Surrogate: p-Terphenyl	*90.3 %*		*39 - 123*		B2F0688	06/26/2012	*06/26/12 21:05*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-9.5-10.0

Lab ID: 1202282-06

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
2-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
4-Chlorotoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Benzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Bromobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Bromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Bromodichloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Bromoform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Bromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Carbon disulfide	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Carbon tetrachloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Chlorobenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Chloroethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Chloroform	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Chloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-55-9.5-10.0

Lab ID: 1202282-06

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Dibromochloromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Dibromomethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Ethyl Acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Ethyl Ether	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Ethylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Freon-113	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Isopropylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
m,p-Xylene	ND	10	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Methylene chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
MTBE	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
n-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
n-Propylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Naphthalene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
o-Xylene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
sec-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Styrene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
tert-Butylbenzene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Tetrachloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Toluene	**8.3**	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Trichloroethene	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Vinyl acetate	ND	50	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Vinyl chloride	ND	5.0	NA	1	B2F0623	06/22/2012	06/22/12 18:29	
Surrogate: 1,2-Dichloroethane-d4	*101 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 18:29*	
Surrogate: 4-Bromofluorobenzene	*96.4 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 18:29*	
Surrogate: Dibromofluoromethane	*96.3 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 18:29*	
Surrogate: Toluene-d8	*95.0 %*	*70 - 130*			B2F0623	06/22/2012	*06/22/12 18:29*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-1.5-2.0

Lab ID: 1202282-07

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Arsenic	**2.5**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Barium	**100**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Chromium	**20**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Cobalt	**7.3**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Copper	**24**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Lead	**16**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Nickel	**24**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Vanadium	**38**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	
Zinc	**43**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:21	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:53	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 15:28	
Surrogate: 4-Bromofluorobenzene	*101 %*	*69 - 158*			B2F0626	06/22/2012	*06/22/12 15:28*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**15**	1.0	NA	1	B2F0688	06/26/2012	06/27/12 00:27	
ORO	**39**	1.0	NA	1	B2F0688	06/26/2012	06/27/12 00:27	
Surrogate: p-Terphenyl	*83.8 %*	*39 - 123*			B2F0688	06/26/2012	*06/27/12 00:27*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-1.5-2.0

Lab ID: 1202282-07

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Carbon disulfide	**5.4**	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-1.5-2.0

Lab ID: 1202282-07

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Toluene	**6.6**	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:37	
Surrogate: 1,2-Dichloroethane-d4	*89.1 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:37*	
Surrogate: 4-Bromofluorobenzene	*95.2 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:37*	
Surrogate: Dibromofluoromethane	*87.1 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:37*	
Surrogate: Toluene-d8	*99.6 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:37*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-5.0-5.5

Lab ID: 1202282-08

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Arsenic	**3.0**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Barium	**160**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:24	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Chromium	**52**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Cobalt	**23**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Copper	**13**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Lead	**6.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Nickel	**97**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Vanadium	**32**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	
Zinc	**28**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:25	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:55	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 15:43	
Surrogate: 4-Bromofluorobenzene	*105 %*	*69 - 158*			B2F0626	06/22/2012	*06/22/12 15:43*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:22	
ORO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:22	
Surrogate: p-Terphenyl	*92.1 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 21:22*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-5.0-5.5

Lab ID: 1202282-08

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Carbon disulfide	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-5.0-5.5

Lab ID: 1202282-08

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Toluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:54	
Surrogate: 1,2-Dichloroethane-d4	*96.1 %*		*70 - 130*		B2F0664	06/23/2012	*06/25/12 12:54*	
Surrogate: 4-Bromofluorobenzene	*98.0 %*		*70 - 130*		B2F0664	06/23/2012	*06/25/12 12:54*	
Surrogate: Dibromofluoromethane	*93.1 %*		*70 - 130*		B2F0664	06/23/2012	*06/25/12 12:54*	
Surrogate: Toluene-d8	*94.2 %*		*70 - 130*		B2F0664	06/23/2012	*06/25/12 12:54*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-9.5-10.0

Lab ID: 1202282-09

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Arsenic	**5.4**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Barium	**110**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Chromium	**69**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Cobalt	**12**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Copper	**16**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Lead	**5.5**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Nickel	**94**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Vanadium	**37**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	
Zinc	**31**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:28	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.12**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:57	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 15:59	
Surrogate: 4-Bromofluorobenzene	*95.2 %*		*69 - 158*		B2F0626	06/22/2012	*06/22/12 15:59*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**1.4**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:39	
ORO	**2.6**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:39	
Surrogate: p-Terphenyl	*98.3 %*		*39 - 123*		B2F0688	06/26/2012	*06/26/12 21:39*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-9.5-10.0

Lab ID: 1202282-09

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Carbon disulfide	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-56-9.5-10.0

Lab ID: 1202282-09

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Toluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 12:19	
Surrogate: 1,2-Dichloroethane-d4	*95.8 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:19*	
Surrogate: 4-Bromofluorobenzene	*98.1 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:19*	
Surrogate: Dibromofluoromethane	*92.1 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:19*	
Surrogate: Toluene-d8	*101 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 12:19*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-57-1.5-2.0

Lab ID: 1202282-10

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Arsenic	**1.9**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Barium	**160**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Chromium	**41**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Cobalt	**8.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Copper	**18**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Lead	**6.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Nickel	**44**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Vanadium	**34**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	
Zinc	**28**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:31	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 16:59	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 16:14	
Surrogate: 4-Bromofluorobenzene	*93.1 %*		*69 - 158*		B2F0626	06/22/2012	*06/22/12 16:14*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**2.2**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:37	
ORO	**8.7**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:37	
Surrogate: p-Terphenyl	*89.3 %*		*39 - 123*		B2F0688	06/26/2012	*06/26/12 23:37*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-57-1.5-2.0

Lab ID: 1202282-10

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Carbon disulfide	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	

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Lab ID: 1202282-10

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Toluene	**5.0**	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:28	
Surrogate: 1,2-Dichloroethane-d4	*95.7 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:28*	
Surrogate: 4-Bromofluorobenzene	*98.2 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:28*	
Surrogate: Dibromofluoromethane	*93.0 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:28*	
Surrogate: Toluene-d8	*100 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:28*	

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Lab ID: 1202282-11

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Arsenic	**4.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Barium	**130**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:34	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Chromium	**53**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Cobalt	**13**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Copper	**19**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Lead	**7.1**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Nickel	**100**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Vanadium	**44**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	
Zinc	**33**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:35	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:01	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 16:30	
Surrogate: 4-Bromofluorobenzene	*99.2 %*	*69 - 158*			B2F0626	06/22/2012	*06/22/12 16:30*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**4.0**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:56	
ORO	**4.9**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 21:56	
Surrogate: p-Terphenyl	*92.1 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 21:56*	

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Lab ID: 1202282-11

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Carbon disulfide	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	

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Lab ID: 1202282-11

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Toluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 13:45	
Surrogate: 1,2-Dichloroethane-d4	*103 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:45*	
Surrogate: 4-Bromofluorobenzene	*98.4 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:45*	
Surrogate: Dibromofluoromethane	*96.8 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:45*	
Surrogate: Toluene-d8	*104 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 13:45*	

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Lab ID: 1202282-12

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Arsenic	**2.0**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Barium	**97**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:37	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Chromium	**58**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Cobalt	**9.0**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Copper	**14**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Lead	**4.5**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Nickel	**57**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Vanadium	**26**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	
Zinc	**32**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:38	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:03	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0626	06/22/2012	06/22/12 16:46	
Surrogate: 4-Bromofluorobenzene	*101 %*	*69 - 158*			B2F0626	06/22/2012	*06/22/12 16:46*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 22:13	
ORO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 22:13	
Surrogate: p-Terphenyl	*71.5 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 22:13*	

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Oakland , CA 94612	Reported : 06/28/2012

Client Sample ID SB-57-9.5-10.0

Lab ID: 1202282-12

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
2-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
4-Chlorotoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Benzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Bromobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Bromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Bromodichloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Bromoform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Bromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Carbon disulfide	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Carbon tetrachloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Chlorobenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Chloroethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Chloroform	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Chloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	

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Lab ID: 1202282-12

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Dibromochloromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Dibromomethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Ethyl Acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Ethyl Ether	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Ethylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Freon-113	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Isopropylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
m,p-Xylene	ND	10	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Methylene chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
MTBE	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
n-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
n-Propylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Naphthalene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
o-Xylene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
sec-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Styrene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
tert-Butylbenzene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Tetrachloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Toluene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Trichloroethene	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Vinyl acetate	ND	50	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Vinyl chloride	ND	5.0	NA	1	B2F0664	06/23/2012	06/25/12 14:02	
Surrogate: 1,2-Dichloroethane-d4	*89.1 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 14:02*	
Surrogate: 4-Bromofluorobenzene	*93.7 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 14:02*	
Surrogate: Dibromofluoromethane	*92.7 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 14:02*	
Surrogate: Toluene-d8	*99.0 %*	*70 - 130*			B2F0664	06/23/2012	*06/25/12 14:02*	

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Lab ID: 1202282-13

Dissolved Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Arsenic	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Barium	**0.11**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Beryllium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Cadmium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Chromium	**0.005**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Cobalt	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Copper	**0.01**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Lead	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Molybdenum	**0.02**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Nickel	**0.007**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Selenium	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Silver	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Thallium	ND	0.02	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Vanadium	**0.01**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:26	
Zinc	**0.23**	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:26	

Dissolved Mercury by AA (Cold Vapor) by EPA 7470

Analyst: VV

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	NA	1	B2F0720	06/27/2012	06/27/12 16:14	

Gasoline Range Organics by EPA 8015B

Analyst: BB

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	**0.07**	0.05	NA	1	B2F0651	06/27/2012	06/27/12 17:09	
Surrogate: 4-Bromofluorobenzene	*101 %*	*70 - 130*			B2F0651	06/27/2012	*06/27/12 17:09*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**0.10**	0.05	NA	1	B2F0643	06/22/2012	06/25/12 16:39	
ORO	**0.14**	0.05	NA	1	B2F0643	06/22/2012	06/25/12 16:39	
Surrogate: p-Terphenyl	*87.2 %*	*48 - 124*			B2F0643	06/22/2012	*06/25/12 16:39*	

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Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,1,1-Trichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,1,2,2-Tetrachloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,1,2-Trichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,1-Dichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,1-Dichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,1-Dichloropropene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2,3-Trichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2,3-Trichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2,4-Trichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2,4-Trimethylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2-Dibromo-3-chloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2-Dibromoethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2-Dichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2-Dichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,2-Dichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,3,5-Trimethylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,3-Dichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,3-Dichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
1,4-Dichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
2,2-Dichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
2-Chloroethyl vinyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
2-Chlorotoluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
4-Chlorotoluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
4-Isopropyltoluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Benzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Bromobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Bromochloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Bromodichloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Bromoform	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Bromomethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Carbon disulfide	ND	1.0	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Carbon tetrachloride	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Chlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Chloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Chloroform	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Chloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	

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Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,2-Dichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
cis-1,3-Dichloropropene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Di-isopropyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Dibromochloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Dibromomethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Dichlorodifluoromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Ethyl Acetate	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Ethyl Ether	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Ethyl tert-butyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Ethylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Freon-113	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Hexachlorobutadiene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Isopropylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
m,p-Xylene	ND	1.0	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Methylene chloride	ND	1.0	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
MTBE	**38**	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
n-Butylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
n-Propylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Naphthalene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
o-Xylene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
sec-Butylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Styrene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
tert-Amyl methyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
tert-Butanol	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
tert-Butylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Tetrachloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Toluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
trans-1,2-Dichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
trans-1,3-Dichloropropene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Trichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Trichlorofluoromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Vinyl acetate	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Vinyl chloride	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 18:43	
Surrogate: 1,2-Dichloroethane-d4	*95.0 %*		*70 - 130*		B2F0621	06/22/2012	*06/22/12 18:43*	
Surrogate: 4-Bromofluorobenzene	*96.0 %*		*70 - 130*		B2F0621	06/22/2012	*06/22/12 18:43*	
Surrogate: Dibromofluoromethane	*97.2 %*		*70 - 130*		B2F0621	06/22/2012	*06/22/12 18:43*	
Surrogate: Toluene-d8	*99.5 %*		*70 - 130*		B2F0621	06/22/2012	*06/22/12 18:43*	

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Lab ID: 1202282-14

Dissolved Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Arsenic	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Barium	**0.09**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Beryllium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Cadmium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Chromium	**0.006**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Cobalt	**0.005**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Copper	**0.02**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Lead	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Molybdenum	**0.01**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Nickel	**0.01**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Selenium	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Silver	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Thallium	ND	0.02	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Vanadium	**0.005**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:27	
Zinc	**0.16**	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:27	

Dissolved Mercury by AA (Cold Vapor) by EPA 7470

Analyst: VV

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	NA	1	B2F0720	06/27/2012	06/27/12 16:16	

Gasoline Range Organics by EPA 8015B

Analyst: BB

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	0.05	NA	1	B2F0651	06/27/2012	06/27/12 17:31	
Surrogate: 4-Bromofluorobenzene	*104 %*	*70 - 130*			B2F0651	06/27/2012	*06/27/12 17:31*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	0.05	NA	1	B2F0643	06/22/2012	06/25/12 16:56	
ORO	ND	0.05	NA	1	B2F0643	06/22/2012	06/25/12 16:56	
Surrogate: p-Terphenyl	*69.7 %*	*48 - 124*			B2F0643	06/22/2012	*06/25/12 16:56*	

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Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,1,1-Trichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,1,2,2-Tetrachloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,1,2-Trichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,1-Dichloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,1-Dichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,1-Dichloropropene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2,3-Trichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2,3-Trichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2,4-Trichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2,4-Trimethylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2-Dibromo-3-chloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2-Dibromoethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2-Dichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2-Dichloroethane	**3.2**	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,2-Dichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,3,5-Trimethylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,3-Dichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,3-Dichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
1,4-Dichlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
2,2-Dichloropropane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
2-Chloroethyl vinyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
2-Chlorotoluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
4-Chlorotoluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
4-Isopropyltoluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Benzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Bromobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Bromochloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Bromodichloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Bromoform	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Bromomethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Carbon disulfide	ND	1.0	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Carbon tetrachloride	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Chlorobenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Chloroethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Chloroform	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Chloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	

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Lab ID: 1202282-14

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,2-Dichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
cis-1,3-Dichloropropene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Di-isopropyl ether	**2.9**	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Dibromochloromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Dibromomethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Dichlorodifluoromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Ethyl Acetate	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Ethyl Ether	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Ethyl tert-butyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Ethylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Freon-113	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Hexachlorobutadiene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Isopropylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
m,p-Xylene	ND	1.0	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Methylene chloride	ND	1.0	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
MTBE	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
n-Butylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
n-Propylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Naphthalene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
o-Xylene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
sec-Butylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Styrene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
tert-Amyl methyl ether	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
tert-Butanol	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
tert-Butylbenzene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Tetrachloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Toluene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
trans-1,2-Dichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
trans-1,3-Dichloropropene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Trichloroethene	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Trichlorofluoromethane	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Vinyl acetate	ND	10	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Vinyl chloride	ND	0.50	NA	1	B2F0621	06/22/2012	06/22/12 19:03	
Surrogate: 1,2-Dichloroethane-d4	*83.1 %*	*70 - 130*			B2F0621	06/22/2012	*06/22/12 19:03*	
Surrogate: 4-Bromofluorobenzene	*81.2 %*	*70 - 130*			B2F0621	06/22/2012	*06/22/12 19:03*	
Surrogate: Dibromofluoromethane	*83.3 %*	*70 - 130*			B2F0621	06/22/2012	*06/22/12 19:03*	
Surrogate: Toluene-d8	*84.8 %*	*70 - 130*			B2F0621	06/22/2012	*06/22/12 19:03*	

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QUALITY CONTROL SECTION

Title 22 Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0671 - EPA 3050B									
Blank (B2F0671-BLK1)				Prepared: 6/25/2012 Analyzed: 6/26/2012					
Antimony	ND	2.0			NR				
Arsenic	ND	1.0			NR				
Barium	ND	1.0			NR				
Beryllium	ND	1.0			NR				
Cadmium	ND	1.0			NR				
Chromium	ND	1.0			NR				
Cobalt	ND	1.0			NR				
Copper	ND	2.0			NR				
Lead	ND	1.0			NR				
Molybdenum	ND	1.0			NR				
Nickel	ND	1.0			NR				
Selenium	ND	1.0			NR				
Silver	ND	1.0			NR				
Thallium	ND	1.0			NR				
Vanadium	ND	1.0			NR				
Zinc	ND	1.0			NR				
LCS (B2F0671-BS1)				Prepared: 6/25/2012 Analyzed: 6/27/2012					
Antimony	48	2.0	50.0		95.5	80 - 120			
Arsenic	46	1.0	50.0		92.6	80 - 120			
Barium	49	1.0	50.0		97.1	80 - 120			
Beryllium	52	1.0	50.0		104	80 - 120			
Cadmium	48	1.0	50.0		95.9	80 - 120			
Chromium	49	1.0	50.0		97.5	80 - 120			
Cobalt	49	1.0	50.0		97.6	80 - 120			
Copper	49	2.0	50.0		97.9	80 - 120			
Lead	49	1.0	50.0		98.6	80 - 120			
Molybdenum	49	1.0	50.0		97.3	80 - 120			
Nickel	49	1.0	50.0		98.3	80 - 120			
Selenium	46	1.0	50.0		91.4	80 - 120			
Silver	45	1.0	50.0		90.2	80 - 120			
Thallium	48	1.0	50.0		96.8	80 - 120			
Vanadium	51	1.0	50.0		103	80 - 120			
Zinc	48	1.0	50.0		95.6	80 - 120			
Matrix Spike (B2F0671-MS1)		**Source: 1202282-01**		Prepared: 6/25/2012 Analyzed: 6/26/2012					
Antimony	60	2.0	125	ND	48.1	44 - 105			
Arsenic	89	1.0	125	4.6	67.9	57 - 103			
Barium	260	1.0	125	180	67.7	36 - 134			
Beryllium	90	1.0	125	0.40	71.7	64 - 106			

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Title 22 Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0671 - EPA 3050B (continued)									
Matrix Spike (B2F0671-MS1) - Continued		**Source: 1202282-01**		Prepared: 6/25/2012 Analyzed: 6/26/2012					
Cadmium	85	1.0	125	0.56	67.6	58 - 102			
Chromium	140	1.0	125	53	73.7	55 - 105			
Cobalt	100	1.0	125	12	70.8	59 - 105			
Copper	120	2.0	125	24	78.7	64 - 117			
Lead	95	1.0	125	8.3	69.1	46 - 116			
Molybdenum	89	1.0	125	0.42	70.6	59 - 108			
Nickel	160	1.0	125	83	64.3	52 - 109			
Selenium	78	1.0	125	ND	62.3	56 - 100			
Silver	93	1.0	125	ND	74.1	65 - 107			
Thallium	85	1.0	125	ND	68.1	47 - 100			
Vanadium	130	1.0	125	37	75.8	64 - 110			
Zinc	130	1.0	125	51	64.8	37 - 123			
Matrix Spike Dup (B2F0671-MSD1)		**Source: 1202282-01**		Prepared: 6/25/2012 Analyzed: 6/26/2012					
Antimony	64	2.0	125	ND	50.9	44 - 105	5.57	20	
Arsenic	92	1.0	125	4.6	70.3	57 - 103	3.28	20	
Barium	270	1.0	125	180	75.6	36 - 134	3.68	20	
Beryllium	94	1.0	125	0.40	75.2	64 - 106	4.84	20	
Cadmium	88	1.0	125	0.56	70.0	58 - 102	3.44	20	
Chromium	150	1.0	125	53	77.3	55 - 105	3.05	20	
Cobalt	100	1.0	125	12	73.1	59 - 105	2.86	20	
Copper	130	2.0	125	24	82.4	64 - 117	3.62	20	
Lead	98	1.0	125	8.3	71.9	46 - 116	3.62	20	
Molybdenum	92	1.0	125	0.42	73.4	59 - 108	3.86	20	
Nickel	170	1.0	125	83	70.1	52 - 109	4.36	20	
Selenium	81	1.0	125	ND	65.1	56 - 100	4.37	20	
Silver	96	1.0	125	ND	76.9	65 - 107	3.82	20	
Thallium	88	1.0	125	ND	70.4	47 - 100	3.41	20	
Vanadium	140	1.0	125	37	79.6	64 - 110	3.46	20	
Zinc	140	1.0	125	51	70.8	37 - 123	5.48	20	

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Dissolved Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0662 - EPA 3010A									
Blank (B2F0662-BLK1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	ND	0.005			NR				
Arsenic	ND	0.01			NR				
Barium	ND	0.003			NR				
Beryllium	ND	0.003			NR				
Cadmium	ND	0.003			NR				
Chromium	ND	0.003			NR				
Cobalt	ND	0.003			NR				
Copper	ND	0.005			NR				
Lead	ND	0.005			NR				
Molybdenum	ND	0.005			NR				
Nickel	ND	0.005			NR				
Selenium	ND	0.01			NR				
Silver	ND	0.003			NR				
Thallium	ND	0.02			NR				
Vanadium	ND	0.003			NR				
Zinc	ND	0.01			NR				
LCS (B2F0662-BS1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	0.97	0.005	1.00		97.0	80 - 120			
Arsenic	0.96	0.01	1.00		96.5	80 - 120			
Barium	0.99	0.003	1.00		99.0	80 - 120			
Beryllium	1.0	0.003	1.00		104	80 - 120			
Cadmium	0.98	0.003	1.00		98.2	80 - 120			
Chromium	0.97	0.003	1.00		96.5	80 - 120			
Cobalt	0.98	0.003	1.00		97.8	80 - 120			
Copper	1.0	0.005	1.00		101	80 - 120			
Lead	1.0	0.005	1.00		99.8	80 - 120			
Molybdenum	1.0	0.005	1.00		101	80 - 120			
Nickel	0.98	0.005	1.00		98.1	80 - 120			
Selenium	0.92	0.01	1.00		92.1	80 - 120			
Silver	0.98	0.003	1.00		97.7	80 - 120			
Thallium	1.0	0.02	1.00		100	80 - 120			
Vanadium	1.0	0.003	1.00		101	80 - 120			
Zinc	0.97	0.01	1.00		96.6	80 - 120			
Matrix Spike (B2F0662-MS1)		**Source: 1202288-08**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	2.4	0.005	2.50	ND	95.9	77 - 123			
Arsenic	2.3	0.01	2.50	ND	93.8	80 - 118			
Barium	2.7	0.003	2.50	0.27	96.1	78 - 120			
Beryllium	2.4	0.003	2.50	ND	97.4	81 - 120			
Cadmium	2.2	0.003	2.50	ND	89.9	76 - 117			
Chromium	2.3	0.003	2.50	ND	92.7	75 - 110			

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Dissolved Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0662 - EPA 3010A (continued)									
Matrix Spike (B2F0662-MS1) - Continued		**Source: 1202288-08**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Cobalt	2.2	0.003	2.50	ND	88.4	76 - 118			
Copper	2.4	0.005	2.50	0.01	94.9	78 - 123			
Lead	2.2	0.005	2.50	ND	86.8	78 - 117			
Molybdenum	2.3	0.005	2.50	0.006	91.3	81 - 115			
Nickel	2.2	0.005	2.50	ND	88.1	75 - 118			
Selenium	2.2	0.01	2.50	ND	89.6	78 - 116			
Silver	2.4	0.003	2.50	0.002	96.1	80 - 122			
Thallium	2.3	0.02	2.50	ND	92.4	69 - 122			
Vanadium	2.4	0.003	2.50	0.01	95.1	77 - 120			
Zinc	2.2	0.01	2.50	0.05	85.9	73 - 119			
Matrix Spike Dup (B2F0662-MSD1)		**Source: 1202288-08**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	2.4	0.005	2.50	ND	97.8	77 - 123	1.99	20	
Arsenic	2.4	0.01	2.50	ND	95.4	80 - 118	1.73	20	
Barium	2.7	0.003	2.50	0.27	98.1	78 - 120	1.84	20	
Beryllium	2.5	0.003	2.50	ND	98.4	81 - 120	1.11	20	
Cadmium	2.3	0.003	2.50	ND	91.3	76 - 117	1.45	20	
Chromium	2.4	0.003	2.50	ND	95.2	75 - 110	2.66	20	
Cobalt	2.2	0.003	2.50	ND	89.6	76 - 118	1.33	20	
Copper	2.4	0.005	2.50	0.01	97.0	78 - 123	2.18	20	
Lead	2.2	0.005	2.50	ND	88.5	78 - 117	1.95	20	
Molybdenum	2.3	0.005	2.50	0.006	92.8	81 - 115	1.53	20	
Nickel	2.2	0.005	2.50	ND	89.7	75 - 118	1.85	20	
Selenium	2.3	0.01	2.50	ND	91.6	78 - 116	2.19	20	
Silver	2.4	0.003	2.50	0.002	97.9	80 - 122	1.80	20	
Thallium	2.3	0.02	2.50	ND	93.5	69 - 122	1.23	20	
Vanadium	2.4	0.003	2.50	0.01	96.7	77 - 120	1.76	20	
Zinc	2.2	0.01	2.50	0.05	87.5	73 - 119	1.80	20	

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Mercury by AA (Cold Vapor) EPA 7471 - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0695 - EPA 7471									
Blank (B2F0695-BLK1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	ND	0.10			NR				
LCS (B2F0695-BS1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.85	0.10	0.833		102	80 - 120			
Matrix Spike (B2F0695-MS1)		**Source: 1202049-02**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.86	0.10	0.833	0.05	97.0	70 - 130			
Matrix Spike (B2F0695-MS2)		**Source: 1202291-37**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.006		0.00500	0.0005	106	70 - 130			
Matrix Spike Dup (B2F0695-MSD1)		**Source: 1202049-02**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.88	0.10	0.833	0.05	100	70 - 130	2.88	20	

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Dissolved Mercury by AA (Cold Vapor) by EPA 7470 - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0720 - EPA 245.1/7470									
Blank (B2F0720-BLK1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	ND	0.20			NR				
LCS (B2F0720-BS1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	10	0.20	10.0		103	85 - 115			
Matrix Spike (B2F0720-MS1)		**Source: 1202270-01**		Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	10	0.20	10.0	ND	101	70 - 130			
Matrix Spike (B2F0720-MS2)		**Source: 1202288-08**		Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	4.9		5.00	0.008	98.6	70 - 130			
Matrix Spike Dup (B2F0720-MSD1)		**Source: 1202270-01**		Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	10	0.20	10.0	ND	100	70 - 130	0.423	20	

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Gasoline Range Organics by EPA 8015B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0626 - GCVOAS									
Blank (B2F0626-BLK1)					Prepared: 6/22/2012 Analyzed: 6/22/2012				
Gasoline Range Organics	ND	1.0			NR				
Surrogate: 4-Bromofluorobenzene	*0.086*		*0.100*		*85.9*	*69 - 158*			
LCS (B2F0626-BS1)					Prepared: 6/22/2012 Analyzed: 6/22/2012				
Gasoline Range Organics	4.8	1.0	5.00		95.4	70 - 130			
Surrogate: 4-Bromofluorobenzene	*0.091*		*0.100*		*90.7*	*69 - 158*			
LCS Dup (B2F0626-BSD1)					Prepared: 6/22/2012 Analyzed: 6/22/2012				
Gasoline Range Organics	4.8	1.0	5.00		96.9	70 - 130	1.50	20	
Surrogate: 4-Bromofluorobenzene	*0.096*		*0.100*		*95.8*	*69 - 158*			
Matrix Spike (B2F0626-MS1)		**Source: 1202282-01**			Prepared: 6/22/2012 Analyzed: 6/22/2012				
Gasoline Range Organics	3.9	1.0	5.00	0.18	73.9	46 - 135			
Surrogate: 4-Bromofluorobenzene	*0.11*		*0.100*		*107*	*69 - 158*			
Matrix Spike Dup (B2F0626-MSD1)		**Source: 1202282-01**			Prepared: 6/22/2012 Analyzed: 6/22/2012				
Gasoline Range Organics	3.9	1.0	5.00	0.18	73.5	46 - 135	0.465	20	
Surrogate: 4-Bromofluorobenzene	*0.12*		*0.100*		*117*	*69 - 158*			
Batch B2F0651 - GCVOAW									
Blank (B2F0651-BLK1)					Prepared: 6/27/2012 Analyzed: 6/27/2012				
Gasoline Range Organics	ND	0.05			NR				
Surrogate: 4-Bromofluorobenzene	*0.098*		*0.100*		*98.1*	*70 - 130*			
LCS (B2F0651-BS1)					Prepared: 6/27/2012 Analyzed: 6/27/2012				
Gasoline Range Organics	1.0	0.05	1.00		101	70 - 130			
Surrogate: 4-Bromofluorobenzene	*0.11*		*0.100*		*106*	*70 - 130*			
LCS (B2F0651-BS2)					Prepared: 6/27/2012 Analyzed: 6/27/2012				
Gasoline Range Organics	1.0	0.05			NR	70 - 130			
Surrogate: 4-Bromofluorobenzene	*0.10*		*0.100*		*102*	*70 - 130*			

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Gasoline Range Organics by EPA 8015B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0651 - GCVOAW (continued)									
LCS Dup (B2F0651-BSD1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Gasoline Range Organics	1.0	0.05	1.00		101	70 - 130	0.298	20	
Surrogate: 4-Bromofluorobenzene	*0.11*		*0.100*		*107*	*70 - 130*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0643 - GCSEMI_DRO									
Blank (B2F0643-BLK1)				Prepared: 6/22/2012 Analyzed: 6/25/2012					
DRO	ND	0.05			NR				
ORO	ND	0.05			NR				
Surrogate: p-Terphenyl	*0.060*		*0.0800*		*75.0*	*48 - 124*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0643 - GCSEMI_DRO (continued)									
LCS (B2F0643-BS1)				Prepared: 6/22/2012 Analyzed: 6/25/2012					
DRO	0.76	0.05	1.00		75.6	45 - 109			
Surrogate: p-Terphenyl	*0.061*		*0.0800*		*76.1*	*48 - 124*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0643 - GCSEMI_DRO (continued)									
LCS Dup (B2F0643-BSD1)				Prepared: 6/22/2012 Analyzed: 6/25/2012					
DRO	0.70	0.05	1.00		70.3	45 - 109	7.18	20	
Surrogate: p-Terphenyl	*0.057*		*0.0800*		*71.3*	*48 - 124*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL									
Blank (B2F0688-BLK1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	ND	1.0			NR				
ORO	ND	1.0			NR				
Surrogate: p-Terphenyl	*1.7*		*2.67*		*64.9*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL (continued)									
LCS (B2F0688-BS1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	26	1.0	33.3		78.0	37 - 109			
Surrogate: p-Terphenyl	*2.0*		*2.67*		*76.0*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL (continued)									
Matrix Spike (B2F0688-MS1)		**Source: 1202282-05**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	28	1.0	33.3	2.6	75.2	29 - 107			
Surrogate: p-Terphenyl	*2.4*		*2.67*		*89.4*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL (continued)									
Matrix Spike Dup (B2F0688-MSD1)		**Source: 1202282-05**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	21	1.0	33.3	2.6	55.1	29 - 107	27.6	20	R
Surrogate: p-Terphenyl	*2.2*		*2.67*		*84.2*	*39 - 123*			

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Volatile Organic Compounds by EPA 8260 - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0621 - MSVOAW_LL									
Blank (B2F0621-BLK1)				Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1,1,2-Tetrachloroethane	ND	0.50			NR				
1,1,1-Trichloroethane	ND	0.50			NR				
1,1,2,2-Tetrachloroethane	ND	0.50			NR				
1,1,2-Trichloroethane	ND	0.50			NR				
1,1-Dichloroethane	ND	0.50			NR				
1,1-Dichloroethene	ND	0.50			NR				
1,1-Dichloropropene	ND	0.50			NR				
1,2,3-Trichloropropane	ND	0.50			NR				
1,2,3-Trichlorobenzene	ND	0.50			NR				
1,2,4-Trichlorobenzene	ND	0.50			NR				
1,2,4-Trimethylbenzene	ND	0.50			NR				
1,2-Dibromo-3-chloropropane	ND	0.50			NR				
1,2-Dibromoethane	ND	0.50			NR				
1,2-Dichlorobenzene	ND	0.50			NR				
1,2-Dichloroethane	ND	0.50			NR				
1,2-Dichloropropane	ND	0.50			NR				
1,3,5-Trimethylbenzene	ND	0.50			NR				
1,3-Dichlorobenzene	ND	0.50			NR				
1,3-Dichloropropane	ND	0.50			NR				
1,4-Dichlorobenzene	ND	0.50			NR				
2,2-Dichloropropane	ND	0.50			NR				
2-Chloroethyl vinyl ether	ND	0.50			NR				
2-Chlorotoluene	ND	0.50			NR				
4-Chlorotoluene	ND	0.50			NR				
4-Isopropyltoluene	ND	0.50			NR				
Benzene	ND	0.50			NR				
Bromobenzene	ND	0.50			NR				
Bromochloromethane	ND	0.50			NR				
Bromodichloromethane	ND	0.50			NR				
Bromoform	ND	0.50			NR				
Bromomethane	ND	0.50			NR				
Carbon disulfide	ND	1.0			NR				
Carbon tetrachloride	ND	0.50			NR				
Chlorobenzene	ND	0.50			NR				
Chloroethane	ND	0.50			NR				
Chloroform	ND	0.50			NR				
Chloromethane	ND	0.50			NR				
cis-1,2-Dichloroethene	ND	0.50			NR				
cis-1,3-Dichloropropene	ND	0.50			NR				
Di-isopropyl ether	ND	0.50			NR				
Dibromochloromethane	ND	0.50			NR				

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0621 - MSVOAW_LL (continued)									
Blank (B2F0621-BLK1) - Continued				Prepared: 6/22/2012 Analyzed: 6/22/2012					
Dibromomethane	ND	0.50			NR				
Dichlorodifluoromethane	ND	0.50			NR				
Ethyl Acetate	ND	10			NR				
Ethyl Ether	ND	10			NR				
Ethyl tert-butyl ether	ND	0.50			NR				
Ethylbenzene	ND	0.50			NR				
Freon-113	ND	0.50			NR				
Hexachlorobutadiene	ND	0.50			NR				
Isopropylbenzene	ND	0.50			NR				
m,p-Xylene	ND	1.0			NR				
Methylene chloride	ND	1.0			NR				
MTBE	ND	0.50			NR				
n-Butylbenzene	ND	0.50			NR				
n-Propylbenzene	ND	0.50			NR				
Naphthalene	ND	0.50			NR				
o-Xylene	ND	0.50			NR				
sec-Butylbenzene	ND	0.50			NR				
Styrene	ND	0.50			NR				
tert-Amyl methyl ether	ND	0.50			NR				
tert-Butanol	ND	10			NR				
tert-Butylbenzene	ND	0.50			NR				
Tetrachloroethene	ND	0.50			NR				
Toluene	ND	0.50			NR				
trans-1,2-Dichloroethene	ND	0.50			NR				
trans-1,3-Dichloropropene	ND	0.50			NR				
Trichloroethene	ND	0.50			NR				
Trichlorofluoromethane	ND	0.50			NR				
Vinyl acetate	ND	10			NR				
Vinyl chloride	ND	0.50			NR				
Surrogate: 1,2-Dichloroethane-d4	*24*		*25.0*		*94.0*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*24*		*25.0*		*96.4*	*70 - 130*			
Surrogate: Dibromofluoromethane	*24*		*25.0*		*96.1*	*70 - 130*			
Surrogate: Toluene-d8	*25*		*25.0*		*99.0*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0621 - MSVOAW_LL (continued)									
LCS (B2F0621-BS1)				Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1-Dichloroethene	19	0.50	20.0		96.0	70 - 130			
Benzene	38	0.50	40.0		94.1	70 - 130			
Chlorobenzene	19	0.50	20.0		96.6	70 - 130			
MTBE	19	0.50	20.0		92.9	70 - 130			
Toluene	38	0.50	40.0		94.2	70 - 130			
Trichloroethene	19	0.50	20.0		95.4	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*24*		*25.0*		*97.3*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*25*		*25.0*		*98.4*	*70 - 130*			
Surrogate: Dibromofluoromethane	*25*		*25.0*		*98.2*	*70 - 130*			
Surrogate: Toluene-d8	*25*		*25.0*		*99.4*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0621 - MSVOAW_LL (continued)									
LCS Dup (B2F0621-BSD1)				Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1-Dichloroethene	19	0.50	20.0		95.8	70 - 130	0.208	20	
Benzene	38	0.50	40.0		94.1	70 - 130	0.0266	20	
Chlorobenzene	19	0.50	20.0		96.7	70 - 130	0.103	20	
MTBE	16	0.50	20.0		78.6	70 - 130	16.7	20	
Toluene	38	0.50	40.0		93.8	70 - 130	0.452	20	
Trichloroethene	19	0.50	20.0		93.1	70 - 130	2.44	20	
Surrogate: 1,2-Dichloroethane-d4	*25*		*25.0*		*98.9*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*25*		*25.0*		*100*	*70 - 130*			
Surrogate: Dibromofluoromethane	*25*		*25.0*		*98.3*	*70 - 130*			
Surrogate: Toluene-d8	*25*		*25.0*		*100*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0623 - MSVOAS									
Blank (B2F0623-BLK1)				Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1,1,2-Tetrachloroethane	ND	5.0			NR				
1,1,1-Trichloroethane	ND	5.0			NR				
1,1,2,2-Tetrachloroethane	ND	5.0			NR				
1,1,2-Trichloroethane	ND	5.0			NR				
1,1-Dichloroethane	ND	5.0			NR				
1,1-Dichloroethene	ND	5.0			NR				
1,1-Dichloropropene	ND	5.0			NR				
1,2,3-Trichloropropane	ND	5.0			NR				
1,2,3-Trichlorobenzene	ND	5.0			NR				
1,2,4-Trichlorobenzene	ND	5.0			NR				
1,2,4-Trimethylbenzene	ND	5.0			NR				
1,2-Dibromo-3-chloropropane	ND	5.0			NR				
1,2-Dibromoethane	ND	5.0			NR				
1,2-Dichlorobenzene	ND	5.0			NR				
1,2-Dichloroethane	ND	5.0			NR				
1,2-Dichloropropane	ND	5.0			NR				
1,3,5-Trimethylbenzene	ND	5.0			NR				
1,3-Dichlorobenzene	ND	5.0			NR				
1,3-Dichloropropane	ND	5.0			NR				
1,4-Dichlorobenzene	ND	5.0			NR				
2,2-Dichloropropane	ND	5.0			NR				
2-Chlorotoluene	ND	5.0			NR				
4-Chlorotoluene	ND	5.0			NR				
4-Isopropyltoluene	ND	5.0			NR				
Benzene	ND	5.0			NR				
Bromobenzene	ND	5.0			NR				
Bromochloromethane	ND	5.0			NR				
Bromodichloromethane	ND	5.0			NR				
Bromoform	ND	5.0			NR				
Bromomethane	ND	5.0			NR				
Carbon disulfide	ND	5.0			NR				
Carbon tetrachloride	ND	5.0			NR				
Chlorobenzene	ND	5.0			NR				
Chloroethane	ND	5.0			NR				
Chloroform	ND	5.0			NR				
Chloromethane	ND	5.0			NR				
cis-1,2-Dichloroethene	ND	5.0			NR				
cis-1,3-Dichloropropene	ND	5.0			NR				
Dibromochloromethane	ND	5.0			NR				
Dibromomethane	ND	5.0			NR				
Dichlorodifluoromethane	ND	5.0			NR				

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0623 - MSVOAS (continued)									
Blank (B2F0623-BLK1) - Continued				Prepared: 6/22/2012 Analyzed: 6/22/2012					
Ethyl Acetate	ND	50			NR				
Ethyl Ether	ND	50			NR				
Ethylbenzene	ND	5.0			NR				
Freon-113	ND	5.0			NR				
Hexachlorobutadiene	ND	5.0			NR				
Isopropylbenzene	ND	5.0			NR				
m,p-Xylene	ND	10			NR				
Methylene chloride	ND	5.0			NR				
MTBE	ND	5.0			NR				
n-Butylbenzene	ND	5.0			NR				
n-Propylbenzene	ND	5.0			NR				
Naphthalene	ND	5.0			NR				
o-Xylene	ND	5.0			NR				
sec-Butylbenzene	ND	5.0			NR				
Styrene	ND	5.0			NR				
tert-Butylbenzene	ND	5.0			NR				
Tetrachloroethene	ND	5.0			NR				
Toluene	ND	5.0			NR				
trans-1,2-Dichloroethene	ND	5.0			NR				
trans-1,3-Dichloropropene	ND	50			NR				
Trichloroethene	ND	5.0			NR				
Trichlorofluoromethane	ND	5.0			NR				
Vinyl acetate	ND	50			NR				
Vinyl chloride	ND	5.0			NR				
Surrogate: 1,2-Dichloroethane-d4	*45*		*50.0*		*89.8*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*48*		*50.0*		*95.7*	*70 - 130*			
Surrogate: Dibromofluoromethane	*47*		*50.0*		*93.3*	*70 - 130*			
Surrogate: Toluene-d8	*48*		*50.0*		*96.9*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0623 - MSVOAS (continued)									
LCS (B2F0623-BS1)				Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1-Dichloroethene	35		50.0		70.6	70 - 130			
Benzene	76		100		76.0	70 - 130			
Chlorobenzene	39		50.0		78.0	70 - 130			
MTBE	44		50.0		88.0	70 - 130			
Toluene	77		100		76.7	70 - 130			
Trichloroethene	42		50.0		83.2	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*48*		*50.0*		*95.1*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*51*		*50.0*		*101*	*70 - 130*			
Surrogate: Dibromofluoromethane	*47*		*50.0*		*94.5*	*70 - 130*			
Surrogate: Toluene-d8	*49*		*50.0*		*98.5*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0623 - MSVOAS (continued)									
LCS Dup (B2F0623-BSD1)				Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1-Dichloroethene	38		50.0		75.5	70 - 130	6.76	20	
Benzene	81		100		81.2	70 - 130	6.59	20	
Chlorobenzene	40		50.0		80.9	70 - 130	3.60	20	
MTBE	46		50.0		93.0	70 - 130	5.48	20	
Toluene	82		100		81.7	70 - 130	6.29	20	
Trichloroethene	43		50.0		85.9	70 - 130	3.24	20	
Surrogate: 1,2-Dichloroethane-d4	*49*		*50.0*		*97.2*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*48*		*50.0*		*96.1*	*70 - 130*			
Surrogate: Dibromofluoromethane	*47*		*50.0*		*94.9*	*70 - 130*			
Surrogate: Toluene-d8	*48*		*50.0*		*96.4*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0623 - MSVOAS (continued)									
Matrix Spike (B2F0623-MS1)		**Source: 1202282-01**		Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1-Dichloroethene	38		50.0	ND	75.8	70 - 130			
Benzene	85		100	ND	85.4	70 - 130			
Chlorobenzene	44		50.0	ND	87.8	70 - 130			
MTBE	44		50.0	ND	87.1	70 - 130			
Toluene	92		100	1.5	90.4	70 - 130			
Trichloroethene	47		50.0	ND	93.3	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*49*		*50.0*		*97.0*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*51*		*50.0*		*101*	*70 - 130*			
Surrogate: Dibromofluoromethane	*46*		*50.0*		*92.2*	*70 - 130*			
Surrogate: Toluene-d8	*50*		*50.0*		*99.8*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0623 - MSVOAS (continued)									
Matrix Spike Dup (B2F0623-MSD1)		**Source: 1202282-01**		Prepared: 6/22/2012 Analyzed: 6/22/2012					
1,1-Dichloroethene	39		50.0	ND	78.0	70 - 130	2.78	20	
Benzene	79		100	ND	79.0	70 - 130	7.87	20	
Chlorobenzene	39		50.0	ND	78.2	70 - 130	11.5	20	
MTBE	42		50.0	ND	83.6	70 - 130	4.10	20	
Toluene	84		100	1.5	82.5	70 - 130	9.06	20	
Trichloroethene	43		50.0	ND	86.6	70 - 130	7.43	20	
Surrogate: 1,2-Dichloroethane-d4	*50*		*50.0*		*99.7*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*51*		*50.0*		*102*	*70 - 130*			
Surrogate: Dibromofluoromethane	*49*		*50.0*		*97.6*	*70 - 130*			
Surrogate: Toluene-d8	*51*		*50.0*		*102*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0664 - MSVOAS									
Blank (B2F0664-BLK1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
1,1,1,2-Tetrachloroethane	ND	5.0			NR				
1,1,1-Trichloroethane	ND	5.0			NR				
1,1,2,2-Tetrachloroethane	ND	5.0			NR				
1,1,2-Trichloroethane	ND	5.0			NR				
1,1-Dichloroethane	ND	5.0			NR				
1,1-Dichloroethene	ND	5.0			NR				
1,1-Dichloropropene	ND	5.0			NR				
1,2,3-Trichloropropane	ND	5.0			NR				
1,2,3-Trichlorobenzene	ND	5.0			NR				
1,2,4-Trichlorobenzene	ND	5.0			NR				
1,2,4-Trimethylbenzene	ND	5.0			NR				
1,2-Dibromo-3-chloropropane	ND	5.0			NR				
1,2-Dibromoethane	ND	5.0			NR				
1,2-Dichlorobenzene	ND	5.0			NR				
1,2-Dichloroethane	ND	5.0			NR				
1,2-Dichloropropane	ND	5.0			NR				
1,3,5-Trimethylbenzene	ND	5.0			NR				
1,3-Dichlorobenzene	ND	5.0			NR				
1,3-Dichloropropane	ND	5.0			NR				
1,4-Dichlorobenzene	ND	5.0			NR				
2,2-Dichloropropane	ND	5.0			NR				
2-Chlorotoluene	ND	5.0			NR				
4-Chlorotoluene	ND	5.0			NR				
4-Isopropyltoluene	ND	5.0			NR				
Benzene	ND	5.0			NR				
Bromobenzene	ND	5.0			NR				
Bromochloromethane	ND	5.0			NR				
Bromodichloromethane	ND	5.0			NR				
Bromoform	ND	5.0			NR				
Bromomethane	ND	5.0			NR				
Carbon disulfide	ND	5.0			NR				
Carbon tetrachloride	ND	5.0			NR				
Chlorobenzene	ND	5.0			NR				
Chloroethane	ND	5.0			NR				
Chloroform	ND	5.0			NR				
Chloromethane	ND	5.0			NR				
cis-1,2-Dichloroethene	ND	5.0			NR				
cis-1,3-Dichloropropene	ND	5.0			NR				
Dibromochloromethane	ND	5.0			NR				
Dibromomethane	ND	5.0			NR				
Dichlorodifluoromethane	ND	5.0			NR				

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0664 - MSVOAS (continued)									
Blank (B2F0664-BLK1) - Continued				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Ethyl Acetate	ND	50			NR				
Ethyl Ether	ND	50			NR				
Ethylbenzene	ND	5.0			NR				
Freon-113	ND	5.0			NR				
Hexachlorobutadiene	ND	5.0			NR				
Isopropylbenzene	ND	5.0			NR				
m,p-Xylene	ND	10			NR				
Methylene chloride	ND	5.0			NR				
MTBE	ND	5.0			NR				
n-Butylbenzene	ND	5.0			NR				
n-Propylbenzene	ND	5.0			NR				
Naphthalene	ND	5.0			NR				
o-Xylene	ND	5.0			NR				
sec-Butylbenzene	ND	5.0			NR				
Styrene	ND	5.0			NR				
tert-Butylbenzene	ND	5.0			NR				
Tetrachloroethene	ND	5.0			NR				
Toluene	ND	5.0			NR				
trans-1,2-Dichloroethene	ND	5.0			NR				
trans-1,3-Dichloropropene	ND	50			NR				
Trichloroethene	ND	5.0			NR				
Trichlorofluoromethane	ND	5.0			NR				
Vinyl acetate	ND	50			NR				
Vinyl chloride	ND	5.0			NR				
Surrogate: 1,2-Dichloroethane-d4	*49*		*50.0*		*97.8*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*49*		*50.0*		*97.6*	*70 - 130*			
Surrogate: Dibromofluoromethane	*47*		*50.0*		*94.2*	*70 - 130*			
Surrogate: Toluene-d8	*48*		*50.0*		*96.0*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0664 - MSVOAS (continued)									
LCS (B2F0664-BS1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
1,1-Dichloroethene	42		50.0		83.6	70 - 130			
Benzene	89		100		89.2	70 - 130			
Chlorobenzene	47		50.0		93.5	70 - 130			
MTBE	45		50.0		90.2	70 - 130			
Toluene	92		100		92.3	70 - 130			
Trichloroethene	49		50.0		98.8	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*44*		*50.0*		*87.5*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*50*		*50.0*		*99.1*	*70 - 130*			
Surrogate: Dibromofluoromethane	*43*		*50.0*		*86.6*	*70 - 130*			
Surrogate: Toluene-d8	*47*		*50.0*		*93.3*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0664 - MSVOAS (continued)									
LCS Dup (B2F0664-BSD1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
1,1-Dichloroethene	41		50.0		82.2	70 - 130	1.76	20	
Benzene	87		100		87.2	70 - 130	2.21	20	
Chlorobenzene	46		50.0		91.1	70 - 130	2.60	20	
MTBE	42		50.0		83.7	70 - 130	7.48	20	
Toluene	92		100		91.9	70 - 130	0.434	20	
Trichloroethene	47		50.0		93.8	70 - 130	5.19	20	
Surrogate: 1,2-Dichloroethane-d4	*44*		*50.0*		*87.8*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*50*		*50.0*		*100*	*70 - 130*			
Surrogate: Dibromofluoromethane	*45*		*50.0*		*90.4*	*70 - 130*			
Surrogate: Toluene-d8	*50*		*50.0*		*99.0*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0664 - MSVOAS (continued)									
Matrix Spike (B2F0664-MS1)		**Source: 1202282-09**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
1,1-Dichloroethene	39		50.0	ND	78.2	70 - 130			
Benzene	86		100	ND	86.1	70 - 130			
Chlorobenzene	47		50.0	ND	93.6	70 - 130			
MTBE	43		50.0	ND	86.1	70 - 130			
Toluene	91		100	0.63	90.0	70 - 130			
Trichloroethene	50		50.0	ND	100	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*43*		*50.0*		*85.2*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*49*		*50.0*		*98.2*	*70 - 130*			
Surrogate: Dibromofluoromethane	*46*		*50.0*		*91.1*	*70 - 130*			
Surrogate: Toluene-d8	*50*		*50.0*		*99.6*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0664 - MSVOAS (continued)									
Matrix Spike Dup (B2F0664-MSD1)		**Source: 1202282-09**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
1,1-Dichloroethene	40		50.0	ND	80.8	70 - 130	3.27	20	
Benzene	89		100	ND	88.6	70 - 130	2.88	20	
Chlorobenzene	48		50.0	ND	96.9	70 - 130	3.55	20	
MTBE	47		50.0	ND	93.9	70 - 130	8.69	20	
Toluene	92		100	0.63	91.8	70 - 130	1.99	20	
Trichloroethene	49		50.0	ND	97.4	70 - 130	2.83	20	
Surrogate: 1,2-Dichloroethane-d4	*43*		*50.0*		*85.5*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*51*		*50.0*		*103*	*70 - 130*			
Surrogate: Dibromofluoromethane	*45*		*50.0*		*90.4*	*70 - 130*			
Surrogate: Toluene-d8	*48*		*50.0*		*96.7*	*70 - 130*			

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Oakland , CA 94612		Reported :	06/28/2012

Notes and Definitions

R	RPD value outside acceptance criteria. Calculation is based on raw values.
ND	Analyte not detected at or above reporting limit
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA1	CA-NELAP (CDPH)
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)
TX1	TX-NELAP (TCEQ)

CHAIN OF CUSTODY RECORD

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Ave., Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

P.O.#: _____ Quote #: _____

Logged By: _____ Date: _____

NOTE: Please include your Quote No. to ensure proper pricing of your project.

FOR LABORATORY USE ONLY:

Method of Transport
☐ Client ☐ ATL
☐ FedEx ☐ OnTrac
☑ GSO
☐ Other: _____

4.8 Sample Condition Upon Receipt
1. CHILLED Y☑ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: Ninyo and Moore
Attn: Cem Atabek
Address: 1956 Webster St., # 400
City Oakland State CA Zip Code 94612
TEL: 510-343-3000
FAX: 510-343-3001

Project Name: RBF I-880/23rd Ave Project #: 401971001 Sampler: (Printed Name) Jake Wilson (Signature) Jake Wilson

Relinquished by: (Signature and Printed Name) Jake Wilson	Date: 6-20-12	Time: 1530	Received by: (Signature and Printed Name) Jeff Siegfried	Date: 6/20/12	Time: 3:30p
Relinquished by: (Signature and Printed Name) Jeff Siegfried	Date: 6/20/12	Time: 3:48p	Received by: (Signature and Printed Name) GSO	Date: 6/20/12	Time: 3:48p
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name) Mark	Date: 6/21/12	Time: 8:06

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Jake Wilson (Print Name) 6/20/12 (Date)
Jake Wilson (Signature)

Send Report To:
Attn: Cem Atabek
Co: _____
Addr: _____
City: State: Zip:

Bill To:
Attn: Cem Atabek
Co: _____
Addr: _____
City: State: Zip:

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
Legal ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) ~~PREPRESERVED~~	8015B (DRO) + MO	TITLE 22 / CAM 17 (6010 / 7000)	Silica Gel	SEDIMENT	SOLID	SOIL	DRINKING WATER	GROUND WATER	WASTEWATER	STORMWATER	AQUEOUS	TAT	Container(s) #	Container(s) Type	REMARKS
	1202282-01	SB-52-1.5-2.0	6/20	1300	X				X	X	X	X				X							E	1	T P
	-2	SB-52-4.5-5.0		1310																					
	-3	SB-52-9.5-10.0		1320																					
	-4	SB-55-1.5-2.0		1110																					
	-5	SB-55-4.5-5.0		1130																					
	-6	SB-55-9.5-10.0		1140																					
	-7	SB-56-1.5-2.0		0840																					
	-8	SB-56-4.5-5.0		0845																					
	-9	SB-56-9.5-100		0850																					

• TAT starts 8 a.m. following day if samples received after 5 p.m.

TAT: ☐A= Overnight ≤ 24 hrs ☐B= Emergency Next workday ☐C= Critical 2 Workdays ☐D= Urgent 3 Workdays ☐E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=Hcl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Ave., Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

P.O.#: _____ Quote #: _____

Logged By: _____ Date: _____

NOTE: Please include your Quote No. to ensure proper pricing of your project.

FOR LABORATORY USE ONLY:

Method of Transport
☐ Client ☐ ATL
☐ FedEx ☐ OnTrac
☐ GSO
☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: Ninyo and Moore
Attn: cem Atabek
Address: 1956 Webster St, #400
City Oakland State CA Zip Code 94612
TEL: 510-343-3000
FAX: 510-343-3001

Project Name: RBF I-880/23rd Ave. Project #: 401971001 Sampler: (Printed Name) Jake Wilson (Signature)

Relinquished by: (Signature and Printed Name)	Jake Wilson	Date: 6-20-12	Time: 1530	Received by: (Signature and Printed Name)	Jeff Siegfried	Date: 6/20/12	Time: 3:30
Relinquished by: (Signature and Printed Name)	Jeff Siegfried	Date: 6/20/12	Time: 3:48	Received by: (Signature and Printed Name)	GSO	Date: 6/20/12	Time: 3:48
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date: 6/21/12	Time: 806

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Jake Wilson 6/20/12
Print Name Date
Signature

Send Report To:
Attn: cem Atabek
Co:
Addr:
City: State: Zip:

Bill To:
Attn: cem Atabek
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
Legal ☐
SWRCB ☐ Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) ~~8021 (BTEX)~~	8015B (DRO) +MC	TITLE 22 / CAM 17 (6010 / 7000)	Silica Gel	SEDIMENT	SOLID	SOIL	DRINKING WATER	GROUND WATER	WASTEWATER	STORMWATER	AQUEOUS	TAT	Container(s) #	Container(s) Type	REMARKS
	1202282-10	SB-57-1.5 & 2.0	6/20	1020	X				X	X	X	X				X						E	1	T P	
	-11	SB-57-4.5-5.0		1030												X							1	T P	
	-12	SB-57-9.5-10.0		1040												X							1	T P	
		~~SB-52-GW~~ JW															X						7		6 voas 1 1-L
	-13	SB-55-GW		1230													X								
	-14	SB-56-GW		0950													X								
		~~SB-57-GW~~ JW															X								

• TAT starts 8 a.m. following day if samples received after 5 p.m.

TAT: ☐A= Overnight ≤ 24 hrs ☐B= Emergency Next workday ☐C= Critical 2 Workdays ☐D= Urgent 3 Workdays ☐E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Rev. 2010-0325

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

Rachelle Arada

From: Cem Atabek [catabek@ninyoandmoore.com]
Sent: Tuesday, June 26, 2012 2:12 PM
To: Rachelle Arada
Cc: Jake Wilson
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for the samples for project # 401971001, please revise the sample IDs for all samples ending in 4.5-5.0 to end in 5.0-5.5. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

Experience · Quality · Commitment

"Celebrating 25 Years"

-----Original Message-----
From: Rachelle Arada [mailto:Rachelle@atlglobal.com]
Sent: Wednesday, June 20, 2012 4:42 PM
To: Cem Atabek
Cc: Jake Wilson; customer.relations@atlglobal.com
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Okay.

From: Cem Atabek [mailto:catabek@ninyoandmoore.com]
Sent: Wednesday, June 20, 2012 4:30 PM
To: Rachelle Arada
Cc: Jake Wilson
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for groundwater samples SB-55-GW and SB-56-GW which should arrive there tomorrow morning, please remove and filter a portion of the groundwater from the 1-liter amber bottles for analysis of dissolved Title 22 Metals. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000

(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

Experience · Quality · Commitment

"Celebrating 25 Years"

-----Original Message-----
From: Jake Wilson
Sent: Wednesday, June 20, 2012 3:59 PM
To: 'Rachelle Arada'
Cc: Cem Atabek
Subject: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle,

The COC's that you will be receiving tomorrow morning indicate that the samples need to be turned around in 7 days. I would greatly appreciate it if you could turn these around in 5 days so that we have adequate time to prepare this report for the client.

Thanks,

Jake

Jake Wilson
Staff Geologist
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000 (x 5203)
(510) 633-5646 (Fax)
(510) 277-6074 (Cell)
jwilson@ninyoandmoore.com

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"Celebrating 25 Years"

Rachelle Arada

From: Cem Atabek [catabek@ninyoandmoore.com]
Sent: Wednesday, June 27, 2012 1:26 PM
To: Rachelle Arada
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for the samples for our project # 401971001, please report results for fuel oxygenates along with VOCs for all groundwater samples and report results for MtBE along with VOCs for all soil samples. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

Experience · Quality · Commitment

"Celebrating 25 Years"

-----Original Message-----
From: Rachelle Arada [mailto:Rachelle@atlglobal.com]
Sent: Wednesday, June 20, 2012 4:42 PM
To: Cem Atabek
Cc: Jake Wilson; customer.relations@atlglobal.com
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Okay.

From: Cem Atabek [mailto:catabek@ninyoandmoore.com]
Sent: Wednesday, June 20, 2012 4:30 PM
To: Rachelle Arada
Cc: Jake Wilson
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for groundwater samples SB-55-GW and SB-56-GW which should arrive there tomorrow morning, please remove and filter a portion of the groundwater from the 1-liter amber bottles for analysis of dissolved Title 22 Metals. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000

ADVANCED TECHNOLOGY LABORATORIES

July 06, 2012

ELAP No.: 1838
NELAP No.: 02107CA
CSDLAC No.: 10196
ORELAP No.: CA300003
TCEQ No.: T104704502

Cem Atabek
Ninyo & Moore
1956 Webster Street, Suite 400
Oakland, CA 94612
Tel: (510) 772-7418
Fax:(510) 633-5646

Re: ATL Work Order Number : 1202282

Client Reference : RBF I-880/23rd Ave, 401971001

Enclosed are the results for sample(s) received on June 21, 2012 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and its absence renders the report invalid. The report cannot be reproduced without written permission from the client and Advanced Technology Laboratories.

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/06/2012

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB-52-1.5-2.0	1202282-01	Soil	6/20/12 13:00	6/21/12 8:06
SB-55-5.0-5.5	1202282-05	Soil	6/20/12 11:30	6/21/12 8:06
SB-56-5.0-5.5	1202282-08	Soil	6/20/12 8:45	6/21/12 8:06
SB-56-9.5-10.0	1202282-09	Soil	6/20/12 8:50	6/21/12 8:06
SB-57-5.0-5.5	1202282-11	Soil	6/20/12 10:30	6/21/12 8:06
SB-57-9.5-10.0	1202282-12	Soil	6/20/12 10:40	6/21/12 8:06

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/06/2012

Client Sample ID SB-52-1.5-2.0

Lab ID: 1202282-01

STLC Metals by ICP-AES by EPA 6010B **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0011	07/02/2012	07/02/12 12:15	

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/06/2012

Client Sample ID SB-55-5.0-5.5

Lab ID: 1202282-05

STLC Metals by ICP-AES by EPA 6010B **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0011	07/02/2012	07/02/12 12:17	

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/06/2012

Client Sample ID SB-56-5.0-5.5

Lab ID: 1202282-08

STLC Metals by ICP-AES by EPA 6010B **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0011	07/02/2012	07/02/12 12:19	

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/06/2012

Client Sample ID SB-56-9.5-10.0

Lab ID: 1202282-09

STLC Metals by ICP-AES by EPA 6010B **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0011	07/02/2012	07/02/12 12:21	

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/06/2012

Client Sample ID SB-57-5.0-5.5

Lab ID: 1202282-11

STLC Metals by ICP-AES by EPA 6010B

Analyst: KK

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0011	07/02/2012	07/02/12 12:23	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/06/2012

Client Sample ID SB-57-9.5-10.0

Lab ID: 1202282-12

STLC Metals by ICP-AES by EPA 6010B **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0011	07/02/2012	07/02/12 12:29	

QUALITY CONTROL SECTION

STLC Metals by ICP-AES by EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2G0011 - STLC Extraction									
Blank (B2G0011-BLK1)				Prepared: 7/2/2012 Analyzed: 7/2/2012					
Chromium	ND	1.0			NR				
Blank (B2G0011-BLK2)				Prepared: 7/2/2012 Analyzed: 7/2/2012					
Chromium	ND	1.0			NR				
LCS (B2G0011-BS1)				Prepared: 7/2/2012 Analyzed: 7/2/2012					
Chromium	1.8	0.10	2.00		91.0	80 - 120			
Matrix Spike (B2G0011-MS1)		**Source: 1202282-08**		Prepared: 7/2/2012 Analyzed: 7/2/2012					
Chromium	2.4	0.10	2.50	ND	97.5	74 - 103			
Matrix Spike (B2G0011-MS2)		**Source: 1202329-02**		Prepared: 7/2/2012 Analyzed: 7/2/2012					
Chromium	2.5	0.10	2.50	ND	99.6	74 - 103			
Matrix Spike Dup (B2G0011-MSD1)		**Source: 1202282-08**		Prepared: 7/2/2012 Analyzed: 7/2/2012					
Chromium	2.5	0.10	2.50	ND	98.2	74 - 103	0.726	20	

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/06/2012

Notes and Definitions

ND	Analyte not detected at or above reporting limit
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA1	CA-NELAP (CDPH)
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)
TX1	TX-NELAP (TCEQ)

Rachelle Arada

From: Cem Atabek [catabek@ninyoandmoore.com]
Sent: Thursday, June 28, 2012 3:47 PM
To: Rachelle Arada
Subject: RE: Final report for RBF I-880/23rd Ave, 401971001 (ATL# 1202282)

Hi Rachelle, please perform analysis of STLC chromium for the following samples on a 5-day TAT:

SB-52-1.5-2.0, SB-55-5.0-5.5, SB-56-5.0-5.5, SB-56-9.5-10.0, SB-57-5.0-5.5, SB-57-9.5-10.0

Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

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-----Original Message-----
From: Rachelle Arada [mailto:Rachelle@atlglobal.com]
Sent: Thursday, June 28, 2012 3:02 PM
To: Cem Atabek
Subject: Final report for RBF I-880/23rd Ave, 401971001 (ATL# 1202282)

Hi Cem,

Attached are the results for the above project.

Rachelle Arada
Project Manager

Advanced Technology Laboratories
www.atlglobal.com
Tel: (562) 989-4045 ext. 237
Fax: (562) 989-4040

Advanced Technology Laboratories is a full-service environmental lab providing organic and inorganic analyses of soil, water, wastewater, storm water and hazardous waste samples. ATL is accredited by the State of California, NELAP and State of Oregon (Air) and holds various SBE, DBE and MBE certificates and a USDA soil permit. ATL takes pride in providing our customers with quick turnaround time, excellent customer service and defensible data while offering very competitive rates. *Advanced Technology Labs - Your Partner for Quality Environmental Testing*

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ADVANCED TECHNOLOGY LABORATORIES

July 09, 2012

ELAP No.: 1838
NELAP No.: 02107CA
CSDLAC No.: 10196
ORELAP No.: CA300003
TCEQ No.: T104704502

Cem Atabek
Ninyo & Moore
1956 Webster Street, Suite 400
Oakland, CA 94612
Tel: (510) 772-7418
Fax:(510) 633-5646

Re: ATL Work Order Number : 1202288

Client Reference : RBF I-880/23rd Ave, 401971001

Enclosed are the results for sample(s) received on June 22, 2012 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and its absence renders the report invalid. The report cannot be reproduced without written permission from the client and Advanced Technology Laboratories.

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB-53-1.5-2.0	1202288-01	Soil	6/21/12 12:00	6/22/12 8:33
SB-53-5.0-5.5	1202288-02	Soil	6/21/12 12:10	6/22/12 8:33
SB-53-9.5-10.0	1202288-03	Soil	6/21/12 12:20	6/22/12 8:33
SB-54-1.5-2.0	1202288-04	Soil	6/21/12 9:20	6/22/12 8:33
SB-54-5.0-5.5	1202288-05	Soil	6/21/12 9:40	6/22/12 8:33
SB-54-9.5-10.0	1202288-06	Soil	6/21/12 9:45	6/22/12 8:33
SB-53-GW	1202288-07	Groundwater	6/21/12 12:30	6/22/12 8:33
SB-54-GW	1202288-08	Groundwater	6/21/12 10:40	6/22/12 8:33

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-1.5-2.0

Lab ID: 1202288-01

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Arsenic	**5.1**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Barium	**200**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Chromium	**44**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Cobalt	**12**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Copper	**30**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Lead	**38**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Nickel	**60**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Vanadium	**35**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	
Zinc	**67**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:41	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.17**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:05	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0666	06/25/2012	06/25/12 13:46	
Surrogate: 4-Bromofluorobenzene	*94.8 %*		*69 - 158*		B2F0666	06/25/2012	*06/25/12 13:46*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**3.7**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:53	
ORO	**11**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:53	
Surrogate: p-Terphenyl	*75.7 %*		*39 - 123*		B2F0688	06/26/2012	*06/26/12 23:53*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-1.5-2.0

Lab ID: 1202288-01

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
2-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
4-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Benzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Bromobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Bromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Bromodichloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Bromoform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Bromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Carbon disulfide	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Carbon tetrachloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Chlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Chloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Chloroform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Chloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-1.5-2.0

Lab ID: 1202288-01

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Dibromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Dibromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Ethyl Acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Ethyl Ether	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Ethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Freon-113	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Isopropylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
m,p-Xylene	ND	10	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Methylene chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
MTBE	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
n-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
n-Propylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Naphthalene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
o-Xylene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
sec-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Styrene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
tert-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Tetrachloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Toluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Trichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Vinyl acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Vinyl chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:59	
Surrogate: 1,2-Dichloroethane-d4	*86.9 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 12:59*	
Surrogate: 4-Bromofluorobenzene	*96.0 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 12:59*	
Surrogate: Dibromofluoromethane	*88.1 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 12:59*	
Surrogate: Toluene-d8	*98.9 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 12:59*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-5.0-5.5

Lab ID: 1202288-02

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Arsenic	**3.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Barium	**120**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Chromium	**53**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Cobalt	**8.7**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Copper	**19**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Lead	**6.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Nickel	**72**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:45	
Vanadium	**32**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	
Zinc	**40**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:44	

STLC Metals by ICP-AES by EPA 6010B — **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Chromium	ND	1.0	NA	20	B2G0082	07/06/2012	07/06/12 11:14	

Mercury by AA (Cold Vapor) EPA 7471 — **Analyst: VV**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:07	

Gasoline Range Organics by EPA 8015B — **Analyst: TP**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0666	06/25/2012	06/25/12 14:02	
Surrogate: 4-Bromofluorobenzene	*99.3 %*	*69 - 158*			B2F0666	06/25/2012	*06/25/12 14:02*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-5.0-5.5

Lab ID: 1202288-02

Diesel Range Organics by EPA 8015B (SGT) **Analyst: CR**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 22:30	
ORO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 22:30	
Surrogate: p-Terphenyl	*67.2 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 22:30*	

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
2-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
4-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Benzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Bromobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Bromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Bromodichloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Bromoform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Client Sample ID SB-53-5.0-5.5

Lab ID: 1202288-02

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Bromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Carbon disulfide	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Carbon tetrachloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Chlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Chloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Chloroform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Chloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Dibromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Dibromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Ethyl Acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Ethyl Ether	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Ethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Freon-113	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Isopropylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
m,p-Xylene	ND	10	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Methylene chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
MTBE	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
n-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
n-Propylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Naphthalene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
o-Xylene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
sec-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Styrene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
tert-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Tetrachloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Toluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Trichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Vinyl acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Vinyl chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:16	
Surrogate: 1,2-Dichloroethane-d4	*89.7 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 13:16*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-5.0-5.5

Lab ID: 1202288-02

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 4-Bromofluorobenzene	*96.9 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 13:16*	
Surrogate: Dibromofluoromethane	*91.7 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 13:16*	
Surrogate: Toluene-d8	*98.8 %*	*70 - 130*			B2F0681	06/26/2012	*06/26/12 13:16*	

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1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-9.5-10.0

Lab ID: 1202288-03

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Arsenic	**3.9**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Barium	**130**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:47	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Chromium	**46**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Cobalt	**11**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Copper	**20**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Lead	**5.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Nickel	**74**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Vanadium	**33**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	
Zinc	**40**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:48	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.11**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:09	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0666	06/25/2012	06/25/12 14:17	
Surrogate: 4-Bromofluorobenzene	*107 %*	*69 - 158*			B2F0666	06/25/2012	*06/25/12 14:17*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**2.1**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 22:46	
ORO	**3.0**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 22:46	
Surrogate: p-Terphenyl	*88.8 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 22:46*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-9.5-10.0

Lab ID: 1202288-03

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
2-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
4-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Benzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Bromobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Bromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Bromodichloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Bromoform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Bromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Carbon disulfide	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Carbon tetrachloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Chlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Chloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Chloroform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Chloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	

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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-9.5-10.0

Lab ID: 1202288-03

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Dibromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Dibromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Ethyl Acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Ethyl Ether	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Ethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Freon-113	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Isopropylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
m,p-Xylene	ND	10	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Methylene chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
MTBE	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
n-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
n-Propylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Naphthalene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
o-Xylene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
sec-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Styrene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
tert-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Tetrachloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Toluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Trichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Vinyl acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Vinyl chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:33	
Surrogate: 1,2-Dichloroethane-d4	*92.4 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:33*	
Surrogate: 4-Bromofluorobenzene	*98.2 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:33*	
Surrogate: Dibromofluoromethane	*94.2 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:33*	
Surrogate: Toluene-d8	*95.6 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:33*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Lab ID: 1202288-04

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Arsenic	**4.3**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Barium	**130**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Chromium	**29**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Cobalt	**9.5**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Copper	**25**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Lead	**41**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Nickel	**44**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Vanadium	**41**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	
Zinc	**77**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 15:51	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.13**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:15	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0666	06/25/2012	06/25/12 14:33	
Surrogate: 4-Bromofluorobenzene	*109 %*	*69 - 158*			B2F0666	06/25/2012	*06/25/12 14:33*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**25**	1.0	NA	1	B2F0688	06/26/2012	06/27/12 00:44	
ORO	**67**	1.0	NA	1	B2F0688	06/26/2012	06/27/12 00:44	
Surrogate: p-Terphenyl	*103 %*	*39 - 123*			B2F0688	06/26/2012	*06/27/12 00:44*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-1.5-2.0

Lab ID: 1202288-04

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
2-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
4-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Benzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Bromobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Bromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Bromodichloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Bromoform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Bromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Carbon disulfide	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Carbon tetrachloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Chlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Chloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Chloroform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Chloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	

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Lab ID: 1202288-04

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Dibromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Dibromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Ethyl Acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Ethyl Ether	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Ethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Freon-113	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Isopropylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
m,p-Xylene	ND	10	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Methylene chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
MTBE	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
n-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
n-Propylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Naphthalene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
o-Xylene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
sec-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Styrene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
tert-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Tetrachloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Toluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Trichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Vinyl acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Vinyl chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 13:51	
Surrogate: 1,2-Dichloroethane-d4	*94.5 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:51*	
Surrogate: 4-Bromofluorobenzene	*94.6 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:51*	
Surrogate: Dibromofluoromethane	*93.1 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:51*	
Surrogate: Toluene-d8	*95.8 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 13:51*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-5.0-5.5

Lab ID: 1202288-05

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Arsenic	**1.2**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Barium	**89**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Chromium	**49**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Cobalt	**3.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Copper	**13**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Lead	**5.5**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Nickel	**52**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Vanadium	**24**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	
Zinc	**30**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:01	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.11**	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:18	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0666	06/25/2012	06/25/12 14:49	
Surrogate: 4-Bromofluorobenzene	*103 %*	*69 - 158*			B2F0666	06/25/2012	*06/25/12 14:49*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:03	
ORO	ND	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:03	
Surrogate: p-Terphenyl	*78.5 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 23:03*	

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Client Sample ID SB-54-5.0-5.5

Lab ID: 1202288-05

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
2-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
4-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Benzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Bromobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Bromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Bromodichloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Bromoform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Bromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Carbon disulfide	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Carbon tetrachloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Chlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Chloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Chloroform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Chloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-5.0-5.5

Lab ID: 1202288-05

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Dibromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Dibromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Ethyl Acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Ethyl Ether	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Ethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Freon-113	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Isopropylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
m,p-Xylene	ND	10	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Methylene chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
MTBE	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
n-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
n-Propylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Naphthalene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
o-Xylene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
sec-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Styrene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
tert-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Tetrachloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Toluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Trichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Vinyl acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Vinyl chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 14:08	
Surrogate: 1,2-Dichloroethane-d4	*90.7 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 14:08*	
Surrogate: 4-Bromofluorobenzene	*96.6 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 14:08*	
Surrogate: Dibromofluoromethane	*90.0 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 14:08*	
Surrogate: Toluene-d8	*95.6 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 14:08*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-9.5-10.0

Lab ID: 1202288-06

Title 22 Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Arsenic	**1.8**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Barium	**95**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Beryllium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:04	
Cadmium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Chromium	**34**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Cobalt	**2.6**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Copper	**11**	2.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Lead	**5.2**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Molybdenum	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Nickel	**23**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Selenium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Silver	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Thallium	ND	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Vanadium	**22**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	
Zinc	**24**	1.0	NA	1	B2F0671	06/25/2012	06/26/12 16:05	

Mercury by AA (Cold Vapor) EPA 7471

Analyst: VV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.10	NA	1	B2F0695	06/26/2012	06/26/12 17:20	

Gasoline Range Organics by EPA 8015B

Analyst: TP

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	1.0	NA	1	B2F0666	06/25/2012	06/25/12 15:04	
Surrogate: 4-Bromofluorobenzene	*98.5 %*	*69 - 158*			B2F0666	06/25/2012	*06/25/12 15:04*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	**4.0**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:20	
ORO	**6.5**	1.0	NA	1	B2F0688	06/26/2012	06/26/12 23:20	
Surrogate: p-Terphenyl	*105 %*	*39 - 123*			B2F0688	06/26/2012	*06/26/12 23:20*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-9.5-10.0

Lab ID: 1202288-06

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,1,1-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,1,2,2-Tetrachloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,1,2-Trichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,1-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,1-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,1-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2,3-Trichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2,3-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2,4-Trichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2,4-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2-Dibromo-3-chloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2-Dibromoethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2-Dichloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,3,5-Trimethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,3-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,3-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
1,4-Dichlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
2,2-Dichloropropane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
2-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
4-Chlorotoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
4-Isopropyltoluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Benzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Bromobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Bromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Bromodichloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Bromoform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Bromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Carbon disulfide	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Carbon tetrachloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Chlorobenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Chloroethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Chloroform	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Chloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
cis-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-9.5-10.0

Lab ID: 1202288-06

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,3-Dichloropropene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Dibromochloromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Dibromomethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Dichlorodifluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Ethyl Acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Ethyl Ether	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Ethylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Freon-113	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Hexachlorobutadiene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Isopropylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
m,p-Xylene	ND	10	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Methylene chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
MTBE	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
n-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
n-Propylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Naphthalene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
o-Xylene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
sec-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Styrene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
tert-Butylbenzene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Tetrachloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Toluene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
trans-1,2-Dichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
trans-1,3-Dichloropropene	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Trichloroethene	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Trichlorofluoromethane	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Vinyl acetate	ND	50	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Vinyl chloride	ND	5.0	NA	1	B2F0681	06/26/2012	06/26/12 12:42	
Surrogate: 1,2-Dichloroethane-d4	*87.5 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 12:42*	
Surrogate: 4-Bromofluorobenzene	*97.0 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 12:42*	
Surrogate: Dibromofluoromethane	*90.2 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 12:42*	
Surrogate: Toluene-d8	*97.9 %*		*70 - 130*		B2F0681	06/26/2012	*06/26/12 12:42*	

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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-53-GW

Lab ID: 1202288-07

Dissolved Metals by ICP-AES EPA 6010B

Analyst: KK

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Arsenic	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Barium	**0.07**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Beryllium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Cadmium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Chromium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Cobalt	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Copper	**0.01**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Lead	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Molybdenum	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Nickel	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Selenium	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Silver	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Thallium	ND	0.02	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Vanadium	**0.009**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:30	
Zinc	**0.07**	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:30	

Dissolved Mercury by AA (Cold Vapor) by EPA 7470

Analyst: VV

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	NA	1	B2F0720	06/27/2012	06/27/12 16:19	

Gasoline Range Organics by EPA 8015B

Analyst: BB

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	0.05	NA	1	B2F0651	06/27/2012	06/27/12 17:53	
Surrogate: 4-Bromofluorobenzene	*98.2 %*	*70 - 130*			B2F0651	06/27/2012	*06/27/12 17:53*	

Diesel Range Organics by EPA 8015B (SGT)

Analyst: CR

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	0.05	NA	1	B2F0704	06/26/2012	06/27/12 02:30	
ORO	ND	0.05	NA	1	B2F0704	06/26/2012	06/27/12 02:30	
Surrogate: p-Terphenyl	*120 %*	*48 - 124*			B2F0704	06/26/2012	*06/27/12 02:30*	

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Lab ID: 1202288-07

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,1,1-Trichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,1,2,2-Tetrachloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,1,2-Trichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,1-Dichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,1-Dichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,1-Dichloropropene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2,3-Trichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2,3-Trichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2,4-Trichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2,4-Trimethylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2-Dibromo-3-chloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2-Dibromoethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2-Dichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2-Dichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,2-Dichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,3,5-Trimethylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,3-Dichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,3-Dichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
1,4-Dichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
2,2-Dichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
2-Chloroethyl vinyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
2-Chlorotoluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
4-Chlorotoluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
4-Isopropyltoluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Benzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Bromobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Bromochloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Bromodichloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Bromoform	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Bromomethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Carbon disulfide	ND	1.0	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Carbon tetrachloride	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Chlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Chloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Chloroform	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Chloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	

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Lab ID: 1202288-07

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,2-Dichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
cis-1,3-Dichloropropene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Di-isopropyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Dibromochloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Dibromomethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Dichlorodifluoromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Ethyl Acetate	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Ethyl Ether	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Ethyl tert-butyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Ethylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Freon-113	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Hexachlorobutadiene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Isopropylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
m,p-Xylene	ND	1.0	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Methylene chloride	ND	1.0	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
MTBE	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
n-Butylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
n-Propylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Naphthalene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
o-Xylene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
sec-Butylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Styrene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
tert-Amyl methyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
tert-Butanol	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
tert-Butylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Tetrachloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Toluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
trans-1,2-Dichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
trans-1,3-Dichloropropene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Trichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Trichlorofluoromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Vinyl acetate	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Vinyl chloride	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 20:09	
Surrogate: 1,2-Dichloroethane-d4	*95.5 %*	*70 - 130*			B2F0719	06/27/2012	*06/27/12 20:09*	
Surrogate: 4-Bromofluorobenzene	*94.4 %*	*70 - 130*			B2F0719	06/27/2012	*06/27/12 20:09*	
Surrogate: Dibromofluoromethane	*97.3 %*	*70 - 130*			B2F0719	06/27/2012	*06/27/12 20:09*	
Surrogate: Toluene-d8	*98.4 %*	*70 - 130*			B2F0719	06/27/2012	*06/27/12 20:09*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Oakland , CA 94612	Reported : 07/09/2012

Client Sample ID SB-54-GW

Lab ID: 1202288-08

Dissolved Metals by ICP-AES EPA 6010B — **Analyst: KK**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Arsenic	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Barium	**0.27**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Beryllium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Cadmium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Chromium	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Cobalt	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Copper	**0.01**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Lead	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Molybdenum	**0.006**	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Nickel	ND	0.005	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Selenium	ND	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Silver	ND	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Thallium	ND	0.02	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Vanadium	**0.01**	0.003	NA	1	B2F0662	06/25/2012	06/25/12 14:32	
Zinc	**0.05**	0.01	NA	1	B2F0662	06/25/2012	06/25/12 14:32	

Dissolved Mercury by AA (Cold Vapor) by EPA 7470 — **Analyst: VV**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	NA	1	B2F0720	06/27/2012	06/27/12 16:25	

Gasoline Range Organics by EPA 8015B — **Analyst: BB**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Gasoline Range Organics	ND	0.05	NA	1	B2F0651	06/27/2012	06/27/12 18:15	
Surrogate: 4-Bromofluorobenzene	*100 %*	*70 - 130*			B2F0651	06/27/2012	*06/27/12 18:15*	

Diesel Range Organics by EPA 8015B (SGT) — **Analyst: CR**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
DRO	ND	0.05	NA	1	B2F0704	06/26/2012	06/27/12 02:47	
ORO	ND	0.05	NA	1	B2F0704	06/26/2012	06/27/12 02:47	
Surrogate: p-Terphenyl	*97.5 %*	*48 - 124*			B2F0704	06/26/2012	*06/27/12 02:47*	

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
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Client Sample ID SB-54-GW

Lab ID: 1202288-08

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,1,1,2-Tetrachloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,1,1-Trichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,1,2,2-Tetrachloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,1,2-Trichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,1-Dichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,1-Dichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,1-Dichloropropene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2,3-Trichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2,3-Trichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2,4-Trichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2,4-Trimethylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2-Dibromo-3-chloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2-Dibromoethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2-Dichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2-Dichloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,2-Dichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,3,5-Trimethylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,3-Dichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,3-Dichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
1,4-Dichlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
2,2-Dichloropropane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
2-Chloroethyl vinyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
2-Chlorotoluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
4-Chlorotoluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
4-Isopropyltoluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Benzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Bromobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Bromochloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Bromodichloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Bromoform	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Bromomethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Carbon disulfide	ND	1.0	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Carbon tetrachloride	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Chlorobenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Chloroethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Chloroform	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Chloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	

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Client Sample ID SB-54-GW

Lab ID: 1202288-08

Volatile Organic Compounds by EPA 8260 **Analyst: RP**

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
cis-1,2-Dichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
cis-1,3-Dichloropropene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Di-isopropyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Dibromochloromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Dibromomethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Dichlorodifluoromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Ethyl Acetate	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Ethyl Ether	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Ethyl tert-butyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Ethylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Freon-113	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Hexachlorobutadiene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Isopropylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
m,p-Xylene	ND	1.0	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Methylene chloride	ND	1.0	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
MTBE	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
n-Butylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
n-Propylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Naphthalene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
o-Xylene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
sec-Butylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Styrene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
tert-Amyl methyl ether	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
tert-Butanol	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
tert-Butylbenzene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Tetrachloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Toluene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
trans-1,2-Dichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
trans-1,3-Dichloropropene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Trichloroethene	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Trichlorofluoromethane	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Vinyl acetate	ND	10	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Vinyl chloride	ND	0.50	NA	1	B2F0719	06/27/2012	06/27/12 19:49	
Surrogate: 1,2-Dichloroethane-d4	*94.1 %*		*70 - 130*		B2F0719	06/27/2012	*06/27/12 19:49*	
Surrogate: 4-Bromofluorobenzene	*94.6 %*		*70 - 130*		B2F0719	06/27/2012	*06/27/12 19:49*	
Surrogate: Dibromofluoromethane	*96.2 %*		*70 - 130*		B2F0719	06/27/2012	*06/27/12 19:49*	
Surrogate: Toluene-d8	*97.9 %*		*70 - 130*		B2F0719	06/27/2012	*06/27/12 19:49*	

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QUALITY CONTROL SECTION

Title 22 Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0671 - EPA 3050B									
Blank (B2F0671-BLK1)					Prepared: 6/25/2012 Analyzed: 6/26/2012				
Antimony	ND	2.0			NR				
Arsenic	ND	1.0			NR				
Barium	ND	1.0			NR				
Beryllium	ND	1.0			NR				
Cadmium	ND	1.0			NR				
Chromium	ND	1.0			NR				
Cobalt	ND	1.0			NR				
Copper	ND	2.0			NR				
Lead	ND	1.0			NR				
Molybdenum	ND	1.0			NR				
Nickel	ND	1.0			NR				
Selenium	ND	1.0			NR				
Silver	ND	1.0			NR				
Thallium	ND	1.0			NR				
Vanadium	ND	1.0			NR				
Zinc	ND	1.0			NR				
LCS (B2F0671-BS1)					Prepared: 6/25/2012 Analyzed: 6/27/2012				
Antimony	48	2.0	50.0		95.5	80 - 120			
Arsenic	46	1.0	50.0		92.6	80 - 120			
Barium	49	1.0	50.0		97.1	80 - 120			
Beryllium	52	1.0	50.0		104	80 - 120			
Cadmium	48	1.0	50.0		95.9	80 - 120			
Chromium	49	1.0	50.0		97.5	80 - 120			
Cobalt	49	1.0	50.0		97.6	80 - 120			
Copper	49	2.0	50.0		97.9	80 - 120			
Lead	49	1.0	50.0		98.6	80 - 120			
Molybdenum	49	1.0	50.0		97.3	80 - 120			
Nickel	49	1.0	50.0		98.3	80 - 120			
Selenium	46	1.0	50.0		91.4	80 - 120			
Silver	45	1.0	50.0		90.2	80 - 120			
Thallium	48	1.0	50.0		96.8	80 - 120			
Vanadium	51	1.0	50.0		103	80 - 120			
Zinc	48	1.0	50.0		95.6	80 - 120			
Matrix Spike (B2F0671-MS1)		**Source: 1202282-01**			Prepared: 6/25/2012 Analyzed: 6/26/2012				
Antimony	60	2.0	125	ND	48.1	44 - 105			
Arsenic	89	1.0	125	4.6	67.9	57 - 103			
Barium	260	1.0	125	180	67.7	36 - 134			
Beryllium	90	1.0	125	0.40	71.7	64 - 106			

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Title 22 Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0671 - EPA 3050B (continued)									
Matrix Spike (B2F0671-MS1) - Continued		**Source: 1202282-01**		Prepared: 6/25/2012 Analyzed: 6/26/2012					
Cadmium	85	1.0	125	0.56	67.6	58 - 102			
Chromium	140	1.0	125	53	73.7	55 - 105			
Cobalt	100	1.0	125	12	70.8	59 - 105			
Copper	120	2.0	125	24	78.7	64 - 117			
Lead	95	1.0	125	8.3	69.1	46 - 116			
Molybdenum	89	1.0	125	0.42	70.6	59 - 108			
Nickel	160	1.0	125	83	64.3	52 - 109			
Selenium	78	1.0	125	ND	62.3	56 - 100			
Silver	93	1.0	125	ND	74.1	65 - 107			
Thallium	85	1.0	125	ND	68.1	47 - 100			
Vanadium	130	1.0	125	37	75.8	64 - 110			
Zinc	130	1.0	125	51	64.8	37 - 123			
Matrix Spike Dup (B2F0671-MSD1)		**Source: 1202282-01**		Prepared: 6/25/2012 Analyzed: 6/26/2012					
Antimony	64	2.0	125	ND	50.9	44 - 105	5.57	20	
Arsenic	92	1.0	125	4.6	70.3	57 - 103	3.28	20	
Barium	270	1.0	125	180	75.6	36 - 134	3.68	20	
Beryllium	94	1.0	125	0.40	75.2	64 - 106	4.84	20	
Cadmium	88	1.0	125	0.56	70.0	58 - 102	3.44	20	
Chromium	150	1.0	125	53	77.3	55 - 105	3.05	20	
Cobalt	100	1.0	125	12	73.1	59 - 105	2.86	20	
Copper	130	2.0	125	24	82.4	64 - 117	3.62	20	
Lead	98	1.0	125	8.3	71.9	46 - 116	3.62	20	
Molybdenum	92	1.0	125	0.42	73.4	59 - 108	3.86	20	
Nickel	170	1.0	125	83	70.1	52 - 109	4.36	20	
Selenium	81	1.0	125	ND	65.1	56 - 100	4.37	20	
Silver	96	1.0	125	ND	76.9	65 - 107	3.82	20	
Thallium	88	1.0	125	ND	70.4	47 - 100	3.41	20	
Vanadium	140	1.0	125	37	79.6	64 - 110	3.46	20	
Zinc	140	1.0	125	51	70.8	37 - 123	5.48	20	

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Dissolved Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0662 - EPA 3010A									
Blank (B2F0662-BLK1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	ND	0.005			NR				
Arsenic	ND	0.01			NR				
Barium	ND	0.003			NR				
Beryllium	ND	0.003			NR				
Cadmium	ND	0.003			NR				
Chromium	ND	0.003			NR				
Cobalt	ND	0.003			NR				
Copper	ND	0.005			NR				
Lead	ND	0.005			NR				
Molybdenum	ND	0.005			NR				
Nickel	ND	0.005			NR				
Selenium	ND	0.01			NR				
Silver	ND	0.003			NR				
Thallium	ND	0.02			NR				
Vanadium	ND	0.003			NR				
Zinc	ND	0.01			NR				
LCS (B2F0662-BS1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	0.97	0.005	1.00		97.0	80 - 120			
Arsenic	0.96	0.01	1.00		96.5	80 - 120			
Barium	0.99	0.003	1.00		99.0	80 - 120			
Beryllium	1.0	0.003	1.00		104	80 - 120			
Cadmium	0.98	0.003	1.00		98.2	80 - 120			
Chromium	0.97	0.003	1.00		96.5	80 - 120			
Cobalt	0.98	0.003	1.00		97.8	80 - 120			
Copper	1.0	0.005	1.00		101	80 - 120			
Lead	1.0	0.005	1.00		99.8	80 - 120			
Molybdenum	1.0	0.005	1.00		101	80 - 120			
Nickel	0.98	0.005	1.00		98.1	80 - 120			
Selenium	0.92	0.01	1.00		92.1	80 - 120			
Silver	0.98	0.003	1.00		97.7	80 - 120			
Thallium	1.0	0.02	1.00		100	80 - 120			
Vanadium	1.0	0.003	1.00		101	80 - 120			
Zinc	0.97	0.01	1.00		96.6	80 - 120			
Matrix Spike (B2F0662-MS1)		**Source: 1202288-08**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	2.4	0.005	2.50	ND	95.9	77 - 123			
Arsenic	2.3	0.01	2.50	ND	93.8	80 - 118			
Barium	2.7	0.003	2.50	0.27	96.1	78 - 120			
Beryllium	2.4	0.003	2.50	ND	97.4	81 - 120			
Cadmium	2.2	0.003	2.50	ND	89.9	76 - 117			
Chromium	2.3	0.003	2.50	ND	92.7	75 - 110			

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Dissolved Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0662 - EPA 3010A (continued)									
Matrix Spike (B2F0662-MS1) - Continued		**Source: 1202288-08**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Cobalt	2.2	0.003	2.50	ND	88.4	76 - 118			
Copper	2.4	0.005	2.50	0.01	94.9	78 - 123			
Lead	2.2	0.005	2.50	ND	86.8	78 - 117			
Molybdenum	2.3	0.005	2.50	0.006	91.3	81 - 115			
Nickel	2.2	0.005	2.50	ND	88.1	75 - 118			
Selenium	2.2	0.01	2.50	ND	89.6	78 - 116			
Silver	2.4	0.003	2.50	0.002	96.1	80 - 122			
Thallium	2.3	0.02	2.50	ND	92.4	69 - 122			
Vanadium	2.4	0.003	2.50	0.01	95.1	77 - 120			
Zinc	2.2	0.01	2.50	0.05	85.9	73 - 119			
Matrix Spike Dup (B2F0662-MSD1)		**Source: 1202288-08**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Antimony	2.4	0.005	2.50	ND	97.8	77 - 123	1.99	20	
Arsenic	2.4	0.01	2.50	ND	95.4	80 - 118	1.73	20	
Barium	2.7	0.003	2.50	0.27	98.1	78 - 120	1.84	20	
Beryllium	2.5	0.003	2.50	ND	98.4	81 - 120	1.11	20	
Cadmium	2.3	0.003	2.50	ND	91.3	76 - 117	1.45	20	
Chromium	2.4	0.003	2.50	ND	95.2	75 - 110	2.66	20	
Cobalt	2.2	0.003	2.50	ND	89.6	76 - 118	1.33	20	
Copper	2.4	0.005	2.50	0.01	97.0	78 - 123	2.18	20	
Lead	2.2	0.005	2.50	ND	88.5	78 - 117	1.95	20	
Molybdenum	2.3	0.005	2.50	0.006	92.8	81 - 115	1.53	20	
Nickel	2.2	0.005	2.50	ND	89.7	75 - 118	1.85	20	
Selenium	2.3	0.01	2.50	ND	91.6	78 - 116	2.19	20	
Silver	2.4	0.003	2.50	0.002	97.9	80 - 122	1.80	20	
Thallium	2.3	0.02	2.50	ND	93.5	69 - 122	1.23	20	
Vanadium	2.4	0.003	2.50	0.01	96.7	77 - 120	1.76	20	
Zinc	2.2	0.01	2.50	0.05	87.5	73 - 119	1.80	20	

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STLC Metals by ICP-AES by EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2G0082 - STLC Extraction									
Blank (B2G0082-BLK1)				Prepared: 7/6/2012 Analyzed: 7/6/2012					
Chromium	ND	1.0			NR				
LCS (B2G0082-BS1)				Prepared: 7/6/2012 Analyzed: 7/6/2012					
Chromium	1.7	0.10	2.00		87.0	80 - 120			
Matrix Spike (B2G0082-MS1)		**Source: 1202288-02**		Prepared: 7/6/2012 Analyzed: 7/6/2012					
Chromium	2.5	0.10	2.50	0.11	95.7	74 - 103			
Matrix Spike Dup (B2G0082-MSD1)		**Source: 1202288-02**		Prepared: 7/6/2012 Analyzed: 7/6/2012					
Chromium	2.5	0.10	2.50	0.11	94.0	74 - 103	1.72	20	

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Mercury by AA (Cold Vapor) EPA 7471 - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0695 - EPA 7471									
Blank (B2F0695-BLK1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	ND	0.10			NR				
LCS (B2F0695-BS1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.85	0.10	0.833		102	80 - 120			
Matrix Spike (B2F0695-MS1)		**Source: 1202049-02**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.86	0.10	0.833	0.05	97.0	70 - 130			
Matrix Spike (B2F0695-MS2)		**Source: 1202291-37**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.006		0.00500	0.0005	106	70 - 130			
Matrix Spike Dup (B2F0695-MSD1)		**Source: 1202049-02**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
Mercury	0.88	0.10	0.833	0.05	100	70 - 130	2.88	20	

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Dissolved Mercury by AA (Cold Vapor) by EPA 7470 - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0720 - EPA 245.1/7470									
Blank (B2F0720-BLK1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	ND	0.20			NR				
LCS (B2F0720-BS1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	10	0.20	10.0		103	85 - 115			
Matrix Spike (B2F0720-MS1)		**Source: 1202270-01**		Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	10	0.20	10.0	ND	101	70 - 130			
Matrix Spike (B2F0720-MS2)		**Source: 1202288-08**		Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	4.9		5.00	0.008	98.6	70 - 130			
Matrix Spike Dup (B2F0720-MSD1)		**Source: 1202270-01**		Prepared: 6/27/2012 Analyzed: 6/27/2012					
Mercury	10	0.20	10.0	ND	100	70 - 130	0.423	20	

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Gasoline Range Organics by EPA 8015B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0651 - GCVOAW									
Blank (B2F0651-BLK1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Gasoline Range Organics	ND	0.05			NR				
Surrogate: 4-Bromofluorobenzene	*0.098*		*0.100*		*98.1*	*70 - 130*			
LCS (B2F0651-BS1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Gasoline Range Organics	1.0	0.05	1.00		101	70 - 130			
Surrogate: 4-Bromofluorobenzene	*0.11*		*0.100*		*106*	*70 - 130*			
LCS Dup (B2F0651-BSD1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Gasoline Range Organics	1.0	0.05	1.00		101	70 - 130	0.298	20	
Surrogate: 4-Bromofluorobenzene	*0.11*		*0.100*		*107*	*70 - 130*			

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Gasoline Range Organics by EPA 8015B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0666 - GCVOAS									
Blank (B2F0666-BLK1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Gasoline Range Organics	ND	1.0			NR				
Surrogate: 4-Bromofluorobenzene	*0.091*		*0.100*		*90.6*	*69 - 158*			

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Gasoline Range Organics by EPA 8015B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0666 - GCVOAS (continued)									
LCS (B2F0666-BS1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Gasoline Range Organics	5.0	1.0	5.00		101	70 - 130			
Surrogate: 4-Bromofluorobenzene	*0.10*		*0.100*		*100*	*69 - 158*			

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Gasoline Range Organics by EPA 8015B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0666 - GCVOAS (continued)									
LCS Dup (B2F0666-BSD1)				Prepared: 6/25/2012 Analyzed: 6/25/2012					
Gasoline Range Organics	5.1	1.0	5.00		103	70 - 130	1.83	20	
Surrogate: 4-Bromofluorobenzene	*0.11*		*0.100*		*106*	*69 - 158*			

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Gasoline Range Organics by EPA 8015B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0666 - GCVOAS (continued)									
Matrix Spike (B2F0666-MS1)		**Source: 1202288-01**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Gasoline Range Organics	3.8	1.0	5.00	ND	75.7	46 - 135			
Surrogate: 4-Bromofluorobenzene	*0.10*		*0.100*		*99.9*	*69 - 158*			

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Gasoline Range Organics by EPA 8015B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0666 - GCVOAS (continued)									
Matrix Spike Dup (B2F0666-MSD1)		**Source: 1202288-01**		Prepared: 6/25/2012 Analyzed: 6/25/2012					
Gasoline Range Organics	4.0	1.0	5.00	ND	79.4	46 - 135	4.72	20	
Surrogate: 4-Bromofluorobenzene	*0.10*		*0.100*		*104*	*69 - 158*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL									
Blank (B2F0688-BLK1)					Prepared: 6/26/2012 Analyzed: 6/26/2012				
DRO	ND	1.0			NR				
ORO	ND	1.0			NR				
Surrogate: p-Terphenyl	*1.7*		*2.67*		*64.9*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL (continued)									
LCS (B2F0688-BS1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	26	1.0	33.3		78.0	37 - 109			
Surrogate: p-Terphenyl	*2.0*		*2.67*		*76.0*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL (continued)									
Matrix Spike (B2F0688-MS1)		**Source: 1202282-05**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	28	1.0	33.3	2.6	75.2	29 - 107			
Surrogate: p-Terphenyl	*2.4*		*2.67*		*89.4*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0688 - GCSEMI_DRO_SOIL_LL (continued)									
Matrix Spike Dup (B2F0688-MSD1)		**Source: 1202282-05**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
DRO	21	1.0	33.3	2.6	55.1	29 - 107	27.6	20	R
Surrogate: p-Terphenyl	*2.2*		*2.67*		*84.2*	*39 - 123*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0704 - GCSEMI_DRO									
Blank (B2F0704-BLK1)				Prepared: 6/26/2012 Analyzed: 6/27/2012					
DRO	ND	0.05			NR				
ORO	ND	0.05			NR				
Surrogate: p-Terphenyl	*0.070*		*0.0800*		*87.8*	*48 - 124*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0704 - GCSEMI_DRO (continued)									
LCS (B2F0704-BS1)				Prepared: 6/26/2012 Analyzed: 6/27/2012					
DRO	0.71	0.05	1.00		71.0	45 - 109			
Surrogate: p-Terphenyl	*0.073*		*0.0800*		*91.5*	*48 - 124*			

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Diesel Range Organics by EPA 8015B (SGT) - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0704 - GCSEMI_DRO (continued)									
LCS Dup (B2F0704-BSD1)				Prepared: 6/26/2012 Analyzed: 6/27/2012					
DRO	0.82	0.05	1.00		82.4	45 - 109	15.0	20	
Surrogate: p-Terphenyl	*0.070*		*0.0800*		*87.8*	*48 - 124*			

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Volatile Organic Compounds by EPA 8260 - Quality Control

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0681 - MSVOAS									
Blank (B2F0681-BLK1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
1,1,1,2-Tetrachloroethane	ND	5.0			NR				
1,1,1-Trichloroethane	ND	5.0			NR				
1,1,2,2-Tetrachloroethane	ND	5.0			NR				
1,1,2-Trichloroethane	ND	5.0			NR				
1,1-Dichloroethane	ND	5.0			NR				
1,1-Dichloroethene	ND	5.0			NR				
1,1-Dichloropropene	ND	5.0			NR				
1,2,3-Trichloropropane	ND	5.0			NR				
1,2,3-Trichlorobenzene	ND	5.0			NR				
1,2,4-Trichlorobenzene	ND	5.0			NR				
1,2,4-Trimethylbenzene	ND	5.0			NR				
1,2-Dibromo-3-chloropropane	ND	5.0			NR				
1,2-Dibromoethane	ND	5.0			NR				
1,2-Dichlorobenzene	ND	5.0			NR				
1,2-Dichloroethane	ND	5.0			NR				
1,2-Dichloropropane	ND	5.0			NR				
1,3,5-Trimethylbenzene	ND	5.0			NR				
1,3-Dichlorobenzene	ND	5.0			NR				
1,3-Dichloropropane	ND	5.0			NR				
1,4-Dichlorobenzene	ND	5.0			NR				
2,2-Dichloropropane	ND	5.0			NR				
2-Chlorotoluene	ND	5.0			NR				
4-Chlorotoluene	ND	5.0			NR				
4-Isopropyltoluene	ND	5.0			NR				
Benzene	ND	5.0			NR				
Bromobenzene	ND	5.0			NR				
Bromochloromethane	ND	5.0			NR				
Bromodichloromethane	ND	5.0			NR				
Bromoform	ND	5.0			NR				
Bromomethane	ND	5.0			NR				
Carbon disulfide	ND	5.0			NR				
Carbon tetrachloride	ND	5.0			NR				
Chlorobenzene	ND	5.0			NR				
Chloroethane	ND	5.0			NR				
Chloroform	ND	5.0			NR				
Chloromethane	ND	5.0			NR				
cis-1,2-Dichloroethene	ND	5.0			NR				
cis-1,3-Dichloropropene	ND	5.0			NR				
Dibromochloromethane	ND	5.0			NR				
Dibromomethane	ND	5.0			NR				
Dichlorodifluoromethane	ND	5.0			NR				

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0681 - MSVOAS (continued)									
Blank (B2F0681-BLK1) - Continued					Prepared: 6/26/2012 Analyzed: 6/26/2012				
Ethyl Acetate	ND	50			NR				
Ethyl Ether	ND	50			NR				
Ethylbenzene	ND	5.0			NR				
Freon-113	ND	5.0			NR				
Hexachlorobutadiene	ND	5.0			NR				
Isopropylbenzene	ND	5.0			NR				
m,p-Xylene	ND	10			NR				
Methylene chloride	ND	5.0			NR				
MTBE	ND	5.0			NR				
n-Butylbenzene	ND	5.0			NR				
n-Propylbenzene	ND	5.0			NR				
Naphthalene	ND	5.0			NR				
o-Xylene	ND	5.0			NR				
sec-Butylbenzene	ND	5.0			NR				
Styrene	ND	5.0			NR				
tert-Butylbenzene	ND	5.0			NR				
Tetrachloroethene	ND	5.0			NR				
Toluene	ND	5.0			NR				
trans-1,2-Dichloroethene	ND	5.0			NR				
trans-1,3-Dichloropropene	ND	50			NR				
Trichloroethene	ND	5.0			NR				
Trichlorofluoromethane	ND	5.0			NR				
Vinyl acetate	ND	50			NR				
Vinyl chloride	ND	5.0			NR				
Surrogate: 1,2-Dichloroethane-d4	*44*		*50.0*		*87.6*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*48*		*50.0*		*95.0*	*70 - 130*			
Surrogate: Dibromofluoromethane	*46*		*50.0*		*91.1*	*70 - 130*			
Surrogate: Toluene-d8	*51*		*50.0*		*102*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0681 - MSVOAS (continued)									
LCS (B2F0681-BS1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
1,1-Dichloroethene	43		50.0		86.3	70 - 130			
Benzene	91		100		91.1	70 - 130			
Chlorobenzene	48		50.0		96.4	70 - 130			
MTBE	49		50.0		98.7	70 - 130			
Toluene	94		100		94.4	70 - 130			
Trichloroethene	50		50.0		100	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*48*		*50.0*		*95.3*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*51*		*50.0*		*102*	*70 - 130*			
Surrogate: Dibromofluoromethane	*48*		*50.0*		*95.7*	*70 - 130*			
Surrogate: Toluene-d8	*49*		*50.0*		*97.8*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0681 - MSVOAS (continued)									
LCS Dup (B2F0681-BSD1)				Prepared: 6/26/2012 Analyzed: 6/26/2012					
1,1-Dichloroethene	41		50.0		81.6	70 - 130	5.60	20	
Benzene	91		100		91.2	70 - 130	0.0877	20	
Chlorobenzene	49		50.0		97.0	70 - 130	0.662	20	
MTBE	46		50.0		91.7	70 - 130	7.39	20	
Toluene	94		100		93.9	70 - 130	0.542	20	
Trichloroethene	52		50.0		103	70 - 130	3.38	20	
Surrogate: 1,2-Dichloroethane-d4	*42*		*50.0*		*84.0*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*49*		*50.0*		*98.6*	*70 - 130*			
Surrogate: Dibromofluoromethane	*44*		*50.0*		*88.6*	*70 - 130*			
Surrogate: Toluene-d8	*49*		*50.0*		*97.6*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0681 - MSVOAS (continued)									
Matrix Spike (B2F0681-MS1)		**Source: 1202288-06**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
1,1-Dichloroethene	36		50.0	ND	72.5	70 - 130			
Benzene	77		100	ND	77.4	70 - 130			
Chlorobenzene	41		50.0	ND	82.1	70 - 130			
MTBE	38		50.0	ND	75.2	70 - 130			
Toluene	80		100	ND	80.1	70 - 130			
Trichloroethene	41		50.0	ND	82.7	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*44*		*50.0*		*87.8*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*50*		*50.0*		*100*	*70 - 130*			
Surrogate: Dibromofluoromethane	*47*		*50.0*		*93.2*	*70 - 130*			
Surrogate: Toluene-d8	*49*		*50.0*		*98.2*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0681 - MSVOAS (continued)									
Matrix Spike Dup (B2F0681-MSD1)		**Source: 1202288-06**		Prepared: 6/26/2012 Analyzed: 6/26/2012					
1,1-Dichloroethene	33		50.0	ND	66.5	70 - 130	8.63	20	M2
Benzene	73		100	ND	73.0	70 - 130	5.80	20	
Chlorobenzene	37		50.0	ND	73.8	70 - 130	10.7	20	
MTBE	37		50.0	ND	73.3	70 - 130	2.48	20	
Toluene	76		100	ND	75.5	70 - 130	5.90	20	
Trichloroethene	40		50.0	ND	80.6	70 - 130	2.65	20	
Surrogate: 1,2-Dichloroethane-d4	*45*		*50.0*		*89.6*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*50*		*50.0*		*99.6*	*70 - 130*			
Surrogate: Dibromofluoromethane	*45*		*50.0*		*90.8*	*70 - 130*			
Surrogate: Toluene-d8	*49*		*50.0*		*97.2*	*70 - 130*			

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Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0719 - MSVOAW_LL									
Blank (B2F0719-BLK1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
1,1,1,2-Tetrachloroethane	ND	0.50			NR				
1,1,1-Trichloroethane	ND	0.50			NR				
1,1,2,2-Tetrachloroethane	ND	0.50			NR				
1,1,2-Trichloroethane	ND	0.50			NR				
1,1-Dichloroethane	ND	0.50			NR				
1,1-Dichloroethene	ND	0.50			NR				
1,1-Dichloropropene	ND	0.50			NR				
1,2,3-Trichloropropane	ND	0.50			NR				
1,2,3-Trichlorobenzene	ND	0.50			NR				
1,2,4-Trichlorobenzene	ND	0.50			NR				
1,2,4-Trimethylbenzene	ND	0.50			NR				
1,2-Dibromo-3-chloropropane	ND	0.50			NR				
1,2-Dibromoethane	ND	0.50			NR				
1,2-Dichlorobenzene	ND	0.50			NR				
1,2-Dichloroethane	ND	0.50			NR				
1,2-Dichloropropane	ND	0.50			NR				
1,3,5-Trimethylbenzene	ND	0.50			NR				
1,3-Dichlorobenzene	ND	0.50			NR				
1,3-Dichloropropane	ND	0.50			NR				
1,4-Dichlorobenzene	ND	0.50			NR				
2,2-Dichloropropane	ND	0.50			NR				
2-Chloroethyl vinyl ether	ND	0.50			NR				
2-Chlorotoluene	ND	0.50			NR				
4-Chlorotoluene	ND	0.50			NR				
4-Isopropyltoluene	ND	0.50			NR				
Benzene	ND	0.50			NR				
Bromobenzene	ND	0.50			NR				
Bromochloromethane	ND	0.50			NR				
Bromodichloromethane	ND	0.50			NR				
Bromoform	ND	0.50			NR				
Bromomethane	ND	0.50			NR				
Carbon disulfide	ND	1.0			NR				
Carbon tetrachloride	ND	0.50			NR				
Chlorobenzene	ND	0.50			NR				
Chloroethane	ND	0.50			NR				
Chloroform	ND	0.50			NR				
Chloromethane	ND	0.50			NR				
cis-1,2-Dichloroethene	ND	0.50			NR				
cis-1,3-Dichloropropene	ND	0.50			NR				
Di-isopropyl ether	ND	0.50			NR				
Dibromochloromethane	ND	0.50			NR				

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Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0719 - MSVOAW_LL (continued)									
Blank (B2F0719-BLK1) - Continued				Prepared: 6/27/2012 Analyzed: 6/27/2012					
Dibromomethane	ND	0.50			NR				
Dichlorodifluoromethane	ND	0.50			NR				
Ethyl Acetate	ND	10			NR				
Ethyl Ether	ND	10			NR				
Ethyl tert-butyl ether	ND	0.50			NR				
Ethylbenzene	ND	0.50			NR				
Freon-113	ND	0.50			NR				
Hexachlorobutadiene	ND	0.50			NR				
Isopropylbenzene	ND	0.50			NR				
m,p-Xylene	ND	1.0			NR				
Methylene chloride	ND	1.0			NR				
MTBE	ND	0.50			NR				
n-Butylbenzene	ND	0.50			NR				
n-Propylbenzene	ND	0.50			NR				
Naphthalene	ND	0.50			NR				
o-Xylene	ND	0.50			NR				
sec-Butylbenzene	ND	0.50			NR				
Styrene	ND	0.50			NR				
tert-Amyl methyl ether	ND	0.50			NR				
tert-Butanol	ND	10			NR				
tert-Butylbenzene	ND	0.50			NR				
Tetrachloroethene	ND	0.50			NR				
Toluene	ND	0.50			NR				
trans-1,2-Dichloroethene	ND	0.50			NR				
trans-1,3-Dichloropropene	ND	0.50			NR				
Trichloroethene	ND	0.50			NR				
Trichlorofluoromethane	ND	0.50			NR				
Vinyl acetate	ND	10			NR				
Vinyl chloride	ND	0.50			NR				
Surrogate: 1,2-Dichloroethane-d4	*20*		*25.0*		*78.3*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*20*		*25.0*		*78.7*	*70 - 130*			
Surrogate: Dibromofluoromethane	*19*		*25.0*		*77.5*	*70 - 130*			
Surrogate: Toluene-d8	*20*		*25.0*		*81.2*	*70 - 130*			

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0719 - MSVOAW_LL (continued)									
LCS (B2F0719-BS1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
1,1-Dichloroethene	20	0.50	20.0		98.0	70 - 130			
Benzene	19	0.50	20.0		97.2	70 - 130			
Chlorobenzene	19	0.50	20.0		94.6	70 - 130			
MTBE	21	0.50	20.0		106	70 - 130			
Toluene	19	0.50	20.0		94.8	70 - 130			
Trichloroethene	19	0.50	20.0		94.0	70 - 130			
Surrogate: 1,2-Dichloroethane-d4	*19*		*25.0*		*77.7*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*19*		*25.0*		*76.0*	*70 - 130*			
Surrogate: Dibromofluoromethane	*19*		*25.0*		*75.7*	*70 - 130*			
Surrogate: Toluene-d8	*19*		*25.0*		*76.3*	*70 - 130*			

Ninyo & Moore	Project Number : RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400	Report To : Cem Atabek
Oakland , CA 94612	Reported : 07/09/2012

Volatile Organic Compounds by EPA 8260 - Quality Control (cont'd)

Analyte	Result (ug/L)	PQL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B2F0719 - MSVOAW_LL (continued)									
LCS Dup (B2F0719-BSD1)				Prepared: 6/27/2012 Analyzed: 6/27/2012					
1,1-Dichloroethene	19	0.50	20.0		95.4	70 - 130	2.64	20	
Benzene	19	0.50	20.0		96.0	70 - 130	1.24	20	
Chlorobenzene	19	0.50	20.0		93.0	70 - 130	1.71	20	
MTBE	21	0.50	20.0		106	70 - 130	0.142	20	
Toluene	19	0.50	20.0		93.2	70 - 130	1.65	20	
Trichloroethene	19	0.50	20.0		93.2	70 - 130	0.802	20	
Surrogate: 1,2-Dichloroethane-d4	*25*		*25.0*		*101*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene	*25*		*25.0*		*98.0*	*70 - 130*			
Surrogate: Dibromofluoromethane	*24*		*25.0*		*97.6*	*70 - 130*			
Surrogate: Toluene-d8	*25*		*25.0*		*98.6*	*70 - 130*			

Ninyo & Moore		Project Number :	RBF I-880/23rd Ave, 401971001
1956 Webster Street, Suite 400		Report To :	Cem Atabek
Oakland , CA 94612		Reported :	07/09/2012

Notes and Definitions

R	RPD value outside acceptance criteria. Calculation is based on raw values.
M2	Matrix spike recovery outside of acceptance limit due to possible matrix interference. The analytical batch was validated by the laboratory control sample.
ND	Analyte not detected at or above reporting limit
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA1	CA-NELAP (CDPH)
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)
TX1	TX-NELAP (TCEQ)

CHAIN OF CUSTODY RECORD

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Ave., Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

P.O.#: _____ Quote #: _____

Logged By: _____ Date: _____

NOTE: Please include your Quote No. to ensure proper pricing of your project.

FOR LABORATORY USE ONLY:

Method of Transport
☐ Client ☐ ATL
☐ FedEx ☐ OnTrac
☑ GSO
☐ Other: _____

2.6 Sample Condition Upon Receipt
1. CHILLED Y☑ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: Ninyo and Moore
Attn: Cem Atabek
Address: 1956 Webster St., #400
City Oakland State CA Zip Code 94612
TEL: 510-343-3000
FAX: 510-343-3001

Project Name: RBF I-880/23rd Ave Project #: 401971001
Sampler: (Printed Name) Jake Wilson (Signature) Jake Wilson

Relinquished by: (Signature and Printed Name) Jake Wilson	Date: 6/21/12	Time: 1542	Received by: (Signature and Printed Name) Jeff Siegfried	Date: 6/21/12	Time: 3:42p
Relinquished by: (Signature and Printed Name) Jeff Siegfried	Date: 6/21/12	Time: 4:17p	Received by: (Signature and Printed Name) GSO	Date: 6/21/12	Time: 4:02
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name) Mark	Date: 6/22/12	Time: 833

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Jake Wilson (Print Name) 6-21-12 (Date)
Jake Wilson (Signature)

Send Report To:
Attn: Cem Atabek
Co:
Addr:
City: State: Zip:

Bill To:
Attn: Cem Atabek
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:
Filter Metal Samples and preserve before analysis for groundwater samples

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time
	1202288-01	SB-53-1.5-2.0	6/21	1200
	2	SB-53-4.5-5.0		1210
	3	SB-53-9.5-10.0		1220
	4	SB-54-1.5-2.0		0920
	5	SB-54-4.5-5.0		0940
	6	SB-54-9.5-10.0		0945
	7	SB-53-GW		1230
	8	SB-54-GW		1040

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8021 (BTEX)	8015B (DRO) +MO	TITLE 22 / CAM 17 (6010 / 7000)	Silica Gel	SEDIMENT	SOLID	SOIL	DRINKING WATER	GROUND WATER	WASTEWATER	STORMWATER	AQUEOUS	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
X				X	X	X	X				X						5-day	1	T P		
↓				↓	↓	↓	↓				↓						↓				
													X					8			6 VOA's HCL AND 1 250mL Poly
													X					8			

QA/QC
RTNE ☐
CT ☐
Legal ☐
SWRCB ☐ Logcode ____
OTHER ____

- TAT starts 8 a.m. following day if samples received after 5 p.m.

TAT: ☐A= Overnight ≤ 24 hrs ☐B= Emergency Next workday ☐C= Critical 2 Workdays ☐D= Urgent 3 Workdays ☐E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=Hcl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Rev. 2010-0325

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

Rachelle Arada

From: Cem Atabek [catabek@ninyoandmoore.com]
Sent: Tuesday, June 26, 2012 2:12 PM
To: Rachelle Arada
Cc: Jake Wilson
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for the samples for project # 401971001, please revise the sample IDs for all samples ending in 4.5-5.0 to end in 5.0-5.5. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

Experience · Quality · Commitment

"Celebrating 25 Years"

-----Original Message-----
From: Rachelle Arada [mailto:Rachelle@atlglobal.com]
Sent: Wednesday, June 20, 2012 4:42 PM
To: Cem Atabek
Cc: Jake Wilson; customer.relations@atlglobal.com
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Okay.

From: Cem Atabek [mailto:catabek@ninyoandmoore.com]
Sent: Wednesday, June 20, 2012 4:30 PM
To: Rachelle Arada
Cc: Jake Wilson
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for groundwater samples SB-55-GW and SB-56-GW which should arrive there tomorrow morning, please remove and filter a portion of the groundwater from the 1-liter amber bottles for analysis of dissolved Title 22 Metals. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000

(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

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-----Original Message-----
From: Jake Wilson
Sent: Wednesday, June 20, 2012 3:59 PM
To: 'Rachelle Arada'
Cc: Cem Atabek
Subject: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle,

The COC's that you will be receiving tomorrow morning indicate that the samples need to be turned around in 7 days. I would greatly appreciate it if you could turn these around in 5 days so that we have adequate time to prepare this report for the client.

Thanks,

Jake

Jake Wilson
Staff Geologist
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000 (x 5203)
(510) 633-5646 (Fax)
(510) 277-6074 (Cell)
jwilson@ninyoandmoore.com

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Rachelle Arada

From: Cem Atabek [catabek@ninyoandmoore.com]
Sent: Wednesday, June 27, 2012 1:26 PM
To: Rachelle Arada
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for the samples for our project # 401971001, please report results for fuel oxygenates along with VOCs for all groundwater samples and report results for MtBE along with VOCs for all soil samples. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

Experience · Quality · Commitment

"Celebrating 25 Years"

-----Original Message-----
From: Rachelle Arada [mailto:Rachelle@atlglobal.com]
Sent: Wednesday, June 20, 2012 4:42 PM
To: Cem Atabek
Cc: Jake Wilson; customer.relations@atlglobal.com
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Okay.

From: Cem Atabek [mailto:catabek@ninyoandmoore.com]
Sent: Wednesday, June 20, 2012 4:30 PM
To: Rachelle Arada
Cc: Jake Wilson
Subject: RE: Change to COC for 401971001 (RBF I-880/23rd Ave.)

Hi Rachelle, for groundwater samples SB-55-GW and SB-56-GW which should arrive there tomorrow morning, please remove and filter a portion of the groundwater from the 1-liter amber bottles for analysis of dissolved Title 22 Metals. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000

Rachelle Arada

From: Cem Atabek [catabek@ninyoandmoore.com]
Sent: Friday, June 29, 2012 3:11 PM
To: Rachelle Arada
Subject: RE: Partial preliminary results for RBF I-880/23rd Ave, 401971001 (ATL# 1202288)

Hi Rachelle, please analyze sample SB-53-5.0-5.5 for STLC chromium on a 5-day TAT. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

Experience · Quality · Commitment

"Celebrating 25 Years"

-----Original Message-----
From: Rachelle Arada [mailto:Rachelle@atlglobal.com]
Sent: Friday, June 29, 2012 3:01 PM
To: Cem Atabek
Subject: Partial preliminary results for RBF I-880/23rd Ave, 401971001 (ATL# 1202288)

Hi Cem,

Attached are partial preliminary results pending TPHg water results.

Rachelle

From: Cem Atabek [mailto:catabek@ninyoandmoore.com]
Sent: Friday, June 29, 2012 12:45 PM
To: Rachelle Arada
Subject: preliminary results for 401971001

Hi Rachelle, can you send me the preliminary results for the second set of samples from our project # 401971001. Thanks

-Cem

Cem R. Atabek
Project Engineer
Ninyo & Moore
Geotechnical & Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612
(510) 343-3000
(510) 343-3001 (Fax)
catabek@ninyoandmoore.com

APPENDIX D

REVISED DATA TABLES FROM PSI & ADL REPORT

Table 1
GPS COORDINATES OF BORING LOCATIONS

Coordinates measured in degrees, minutes, seconds on 2/4/09

PSI Boring #	Latitude (degrees North)	Longitude (degrees west)
1	37, 46, 24.890	122, 13, 49.988
2	37, 46, 25.265	122, 13, 49.464
3	37, 46, 27.519	122, 13, 48.771
4	37, 46, 27.737	122, 13, 49.424
5	37, 46, 28.577	122, 13, 52.539
6	37, 46, 28.537	122, 13, 54.153
7	37, 46, 31.317	122, 14, 00.101
8	37, 46, 31.246	122, 13, 55.253
9	37, 46, 31.424	122, 14, 00.637
10	37, 46, 32.305	122, 14, 02, 007
11	37, 46, 32.154	122, 14, 02.508
12	37, 46, 32.756	122, 14, 03.535
13	37, 46, 33.422	122, 14, 04.738
14	37, 46, 34.318	122, 14, 06.217
15	37, 46, 34.622	122, 14, 06.916
16	37, 46, 36.242	122, 14, 08.677
17	37, 46, 36.480	122, 14, 08.829
18	37, 46, 40.252	122, 14, 08.947
19	37, 46, 40.716	122, 14, 09.792
20	37, 46, 39.525	122, 14, 10.971
21	37, 46, 39.605	122, 14, 11.228
22	37, 46, 41.869	122, 14, 11.729
23	37, 46, 42.576	122, 14, 11.860
24	37, 46, 43.452	122, 14, 12.126
25	37, 46, 44.051	122, 14, 12.126
26	37, 46, 44.896	122, 14, 12.292
27	37, 46, 45.445	122, 14, 12.402
28	37, 46, 45.353	122, 14, 10.624
29	37, 46, 32.126	122, 14, 09.801
30	37, 46, 32.821	122, 14, 10.494
31	37, 46, 33.240	122, 14, 10.676
32	37, 46, 31.682	122, 14, 09.529
33	37, 46, 30.891	122, 14, 06.998
34	37, 46, 30.706	122, 14, 06.454
35	37, 46, 29.345	122, 14, 03.344
36	37, 46, 28.737	122, 14, 02.822
37	37, 46, 29.583	122, 14, 01.452
38	37, 46, 31.444	122, 14, 10.072
39	37, 46, 30.839	122, 14, 09.972
40	37, 46, 30.152	122, 14, 09.897

Table 1
GPS COORDINATES OF BORING LOCATIONS

Coordinates measured in degrees, minutes, seconds on 2/4/09

PSI Boring #	Latitude (degrees North)	Longitude (degrees west)
41	37, 46, 29.346	122, 14, 10.447
42	37, 46, 25.796	122, 14, 04.784
43	37, 46, 25.324	122, 14, 05.251
44	37, 46, 25.097	122, 14, 04.149
45	37, 46, 25.585	122, 14, 03.673
46	37, 46, 26.506	122, 14, 02.802
47	37, 46, 27.416	122, 14, 01.893
48	37, 46, 27.900	122, 14, 00.435
49	37, 46, 28.409	122, 14, 00.940
50	37, 46, 28.654	122, 14, 00.714
51	37, 46, 28.842	122, 14, 00.693

ADL Boring #	Latitude (degrees North)	Longitude (degrees west)
ADL -1	37, 46, 29.982	122, 13, 56.378
ADL-2	37, 46, 30.705	122, 13, 59.430
ADL-3	37, 46, 32.860	122, 13, 57.415
ADL-4	37, 46, 32.997	122, 13, 58.292
ADL-5	37, 46, 32.372	122, 13, 58.954
ADL-6	37, 46, 35.184	122, 13, 55.116
ADL-7	37, 46, 27.900	122, 14, 03.127
ADL-8	37, 46, 28.904	122, 14, 01.893
ADL-9	37, 46, 44.141	122, 14, 12.443
ADL-10	37, 46, 47.436	122, 14, 15.206
ADL-11	37, 46, 43.552	122, 14, 14.532
ADL-12	37, 46, 42.747	122, 14, 14.541
ADL-13	37, 46, 40.310	122, 14, 12.113
ADL-14	37, 46, 33.737	122, 14, 10.889
ADL-15	37, 46, 34.250	122, 14, 10.816
ADL-16	37, 46, 33.675	122, 14, 12.138
ADL-17	37, 46, 33.043	122, 14, 11.990
ADL-18	37, 46, 27.752	122, 13, 56.658

TABLE 2
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
AERIAL DEPOSITED LEAD

Boring I.D.	Date	Sample Depth (ft bgs)	Sample Description	pH	Total Lead	Lead WET (STLC)	Lead WET-DI	Lead TCLP
Commercial Direct Exposure ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
Commerical/Industrial ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
				Analytical Results				
					mg/kg	**mg/L**	**mg/L**	**mg/L**
ADL-1	9/25/2008	0	Grab	-	519	11.5	0.124	1
ADL-1	9/25/2008	1	Grab	-	13.0	-	-	-
ADL-1	9/25/2008	2	Grab	-	14.0	-	-	-
ADL-1	9/25/2008	3	Grab	-	15.0	-	-	-
ADL-1	9/25/2008	4	Grab	-	7.40	-	-	-
ADL-2	9/25/2008	0	Grab	7.66	175	3.10	0.0600	-
ADL-2	9/25/2008	1	Grab	-	241	5.30	0.0400	1.2
ADL-2	9/25/2008	2	Grab	-	16.0	-	-	-
ADL-2	9/25/2008	3	Grab	-	12.0	-	-	-
ADL-2	9/25/2008	4	Grab	8.19	11.0	-	-	-
ADL-3	9/25/2008	0	Grab	7.03	**1050**	20.0	0.163	1.02
ADL-3	9/25/2008	1	Grab	-	**1100**	25.0	0.0100	1.18
ADL-3	9/25/2008	2	Grab	-	23.0	-	-	-
ADL-3	9/25/2008	3	Grab	-	12.0	-	-	-
ADL-4	9/25/2008	0	Grab	-	727	20.0	0.0160	<0.05
ADL-4	9/25/2008	1	Grab	-	64.0	0.500	0.0240	-
ADL-4	9/25/2008	2	Grab	-	31.0	-	-	-
ADL-4	9/25/2008	3	Grab	-	12.0	-	-	-
ADL-4	9/25/2008	4	Grab	-	9.10	-	-	-
ADL-5	9/25/2008	0	Grab	-	65.0	1.20	0.0270	-
ADL-5	9/25/2008	1	Grab	-	140	2.20	0.0190	-
ADL-5	9/25/2008	2	Grab	-	53.0	0.530	0.0900	-
ADL-5	9/25/2008	3	Grab	-	11.0	-	-	-
ADL-5	9/25/2008	4	Grab	-	9.94	-	-	-

TABLE 2
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
AERIAL DEPOSITED LEAD

Boring I.D.	Date	Sample Depth (ft bgs)	Sample Description	pH	Total Lead	Lead WET (STLC)	Lead WET-DI	Lead TCLP
Commercial Direct Exposure ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
Commerical/Industrial ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
				Analytical Results				
ADL-6	9/25/2008	0	Grab	-	32.0	-	-	-
ADL-6	9/25/2008	1	Grab	-	13.0	-	-	-
ADL-6	9/25/2008	2	Grab	-	31.0	-	-	-
ADL-6	9/25/2008	3	Grab	-	25.0	-	-	-
ADL-6	9/25/2008	4	Grab	-	168	3.20	0.0800	-
				-				
ADL-7	9/25/2008	0	Grab	-	150	1.70	0.0190	-
ADL-7	9/25/2008	1	Grab	-	171	3.20	0.0510	-
ADL-7	9/25/2008	2	Grab	-	117	0.310	0.0520	-
ADL-7	9/25/2008	3	Grab	-	57.0	1.40	0.0340	-
ADL-7	9/25/2008	4	Grab	-	74.0	7.20	0.0190	<0.05
				-				
ADL-8	9/25/2008	0	Grab	-	310	4.20	<0.010	-
ADL-8	9/25/2008	1	Grab	-	432	10.00	0.03	<0.05
ADL-8	9/26/2008	2	Grab	-	382	8.40	0.047	<0.05
ADL-8	9/26/2008	3	Grab	-	17.0	-	-	-
ADL-8	9/26/2008	4	Grab	-	12.0	-	-	-
				-				
ADL-9	9/26/2008	0	Grab	-	128	3.80	0.0120	-
ADL-9	9/26/2008	1	Grab	-	54.0	1.00	<0.010	-
ADL-9	9/26/2008	2	Grab	-	82.0	3.70	0.130	-
ADL-9	9/26/2008	3	Grab	-	11.0	-	-	-
ADL-9	9/26/2008	4	Grab	-	45.0	-	-	-
				-				
ADL-10	9/26/2008	0	Grab	-	440	7.40	0.0600	1
ADL-10	9/26/2008	1	Grab	-	65.0	1.00	0.0410	-
ADL-10	9/26/2008	2	Grab	-	144	1.50	0.160	-
ADL-10	9/26/2008	3	Grab	-	24.0	-	-	-
ADL-10	9/26/2008	4	Grab	-	60.0	0.730	0.0160	-

TABLE 2
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
AERIAL DEPOSITED LEAD

Boring I.D.	Date	Sample Depth (ft bgs)	Sample Description	pH	Total Lead	Lead WET (STLC)	Lead WET-DI	Lead TCLP
Commercial Direct Exposure ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
Commerical/Industrial ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
				Analytical Results				
ADL-11	9/26/2008	0	Grab	-	334	6.50	0.0140	1.18
ADL-11	9/26/2008	1	Grab	-	486	13.00	0.0250	1.12
ADL-11	9/26/2008	2	Grab	-	53.0	0.200	0.0190	-
ADL-11	9/26/2008	3	Grab	-	20.0	-	-	-
ADL-11	9/26/2008	4	Grab	-	13.0	-	-	-
ADL-12	9/26/2008	0	Grab	7.37	375	6.20	0.0200	<0.05
ADL-12	9/26/2008	1	Grab	6.86	263	5.00	0.0840	1.12
ADL-12	9/26/2008	2	Grab	-	24.0	-	-	-
ADL-12	9/26/2008	3	Grab	-	12.0	-	-	-
ADL-12	9/26/2008	4	Grab	-	11.0	-	-	-
ADL-13	9/26/2008	0	Grab	-	406	6.50	0.0800	1.23
ADL-13	9/26/2008	1	Grab	-	464	7.60	0.0210	<0.05
ADL-13	9/26/2008	2	Grab	-	30.0	-	-	-
ADL-13	9/26/2008	3	Grab	-	18.0	-	-	-
ADL-13	9/26/2008	4	Grab	-	13.0	-	-	-
ADL-14	10/7/2008	0	Grab	-	**4120**	-	-	5.46
ADL-14	10/7/2008	1	Grab	-	**910**	22.0	0.0520	<0.05
ADL-14	10/7/2008	2	Grab	-	25	-	-	-
ADL-14	10/7/2008	3	Grab	-	500	8.4	<0.010	1.13
ADL-15	10/7/2008	0	Grab	-	540	22.0	0.140	1.17
ADL-15	10/7/2008	1	Grab	-	200	3.00	<0.010	-
ADL-15	10/7/2008	2	Grab	-	420	5.00	<0.010	0.983
ADL-15	10/7/2008	3	Grab	-	350	12.0	<0.010	<0.05

TABLE 2
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
AERIAL DEPOSITED LEAD

Boring I.D.	Date	Sample Depth (ft bgs)	Sample Description	pH	Total Lead	Lead WET (STLC)	Lead WET-DI	Lead TCLP
Commercial Direct Exposure ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
Commerical/Industrial ESL (mg/kg)				**N/A**	**750**	**N/A**	**N/A**	**N/A**
				Analytical Results				
ADL-16	10/7/2008	0	Grab	-	350	5.80	<0.010	<0.05
ADL-16	10/7/2008	1	Grab	-	180	1.40	<0.010	-
ADL-16	10/7/2008	2	Grab	-	140	2.00	0.0700	-
ADL-16	10/7/2008	3	Grab	-	250	0.730	0.0600	-
ADL-16	10/7/2008	4	Grab	-	10	-	-	-
ADL-17	10/7/2008	0	Grab	-	320	3.00	<0.010	-
ADL-17	10/7/2008	1	Grab	-	300	2.30	<0.010	-
ADL-17	10/7/2008	2	Grab	-	30	-	-	-
ADL-17	10/7/2008	3	Grab	-	10	-	-	-
ADL-17	10/7/2008	4	Grab	-	10	-	-	-
ADL-18	10/7/2008	0	Grab	-	**820**	5.70	<0.010	<0.05
ADL-18	10/7/2008	1	Grab	-	160	0.600	<0.010	-
ADL-18	10/7/2008	2	Grab	-	23	-	-	-
ADL-18	10/7/2008	3	Grab	-	70	0.160	<0.010	-
ADL-19	10/7/2008	0	Grab	-	**780**	3.90	<0.010	-
ADL-19	10/7/2008	1	Grab	-	410	1.80	<0.010	-
ADL-19	10/7/2008	2	Grab	-	150	0.420	<0.010	-
ADL-19	10/7/2008	3	Grab	-	70	0.120	<0.010	-

Notes and Abbreviations:
ft bgs = feet below ground surface
Total lead analyzed using EPA Method 6010B
WET = Waste Extraction Test
WET DI = Waste Extraction Test - Distilled Water
STLC = soluble threshold limit concentration
TCLP = toxicity characteristic leaching procedure
mg/kg = milligrams per kilograms
mg/L = milligrams per liter
- = not analyzed
C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource
N/A = Not Applicable
BOLD = Total lead concentration in exceedance of Commercial Direct Exposure ESL
Shaded cell - indicates lead WET or TCLP concentration greater than or equal to 5 mg/L

TABLE 3
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Sample I.D.	Sample Collection Date	Sample Depth (ft bgs)	Analytes		
			TPH-D	TPH-MO	TPH-G
			Analytical Results (mg/kg)		
C/I Direct Exposure ESL (mg/kg)			**450**	**3,700**	**450**
Commerical/Industrial ESL (mg/kg)			**83**	**2,500**	**83**
SB-1 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-1 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-1 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-2 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-2 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-2 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-3 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-3 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-3 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-4 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-4 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-4 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-5 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-5 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-5 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-6 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-6 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-6 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-7 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-7 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-7 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-8 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-8 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-8 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-9 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-9 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-9 @ 5	October 2008	5.0	<1.0	<10	<0.5

TABLE 3
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Sample I.D.	Sample Collection Date	Sample Depth (ft bgs)	Analytes		
			TPH-D	TPH-MO	TPH-G
			Analytical Results (mg/kg)		
C/I Direct Exposure ESL (mg/kg)			450	3,700	450
SB-10 @ 0.5	October 2008	0.5	<1.0	**3,100**	<0.5
SB-10 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-10 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-11 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-11 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-11 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-12 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-12 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-12 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-13 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-13 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-13 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-14 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-14 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-14 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-15 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-15 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-15 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-16 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-16 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-16 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-17 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-17 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-17 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-18 @ 0.5	October 2008	0.5	--	--	--
SB-18 @ 2	October 2008	2.0	--	--	--
SB-18 @ 5	October 2008	5.0	--	--	--

TABLE 3
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Sample I.D.	Sample Collection Date	Sample Depth (ft bgs)	Analytes		
			TPH-D	TPH-MO	TPH-G
			Analytical Results (mg/kg)		
C/I Direct Exposure ESL (mg/kg)			450	3,700	450
SB-19 @ 0.5	October 2008	0.5	--	--	--
SB-19 @ 2	October 2008	2.0	--	--	--
SB-19 @ 5	October 2008	5.0	--	--	--
SB-20 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-20 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-20 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-21 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-21 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-21 @ 5	October 2008	5.0	<1.0	**160**	<0.5
SB-22 @ 0.5	October 2008	0.5	**150**	<10	**1,900**
SB-22 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-22 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-23 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-23 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-23 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-24 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-24 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-24 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-25 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-25 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-25 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-26 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-26 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-26 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-27 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-27 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-27 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-28 @ 0.5	October 2008	0.5	<1.0	**190**	<0.5
SB-28 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-28 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-29 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-29 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-29 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-30 @ 0.5	October 2008	0.5	<1.0	<10	<0.5

TABLE 3
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Sample I.D.	Sample Collection Date	Sample Depth (ft bgs)	Analytes		
			TPH-D	TPH-MO	TPH-G
			Analytical Results (mg/kg)		
C/I Direct Exposure ESL (mg/kg)			**450**	**3,700**	**450**
SB-30 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-30 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-31 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-31 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-31 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-32 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-32 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-32 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-33 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-33 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-33 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-34 @ 0.5	October 2008	0.5	**470**	<10	**0.6**
SB-34 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-34 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-35 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-35 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-35 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-36 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-36 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-36 @ 5	October 2008	5.0	<1.0	<10	<0.5

TABLE 3
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Sample I.D.	Sample Collection Date	Sample Depth (ft bgs)	Analytes		
			TPH-D	TPH-MO	TPH-G
			Analytical Results (mg/kg)		
C/I Direct Exposure ESL (mg/kg)			450	3,700	450
SB-37 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-37 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-37 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-38 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-38 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-38 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-39 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-39 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-39 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-40 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-40 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-40 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-41 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-41 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-41 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-42 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-42 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-42 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-43 @ 0.5	October 2008	0.5	<1.0	**70**	<0.5
SB-43 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-43 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-44 @ 0.5	October 2008	0.5	<1.0	**190**	<0.5
SB-44 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-44 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-45 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-45 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-45 @ 5	October 2008	5.0	<1.0	<10	<0.5

TABLE 3
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Sample I.D.	Sample Collection Date	Sample Depth (ft bgs)	Analytes		
			TPH-D	TPH-MO	TPH-G
			Analytical Results (mg/kg)		
C/I Direct Exposure ESL (mg/kg)			450	3,700	450
SB-46 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-46 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-46 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-47 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-47 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-47 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-48 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-48 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-48 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-49 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-49 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-49 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-50 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-50 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-50 @ 5	October 2008	5.0	<1.0	<10	<0.5
SB-51 @ 0.5	October 2008	0.5	<1.0	<10	<0.5
SB-51 @ 2	October 2008	2.0	<1.0	<10	<0.5
SB-51 @ 5	October 2008	5.0	<1.0	<10	<0.5

Notes and Abbreviations:
TPH-D= Total Petroleum Hydrocarbons as Diesel analyzed by EPA Method 8015B
TPH-MO = Total Petroleum Hydrocarbons as Motor Oil analyzed by EPA Method 8015B
TPH-G = Total Petroleum Hydrocarbons as Gasoline analyzed by EPA Method 8015B
mg/kg = milligrams per kilogram
< X = concentration not detected above laboratory reporting limits of X

C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource

Bold indicates concentrations detected greater than laboratory reporting limits

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	Other VOCs
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-1 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-1 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-1 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-2 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-2 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-2 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-3 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-3 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.01**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-3 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.03**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-4 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-4 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.04**	<0.002	<0.002	<0.002	**0.002**	<0.002	<0.002	<0.002	<0.002	<0.002
SB-4 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.07**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-5 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.11**	<0.002	<0.002	<0.002	<0.002	**0.0092**	<0.002	<0.002	<0.002	<0.002
SB-5 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-5 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-6 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0094**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-6 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-6 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0026**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-7 @ 0.5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-7 @ 2	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-7 @ 5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-8 @ 0.5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-8 @ 2	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-8 @ 5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-9 @ 0.5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-9 @ 2	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	Other VOCs
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-9 @ 5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-10 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-10 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-10 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-11 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-11 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-11 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-12 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-12 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0042**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-12 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.006**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-13 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-13 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-13 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0031**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-14 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-14 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-14 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-15 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-15 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-15 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-16 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-16 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-16 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-17 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	Other VOCs
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-17 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-17 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-18 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-18 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-18 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-19 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-19 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-19 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.05**	<0.002	<0.002	<0.002	**0.01**	<0.002	<0.002	<0.002	<0.002
SB-20 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-20 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-20 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0039**	**0.06**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-21 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-21 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-21 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-22 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	**0.06**	<0.002	<0.002	<0.002	<0.002	**0.0042**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-22 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-22 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-23 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-23 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-23 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-24 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.01**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-24 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-24 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0029**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	Other VOCs
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-25 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-25 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-25 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-26 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.02**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-26 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.02**	<0.002	<0.002	<0.002	**0.0036**	**0.004**	<0.002	<0.002	<0.002	<0.002
SB-26 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.03**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-27 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0053**	<0.002	<0.002	<0.002	**0.0025**	<0.002	<0.002	<0.002	<0.002	<0.002
SB-27 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0031**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-27 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-28 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-28 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-28 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-29 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-29 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-29 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-30 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-30 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-30 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-31 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	**0.002**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-31 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-31 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-32 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-32 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-32 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	Other VOCs
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-33 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-33 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-33 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-34 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.06**	<0.002	<0.002	<0.002	**0.0069**	<0.002	<0.002	<0.002	<0.002
SB-34 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-34 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-35 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-35 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-35 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-36 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-36 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-36 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-37 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-37 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-37 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-38 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-38 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-38 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-39 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0027**	<0.002	<0.002	<0.002	<0.002
SB-39 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.003**	<0.002	<0.002	<0.002	<0.002
SB-39 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.03**	<0.002	<0.002	<0.002	<0.002	**0.002**	<0.002	<0.002	<0.002	<0.002
SB-40 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.008**	<0.002	<0.002	<0.002	<0.002
SB-40 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0033**	<0.002	<0.002	<0.002	<0.002
SB-40 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0077**	<0.002	<0.002	<0.002	<0.002

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	Other VOCs
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-41 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-41 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-41 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-42 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-42 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-42 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-43 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-43 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-43 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-44 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.01**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-44 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-44 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-45 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-45 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-45 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-46 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-46 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-46 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-47 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-47 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-47 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-48 @ 0.5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-48 @ 2	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0049**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Ethylbenzene	Benzene	Toluene	Total Xylenes	Methyl-tert-butyl-ether	n-Propylbenzene	n-Butylbenzene	1,3,5-Trimethylbenzene	Tetrachloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Hexanone	Acetone	Chloroform	Vinyl chloride	Dichloromethane	Carbon disulfide	2-Butanone	Trichloroethene	Naphthalene	Isopropylbenzene	**Other VOCs**
C/I Direct Exposure ESL (mg/kg)	**5**	**0.27**	**210**	**100**	**65**	**NA**	**NA**	**NA**	**0.95**	**22**	**34**	**NA**	**11,000**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**4.1**	**2.8**	**NA**	
Commerical/Industrial ESL (mg/kg)	**3.3**	**0.044**	**2.9**	**2.3**	**0.023**	**NA**	**NA**	**NA**	**0.7**	**0.19**	**0.67**	**NA**	**0.5**	**1.5**	**0.047**	**NA**	**NA**	**NA**	**0.46**	**2.8**	**NA**	
Sample ID	**Analytical Results (mg/kg)**																					
SB-48 @ 5	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0093**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SB-49 @ 0.5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-49 @ 2	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-49 @ 5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-50 @ 0.5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-50 @ 2	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-50 @ 5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-51 @ 0.5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-51 @ 2	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-51 @ 5	<0.001	<0.001	<0.001	<0.001	<0.0005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations:
C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource
<X = concentration not detected above laboratory reporting limit of X
-- = not analyzed
Bold indicates exceedence of laboratory detection limit
mg/kg = milligrams per kilogram
NA = Not available

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)																
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																	
SB-1 @ 0.5	October 2008	0.5	<0.5	**37**	**25**	**22**	**51**	--	--	--	--	--	--	--	--	--	--	--	--
SB-1 @ 2	October 2008	2.0	<0.5	**42**	**50**	**5.5**	**4.5**	--	--	--	--	--	--	--	--	--	--	--	--
SB-1 @ 5	October 2008	5.0	<0.5	**56**	**24**	**5.6**	**33**	--	--	--	--	--	--	--	--	--	--	--	--
SB-2 @ 0.5	October 2008	0.5	<0.5	**43**	**33**	**27**	**43**	--	--	--	--	--	--	--	--	--	--	--	--
SB-2 @ 2	October 2008	2.0	<0.5	**57**	**20**	**4.6**	**37**	--	--	--	--	--	--	--	--	--	--	--	--
SB-2 @ 5	October 2008	5.0	<0.5	**40**	**174**	**7.4**	**48**	--	--	--	--	--	--	--	--	--	--	--	--
SB-3 @ 0.5	October 2008	0.5	<0.5	**26**	**23**	**19**	**89**	--	--	--	--	--	--	--	--	--	--	--	--
SB-3 @ 2	October 2008	2.0	<0.5	**35**	**30**	**12**	**50**	--	--	--	--	--	--	--	--	--	--	--	--
SB-3 @ 5	October 2008	5.0	<0.5	**38**	**35**	**30**	**48**	--	--	--	--	--	--	--	--	--	--	--	--
SB-4 @ 0.5	October 2008	0.5	<0.5	**28**	**21**	**37**	**72**	--	--	--	--	--	--	--	--	--	--	--	--
SB-4 @ 2	October 2008	2.0	<0.5	**40**	**21**	**7.7**	**38**	--	--	--	--	--	--	--	--	--	--	--	--
SB-4 @ 5	October 2008	5.0	<0.5	**42**	**22**	**9.3**	**41**	--	--	--	--	--	--	--	--	--	--	--	--
SB-5 @ 0.5	October 2008	0.5	**0.7**	**33**	**5.6**	**311**	**137**	--	--	--	--	--	--	--	--	--	--	--	--
SB-5 @ 2	October 2008	2.0	<0.5	**48**	**43**	**7.2**	**38**	--	--	--	--	--	--	--	--	--	--	--	--
SB-5 @ 5	October 2008	5.0	<0.5	**44**	**47**	**4.9**	**42**	--	--	--	--	--	--	--	--	--	--	--	--
SB-6 @ 0.5	October 2008	0.5	**1.1**	**52**	**<4**	**136**	**187**	--	--	--	--	--	--	--	--	--	--	--	--
SB-6 @ 2	October 2008	2.0	<0.5	**40**	**23**	**4.4**	**31**	--	--	--	--	--	--	--	--	--	--	--	--
SB-6 @ 5	October 2008	5.0	<0.5	**88**	**118**	**6.4**	**57**	--	--	--	--	--	--	--	--	--	--	--	--
SB-7 @ 0.5	October 2008	0.5	<0.5	**67**	**84**	**16**	**220**	--	--	--	--	--	--	--	--	--	--	--	--
SB-7 @ 2	October 2008	2.0	<0.5	**67**	**73**	**15**	**71**	--	--	--	--	--	--	--	--	--	--	--	--
SB-7 @ 5	October 2008	5.0	<0.5	**56**	**59**	**14**	**55**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-8 @ 0.5	October 2008	0.5	<0.5	**28**	**36**	**4.1**	**37**	--	--	--	--	--	--	--	--	--	--	--	--
SB-8 @ 2	October 2008	2.0	<0.5	**50**	**52**	**10**	**40**	--	--	--	--	--	--	--	--	--	--	--	--
SB-8 @ 5	October 2008	5.0	<0.5	**47**	**60**	**4.7**	**40**	--	--	--	--	--	--	--	--	--	--	--	--
SB-9 @ 0.5	October 2008	0.5	<0.5	**62**	**100**	**7.2**	**51**	--	--	--	--	--	--	--	--	--	--	--	--
SB-9 @ 2	October 2008	2.0	<0.5	**9.2**	**8.3**	**5.8**	**67**	--	--	--	--	--	--	--	--	--	--	--	--
SB-9 @ 5	October 2008	5.0	<0.5	**72**	**71**	**6.2**	**44**	--	--	--	--	--	--	--	--	--	--	--	--
SB-10 @ 0.5	October 2008	0.5	<0.5	**50**	**51**	**8.9**	**54**	<6	<2	104	<0.3	**13**	**28**	**0.045**	<5	<10	<1	<10	**30**
SB-10 @ 2	October 2008	2.0	<0.5	**65**	**72**	**6.8**	**47**	<6	**3.9**	**135**	**0.38**	**5.2**	**21**	**0.12**	<5	<10	<1	<10	**39**
SB-10 @ 5	October 2008	5.0	<0.5	**73**	**91**	**6.2**	**44**	<6	**3.4**	**94**	<0.3	**5.8**	**19**	**0.26**	<5	<10	<1	<10	**36**
SB-11 @ 0.5	October 2008	0.5	<0.5	**43**	**33**	**7.8**	**40**	<6	<2	**51**	<0.3	**8.2**	**25**	**0.23**	**10**	<10	<1	<10	**23**
SB-11 @ 2	October 2008	2.0	<0.5	**58**	**57**	**64**	**50**	<6	**3**	**114**	**0.45**	**7.2**	**23**	**0.096**	<5	<10	<1	<10	**35**
SB-11 @ 5	October 2008	5.0	<0.5	**71**	**150**	**14**	**46**	<6	**5.4**	**476**	<0.3	**21**	**47**	**0.16**	<5	<10	<1	<10	**21**
SB-12 @ 0.5	October 2008	0.5	<0.5	**36**	**48**	**22**	**46**	<6	<2	**89**	<0.3	**28**	**10**	**0.028**	**8.6**	<10	<1	<10	**19**
SB-12 @ 2	October 2008	2.0	<0.5	**55**	**53**	**6.4**	**39**	<6	**2.1**	**111**	<0.3	**5**	**13**	**0.13**	<5	<10	<1	<10	**32**
SB-12 @ 5	October 2008	5.0	<0.5	**50**	**91**	**6.5**	**42**	<6	**4.9**	**138**	<0.3	**17**	**12**	**0.15**	<5	<10	<1	<10	**27**
SB-13 @ 0.5	October 2008	0.5	<0.5	**22**	**31**	**12**	**41**	--	--	--	--	--	--	--	--	--	--	--	--
SB-13 @ 2	October 2008	2.0	<0.5	**60**	**60**	**7.7**	**49**	--	--	--	--	--	--	--	--	--	--	--	--
SB-13 @ 5	October 2008	5.0	<0.5	**80**	**78**	**6**	**50**	--	--	--	--	--	--	--	--	--	--	--	--
SB-14 @ 0.5	October 2008	0.5	<0.5	**58**	**135**	**74**	**102**	--	--	--	--	--	--	--	--	--	--	--	--
SB-14 @ 2	October 2008	2.0	<0.5	**68**	**61**	**9**	**56**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-14 @ 5	October 2008	5.0	<0.5	**73**	**91**	**6.5**	**45**	--	--	--	--	--	--	--	--	--	--	--	--
SB-15 @ 0.5	October 2008	0.5	<0.5	**56**	**45**	**50**	**73**	--	--	--	--	--	--	--	--	--	--	--	--
SB-15 @ 2	October 2008	2.0	<0.5	**57**	**54**	**18**	**54**	--	--	--	--	--	--	--	--	--	--	--	--
SB-15 @ 5	October 2008	5.0	<0.5	**55**	**51**	**13**	**49**	--	--	--	--	--	--	--	--	--	--	--	--
SB-16 @ 0.5	October 2008	0.5	<0.5	**57**	**89**	**52**	**132**	<6	**6**	**316**	**0.48**	**30**	**51**	**0.12**	<5	<10	<1	<10	**28**
SB-16 @ 2	October 2008	2.0	<0.5	**49**	**63**	**6.9**	**47**	<6	**3.2**	**149**	<0.3	**16**	**19**	**0.071**	<5	<10	<1	<10	**30**
SB-16 @ 5	October 2008	5.0	<0.5	**57**	**53**	**4.4**	**47**	<6	<2	**86**	<0.3	**7.4**	**16**	**0.077**	<5	<10	<1	<10	**30**
SB-17 @ 0.5	October 2008	0.5	<0.5	**53**	**62**	**9.4**	**53**	<6	**6.1**	**122**	**0.51**	**7.5**	**26**	**0.068**	<5	<10	<1	<10	**41**
SB-17 @ 2	October 2008	2.0	<0.5	**52**	**74**	**8.2**	**44**	<6	**4.7**	**153**	**0.41**	**23**	**20**	**0.054**	<5	<10	<1	<10	**32**
SB-17 @ 5	October 2008	5.0	<0.5	**58**	**64**	**4.8**	**48**	<6	**2.2**	**85**	<0.4	**6.8**	**18**	**0.12**	<5	<10	<1	<10	**34**
SB-18 @ 0.5	October 2008	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-18 @ 2	October 2008	2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-18 @ 5	October 2008	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-19 @ 0.5	October 2008	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-19 @ 2	October 2008	2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-19 @ 5	October 2008	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-20 @ 0.5	October 2008	0.5	<0.5	**64**	**90**	**8.1**	**60**	<6	**3.7**	**112**	**0.44**	**13**	**28**	**0.067**	<5	<10	<1	<10	**35**
SB-20 @ 2	October 2008	2.0	<0.5	**55**	**76**	**24**	**71**	<6	**6.6**	**211**	**0.51**	**12**	**33**	**0.083**	<5	<10	<1	<10	**35**
SB-20 @ 5	October 2008	5.0	**0.65**	**37**	**82**	**296**	**290**	<6	**18**	**271**	<0.3	**16**	**68**	**0.16**	<5	<10	<1	<10	**33**

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-21 @ 0.5	October 2008	0.5	<0.5	**69**	**87**	**12**	**54**	<6	**4.8**	**165**	**0.51**	**14**	**26**	**0.085**	<5	<10	<1	<10	**41**
SB-21 @ 2	October 2008	2.0	<0.5	**73**	**106**	**48**	**101**	<6	**4.7**	**153**	**0.46**	**10**	**49**	**0.13**	<5	<10	<1	<10	**39**
SB-21 @ 5	October 2008	5.0	<0.5	**31**	**46**	**190**	**212**	<6	**7.9**	**135**	<0.3	**8.5**	**58**	**0.25**	<5	<10	<1	<10	**29**
SB-22 @ 0.5	October 2008	0.5	<0.5	**31**	**24**	**31**	**38**	--	--	--	--	--	--	--	--	--	--	--	--
SB-22 @ 2	October 2008	2.0	<0.5	**75**	**110**	**11**	**58**	--	--	--	--	--	--	--	--	--	--	--	--
SB-22 @ 5	October 2008	5.0	<0.5	**65**	**114**	**9.3**	**73**	--	--	--	--	--	--	--	--	--	--	--	--
SB-23 @ 0.5	October 2008	0.5	<0.5	**83**	**145**	**10**	**66**	--	--	--	--	--	--	--	--	--	--	--	--
SB-23 @ 2	October 2008	2.0	<0.5	**74**	**122**	**9.2**	**72**	--	--	--	--	--	--	--	--	--	--	--	--
SB-23 @ 5	October 2008	5.0	<0.5	**92**	**148**	**7.2**	**57**	--	--	--	--	--	--	--	--	--	--	--	--
SB-24 @ 0.5	October 2008	0.5	<0.5	**48**	<0.4	**3.9**	**35**	--	--	--	--	--	--	--	--	--	--	--	--
SB-24 @ 2	October 2008	2.0	<0.5	**59**	**82**	**6.8**	**50**	--	--	--	--	--	--	--	--	--	--	--	--
SB-24 @ 5	October 2008	5.0	<0.5	**96**	**166**	**7.7**	**60**	--	--	--	--	--	--	--	--	--	--	--	--
SB-25 @ 0.5	October 2008	0.5	<0.5	**77**	**100**	**11**	**63**	--	--	--	--	--	--	--	--	--	--	--	--
SB-25 @ 2	October 2008	2.0	<0.5	**61**	**99**	**8.9**	**59**	--	--	--	--	--	--	--	--	--	--	--	--
SB-25 @ 5	October 2008	5.0	<0.5	**71**	**127**	**9.3**	**52**	--	--	--	--	--	--	--	--	--	--	--	--
SB-26 @ 0.5	October 2008	0.5	<0.5	**38**	**18**	**3.6**	**30**	--	--	--	--	--	--	--	--	--	--	--	--
SB-26 @ 2	October 2008	2.0	<0.5	**79**	**113**	**8.7**	**54**	--	--	--	--	--	--	--	--	--	--	--	--
SB-26 @ 5	October 2008	5.0	<0.5	**80**	**115**	**11**	**82**	--	--	--	--	--	--	--	--	--	--	--	--
SB-27 @ 0.5	October 2008	0.5	<0.5	**86**	**139**	**8.1**	**64**	--	--	--	--	--	--	--	--	--	--	--	--
SB-27 @ 2	October 2008	2.0	<0.5	**86**	**139**	**9.5**	**63**	--	--	--	--	--	--	--	--	--	--	--	--
SB-27 @ 5	October 2008	5.0	<0.5	**84**	**142**	**9.8**	**89**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-28 @ 0.5	October 2008	0.5	<0.5	**35**	**29**	**35**	**101**	--	--	--	--	--	--	--	--	--	--	--	--
SB-28 @ 2	October 2008	2.0	<0.5	**77**	**103**	**10**	**78**	--	--	--	--	--	--	--	--	--	--	--	--
SB-28 @ 5	October 2008	5.0	<0.5	**96**	**191**	**10**	**67**	--	--	--	--	--	--	--	--	--	--	--	--
SB-29 @ 0.5	October 2008	0.5	<0.5	**52**	**37**	**5.1**	**36**	--	--	--	--	--	--	--	--	--	--	--	--
SB-29 @ 2	October 2008	2.0	<0.5	**56**	**43**	**5.5**	**39**	--	--	--	--	--	--	--	--	--	--	--	--
SB-29 @ 5	October 2008	5.0	<0.5	**46**	**86**	**5.4**	**49**	--	--	--	--	--	--	--	--	--	--	--	--
SB-30 @ 0.5	October 2008	0.5	**1.8**	**39**	**32**	**1050**	**372**	--	--	--	--	--	--	--	--	--	--	--	--
SB-30 @ 2	October 2008	2.0	<0.5	**23**	**29**	**20**	**52**	--	--	--	--	--	--	--	--	--	--	--	--
SB-30 @ 5	October 2008	5.0	<0.5	**62**	**71**	**7.8**	**49**	--	--	--	--	--	--	--	--	--	--	--	--
SB-31 @ 0.5	October 2008	0.5	**0.7**	**64**	**64**	**115**	**290**	--	--	--	--	--	--	--	--	--	--	--	--
SB-31 @ 2	October 2008	2.0	<0.5	**26**	**16**	**322**	**135**	--	--	--	--	--	--	--	--	--	--	--	--
SB-31 @ 5	October 2008	5.0	<0.5	**47**	**50**	**6.7**	**40**	--	--	--	--	--	--	--	--	--	--	--	--
SB-32 @ 0.5	October 2008	0.5	<0.5	**52**	**99**	**6.2**	**40**	<6	<2	**77**	<0.3	**15**	**16**	**0.18**	<5	<10	<1	<10	**25**
SB-32 @ 2	October 2008	2.0	<0.5	**56**	**155**	**7.5**	**46**	<6	**2.5**	**242**	<0.3	**16**	**19**	**0.24**	<5	<10	<1	<10	**22**
SB-32 @ 5	October 2008	5.0	<0.5	**39**	**68**	**5.3**	**36**	<6	**3**	**73**	<0.3	**9.5**	**15**	**0.18**	<5	<10	<1	<10	**22**
SB-33 @ 0.5	October 2008	0.5	<0.5	**57**	**72**	**4.6**	**45**	--	--	--	--	--	--	--	--	--	--	--	--
SB-33 @ 2	October 2008	2.0	<0.5	**72**	**86**	**6**	**46**	--	--	--	--	--	--	--	--	--	--	--	--
SB-33 @ 5	October 2008	5.0	<0.5	**57**	**114**	**5.4**	**43**	--	--	--	--	--	--	--	--	--	--	--	--
SB-34 @ 0.5	October 2008	0.5	**1**	**36**	**22**	**12**	**354**	--	--	--	--	--	--	--	--	--	--	--	--
SB-34 @ 2	October 2008	2.0	<0.5	**54**	**60**	**6**	**45**	--	--	--	--	--	--	--	--	--	--	--	--
SB-34 @ 5	October 2008	5.0	<0.5	**88**	**77**	**5.2**	**41**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-35 @ 0.5	October 2008	0.5	<0.5	**43**	**41**	**19**	**56**	--	--	--	--	--	--	--	--	--	--	--	--
SB-35 @ 2	October 2008	2.0	<0.5	**59**	**76**	**7.2**	**51**	--	--	--	--	--	--	--	--	--	--	--	--
SB-35 @ 5	October 2008	5.0	<0.5	**67**	**68**	**5.3**	**47**	--	--	--	--	--	--	--	--	--	--	--	--
SB-36 @ 0.5	October 2008	0.5	<0.5	**39**	**60**	**20**	**132**	--	--	--	--	--	--	--	--	--	--	--	--
SB-36 @ 2	October 2008	2.0	<0.5	**55**	**52**	**5.4**	**43**	--	--	--	--	--	--	--	--	--	--	--	--
SB-36 @ 5	October 2008	5.0	<0.5	**72**	**76**	**4.9**	**42**	--	--	--	--	--	--	--	--	--	--	--	--
SB-37 @ 0.5	October 2008	0.5	<0.5	**48**	**48**	**123**	**125**	--	--	--	--	--	--	--	--	--	--	--	--
SB-37 @ 2	October 2008	2.0	<0.5	**40**	**53**	**52**	**100**	--	--	--	--	--	--	--	--	--	--	--	--
SB-37 @ 5	October 2008	5.0	<0.5	**55**	**94**	**6.7**	**42**	--	--	--	--	--	--	--	--	--	--	--	--
SB-38 @ 0.5	October 2008	0.5	<0.5	**78**	**141**	**9.2**	**69**	<6	**6.3**	**303**	<0.3	**20**	**33**	**0.6**	<5	<10	<1	<10	**35**
SB-38 @ 2	October 2008	2.0	<0.5	**86**	**118**	**7.8**	**62**	<6	**2.9**	**99**	<0.3	**15**	**28**	**0.2**	<5	<10	<1	<10	**48**
SB-38 @ 5	October 2008	5.0	<0.5	**76**	**115**	**6.5**	**60**	<6	**3.8**	**26**	<0.3	**18**	**27**	**0.8**	<5	<10	<1	<10	**38**
SB-39 @ 0.5	October 2008	0.5	<0.5	**70**	**71**	**5.5**	**48**	<6	<2	**239**	<0.3	**7.3**	**17**	**0.17**	<5	<10	<1	<10	**25**
SB-39 @ 2	October 2008	2.0	<0.5	**66**	**92**	**8**	**41**	<6	**3.2**	**214**	**0.31**	**16**	**17**	**0.14**	<5	<10	<1	<10	**33**
SB-39 @ 5	October 2008	5.0	<0.5	**52**	**47**	**7.1**	**34**	<6	**2.2**	**182**	**0.41**	**10**	**18**	**0.07**	<5	<10	<1	<10	**35**
SB-40 @ 0.5	October 2008	0.5	<0.5	**67**	**146**	**6.5**	**54**	<6	**2.9**	**204**	<0.3	**13**	**23**	**0.18**	<5	<10	<1	<10	**36**
SB-40 @ 2	October 2008	2.0	<0.5	**61**	**78**	**6.6**	**44**	<6	**3**	**220**	<0.3	**12**	**17**	**0.1**	<5	<10	<1	<10	**30**
SB-40 @ 5	October 2008	5.0	<0.5	**43**	**41**	**5.5**	**32**	<6	<2	**185**	<0.3	**6.3**	**18**	**0.076**	<5	<10	<1	<10	**27**
SB-41 @ 0.5	October 2008	0.5	<0.5	**45**	**53**	**10**	**50**	--	--	--	--	--	--	--	--	--	--	--	--
SB-41 @ 2	October 2008	2.0	<0.5	**46**	**54**	**5.2**	**49**	--	--	--	--	--	--	--	--	--	--	--	--
SB-41 @ 5	October 2008	5.0	<0.5	**52**	**72**	**5.3**	**45**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-42 @ 0.5	October 2008	0.5	<0.5	**58**	**65**	**8.2**	**46**	<6	**5.4**	**168**	**0.61**	**11**	**24**	**0.049**	<5	<10	<1	<10	**44**
SB-42 @ 2	October 2008	2.0	<0.5	**29**	**50**	**186**	**106**	<6	**4.5**	**138**	<0.3	**23**	**22**	**0.19**	<5	<10	<1	<10	**22**
SB-42 @ 5	October 2008	5.0	<0.5	**47**	**49**	**6.7**	**38**	<6	**3.8**	**136**	**0.48**	**6.6**	**19**	**0.062**	<5	<10	<1	<10	**41**
SB-43 @ 0.5	October 2008	0.5	<0.5	**44**	**57**	**206**	**224**	<6	**11**	**234**	**0.32**	**10**	**38**	**0.16**	<5	<10	<1	<10	**34**
SB-43 @ 2	October 2008	2.0	<0.5	**48**	**70**	**283**	**172**	<6	**7.3**	**218**	**0.36**	**11**	**41**	**0.18**	<5	<10	<1	<10	**32**
SB-43 @ 5	October 2008	5.0	<0.5	**45**	**58**	**5.9**	**35**	<6	**4.1**	**121**	**0.44**	**45**	**8.5**	**0.064**	<5	<10	<1	<10	**32**
SB-44 @ 0.5	October 2008	0.5	<0.5	**38**	**43**	**4.2**	**28**	<6	<2	**110**	<0.3	**6.7**	**14**	**0.063**	<5	<10	<1	<10	**29**
SB-44 @ 2	October 2008	2.0	<0.5	**54**	**74**	**7.2**	**38**	<6	**3.4**	**73**	**0.37**	**7.6**	**20**	**0.078**	<5	<10	<1	<10	**36**
SB-44 @ 5	October 2008	5.0	<0.5	**53**	**72**	**5.1**	**42**	<6	<2	**79**	<0.3	**8.6**	**16**	**0.038**	<5	<10	<1	<10	**26**
SB-45 @ 0.5	October 2008	0.5	<0.5	**56**	**80**	**5.6**	**39**	<6	**2.9**	**126**	**0.47**	**11**	**21**	**0.12**	<5	<10	<1	<10	**32**
SB-45 @ 2	October 2008	2.0	<0.5	**60**	**75**	**6.1**	**44**	<6	**4.9**	**201**	**0.54**	**7.1**	**20**	**0.18**	<5	<10	<1	<10	**46**
SB-45 @ 5	October 2008	5.0	<0.5	**49**	**66**	**4.4**	**40**	<6	<2	**90**	<0.3	**6.2**	**16**	**0.089**	<5	<10	<1	<10	**24**
SB-46 @ 0.5	October 2008	0.5	<0.5	**8.9**	**12**	**5.4**	**88**	--	--	--	--	--	--	--	--	--	--	--	--
SB-46 @ 2	October 2008	2.0	<0.5	**71**	**97**	**7.9**	**41**	--	--	--	--	--	--	--	--	--	--	--	--
SB-46 @ 5	October 2008	5.0	<0.5	**62**	**119**	**6.2**	**51**	--	--	--	--	--	--	--	--	--	--	--	--
SB-47 @ 0.5	October 2008	0.5	<0.5	**58**	**67**	**72**	**49**	--	--	--	--	--	--	--	--	--	--	--	--
SB-47 @ 2	October 2008	2.0	<0.5	**45**	**47**	**4.2**	**32**	--	--	--	--	--	--	--	--	--	--	--	--
SB-47 @ 5	October 2008	5.0	<0.5	**54**	**88**	**5.2**	**46**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
METALS

				Analyte (mg/kg)															
Sample ID	**Sample Collection Date**	**Sample Depth**	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
C/I Direct Exposure ESL (mg/kg)			**7.4**	**310,000***	**3,400**	**750**	**610,000**	**82**	**1.6**	**34,000**	**390**	**1,900**	**82,000**	**18**	**1,000**	**1,000**	**1,000**	**16**	**200**
Commerical/Industrial ESL (mg/kg)			**7.4**	**750***	**150**	**750**	**600**	**40**	**1.6**	**1,500**	**8**	**80**	**230**	**10**	**40**	**10**	**40**	**16**	**200**
			Analytical Results (mg/kg)																
SB-48 @ 0.5	October 2008	0.5	**1.6**	**3.5**	**13**	**7**	**492**	--	--	--	--	--	--	--	--	--	--	--	--
SB-48 @ 2	October 2008	2.0	<0.5	**55**	**79**	**6**	**46**	--	--	--	--	--	--	--	--	--	--	--	--
SB-48 @ 5	October 2008	5.0	<0.5	**66**	**85**	**5**	**51**	--	--	--	--	--	--	--	--	--	--	--	--
SB-49 @ 0.5	October 2008	0.5	<0.5	**58**	**142**	**13**	**50**	--	--	--	--	--	--	--	--	--	--	--	--
SB-49 @ 2	October 2008	2.0	<0.5	**60**	**76**	**4.3**	**41**	--	--	--	--	--	--	--	--	--	--	--	--
SB-49 @ 5	October 2008	5.0	<0.5	**58**	**66**	**7.5**	**47**	--	--	--	--	--	--	--	--	--	--	--	--
SB-50 @ 0.5	October 2008	0.5	<0.5	**49**	**51**	**6**	**35**	--	--	--	--	--	--	--	--	--	--	--	--
SB-50 @ 2	October 2008	2.0	<0.5	**58**	**62**	**6.8**	**41**	--	--	--	--	--	--	--	--	--	--	--	--
SB-50 @ 5	October 2008	5.0	<0.5	**48**	**54**	**3.8**	**36**	--	--	--	--	--	--	--	--	--	--	--	--
SB-51 @ 0.5	October 2008	0.5	<0.5	**51**	**45**	**4.7**	**28**	--	--	--	--	--	--	--	--	--	--	--	--
SB-51 @ 2	October 2008	2.0	<0.5	**53**	**67**	**5.7**	**42**	--	--	--	--	--	--	--	--	--	--	--	--
SB-51 @ 5	October 2008	5.0	<0.5	**62**	**95**	**5.6**	**44**	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations:

mg/kg = milligrams per kilogram

C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resource

-- = not analyzed

Bold indicates exceedence of laboratory detection limit

Shading indicates exceedence of ESL

* indicates Chromium III ESL used as there is no ESL established for total chromium

TABLE 6
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
SEMI-VOLATILE ORGANIC COMPOUNDS

Analyte	Sample ID									Commerical/ Industrial ESL (mg/kg)	C/I Direct Exposure ESL (mg/kg)
	SB-17 @ 0.5	SB-17 @ 2	SB-17 @ 5	SB-20 @ 0.5	SB-20 @ 2	SB-20 @ 5	SB-21 @ 0.5	SB-21 @ 2	SB-21 @ 5		
	Analytical Result (mg/kg)										
bis(2-ethylhexyl)phthalate	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	**0.68**	**120**	**120**
Butylbenzylphthalate	<0.33	<0.33	<0.33	<0.33	<0.33	**0.47**	<0.33	<0.33	<0.33	**NA**	**NA**
Other SVOCs	ND	ND	ND	ND	ND	ND	ND	ND	ND	**NA**	**NA**

Notes and Abbreviations:
SVOC = Semi-volatile organic compounds analyzed by EPA Method 8270B
C/I Direct Exposure ESLs = SFRWQCB Environmental Screening Levels - Table K-2 Commercial/Industrial Direct Exposure
Commercial/Industrial ESLs = SFRWQCB Environmental Screening Levels - Table A-2 Commercial/Industrial Land Use where groundwater is a current or potential drinking water resour
mg/kg = milligrams per kilogram
<X = concentration not detected above laboratory reporting limit of X
ND = not detected (laboratory detection limits vary, see lab report)
Bold indicates exceedence of laboratory detection limit
NA = not available or not applicable

TABLE 7
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS AS
DIESEL, MOTOR OIL, AND GASOLINE

Boring I.D.	Sample Collection Date	Analytes		
		TPH-D	TPH-MO	TPH-G
		Analytical Results (µg/L)		
Drinking Water ESLs (µg/L)		**100**	**100**	**100**
SB-7	October 2008	<50	<50	<50
SB-16	October 2008	<50	<50	<50
SB-20	October 2008	<50	<50	<50

Notes and Abbreviations:
TPH-D = total petroleum hydrocarbons as diesel analyzed using EPA Method 8015
TPH-MO = total petroleum hydrocarbons as motor oil analyzed using EPA Method 8015
TPH-G = total petroleum hydrocarbons as gasoline analyzed using EPA Method 8015
µg/L = micrograms per liter
ESLs = San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels: Table F-1a - Groundwater Screening Levels - Where Groundwater is a Current or Potential Source of Drinking Water (Revised May 2008)
<X = concentration not detected above laboratory reporting limit of X

TABLE 8
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

Analyte	Sample ID			ESLs (µg/L)
	SB-7	SB-16	SB-20	
	Analytical Results (µg/L)			
Ethylbenzene	<1.0	<1.0	<1.0	**30**
Styrene	<1.0	<1.0	<1.0	**10**
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0	**NA**
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0	**NA**
n-Propylbenzene	<1.0	<1.0	<1.0	**NA**
n-Butylbenzene	<1.0	<1.0	<1.0	**NA**
4-Chlorotoluene	<1.0	<1.0	<1.0	**NA**
1,4-Dichlorobenzene	<1.0	<1.0	<1.0	**5**
1,2-Dibromoethane	<1.0	<1.0	<1.0	**0.05**
Acrolein	<1.0	<1.0	<1.0	**NA**
1,2-Dichloroethane	<1.0	<1.0	<1.0	**0.5**
Acrylonitrile	<1.0	<1.0	<1.0	**NA**
Vinyl acetate	<5.0	<5.0	<5.0	**NA**
4-Methyl-2-pentanone	<5.0	<5.0	<5.0	**NA**
Xylenes	<1.0	<1.0	<1.0	**20**
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	**NA**
Bromobenzene	<1.0	<1.0	<1.0	**NA**
Toluene	<1.0	<1.0	<1.0	**40**
Chlorobenzene	<1.0	<1.0	<1.0	**25**
2-Chloroethylvinyl ether	<1.0	<1.0	<1.0	**NA**
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0	**5**
Dibromochloromethane	<1.0	<1.0	<1.0	**100**
Tetrachloroethene	<1.0	<1.0	<1.0	**5**
sec-Butylbenzene	<1.0	<1.0	<1.0	**NA**
1,3-Dichloropropane	<1.0	<1.0	<1.0	**0.5**
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	**6**
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0	**10**
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	**65**
Carbon tetrachloride	<1.0	<1.0	<1.0	**0.5**
2-Hexanone	<1.0	<1.0	<1.0	**NA**
2,2-dichloropropane	<1.0	<1.0	<1.0	**NA**
1,1,1,2-Tetrachloroethane	<1.0	<1.0	<1.0	**1.3**
Acetone	<1.0	**10**	**10**	**1500**
Chloroform	<1.0	<1.0	<1.0	**70**
Benzene	<1.0	<1.0	<1.0	**1**
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	**62**
Bromomethane	<1.0	<1.0	<1.0	**9.8**
Chloromethane	<1.0	<1.0	<1.0	**41**
Iodomethane	<1.0	<1.0	<1.0	**NA**
Dibromomethane	<1.0	<1.0	<1.0	**NA**
Bromochloromethane	<1.0	<1.0	<1.0	**NA**
Chloroethane	<1.0	<1.0	<1.0	**12**
Vinyl chloride	<1.0	<1.0	<1.0	**0.5**
Dichloromethane	<1.0	<1.0	<1.0	**NA**
Carbon disulfide	<1.0	<1.0	<1.0	**NA**
Bromoform	<1.0	<1.0	<1.0	**100**

TABLE 8
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

Analyte	Sample ID			ESLs (µg/L)
	SB-7	SB-16	SB-20	
	Analytical Results (µg/L)			
Bromodichloromethane	<1.0	<1.0	<1.0	**100**
1,1-Dichloroethane	<1.0	<1.0	<1.0	**5**
1,1-Dichloroethene	<1.0	<1.0	<1.0	**6**
Trichlorofluoromethane	<1.0	<1.0	<1.0	**NA**
Dichlorodifluoromethane	<1.0	<1.0	<1.0	**NA**
1,2-Dichloropropane	<1.0	<1.0	<1.0	**5**
2-Butanone	<5.0	<5.0	<5.0	**NA**
1,1-dichloropropane	<1.0	<1.0	<1.0	**NA**
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	**62**
Trichloroethene	<1.0	<1.0	**3.4**	**5**
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	**1**
1,2,3-Trichlorobenzene	<1.0	<1.0	<1.0	**NA**
Hexachlorobutadiene	<1.0	<1.0	<1.0	**0.45**
Naphthalene	<1.0	<1.0	<1.0	**17**
2-Chlorotoluene	<1.0	<1.0	<1.0	**NA**
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	**NA**
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	**NA**
1,2-Dibromo-3-chloropropane	<1.0	<1.0	<1.0	**0.2**
1,2,3-Trichloropropane	<1.0	<1.0	<1.0	**NA**
tert-Butylbenzene	<1.0	<1.0	<1.0	**NA**
Isopropylbenzene	<1.0	<1.0	<1.0	**NA**
4-Isopropyltoluene	<1.0	<1.0	<1.0	**NA**
Depth to Groundwater (ft bgs)*	**7**	**10**	**10**	

Notes and Abbreviations:
* Described depth to static groundwater, where groundwater samples where collected
ESLs = San Francisco Bay RWQCB Environmental Screening Levels - Table F1-a - Groundwater Screening Levels (Groundwater is a Current or Potential Source of Drinking Water (May 2008))
<X = concentration not detected above laboratory reporting limit of X
Bold indicates exceedence of laboratory detection limit
µg/L = micrograms per liter
NA = Not available

TABLE 9
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
CAM 17 METALS

	Analytes																
Sample ID	**Cadmium**	**Chromium**	**Nickel**	**Lead**	**Zinc**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cobalt**	**Copper**	**Mercury**	**Molybdenum**	**Selenium**	**Silver**	**Thallium**	**Vanadium**
MCL (µg/L)	**5**	**50**	**100**	**15**	**5,000**	**6**	**50**	**1,000**	**4**	**NA**	**1,300**	**2**	**NA**	**50**	**NA**	**2**	**NA**
ESLs (µg/L)	**0.25**	**50**	**8.2**	**2.5**	**81**	**6**	**36**	**1,000**	**0.53**	**3**	**3.1**	**0.025**	**35**	**5**	**0.19**	**2**	**15**
	Analytical Results (µg/L)																
SB-7	<5	<10	<40	<10	<15	<60	<80	**120**	<3	<50	<20	<0.2	<50	<100	<10	<100	<50
SB-16	<5	**23**	**63**	<10	**71**	<60	<80	**230**	<3	<50	<20	<0.2	<50	<100	<10	<100	<50
SB-20	<5	<10	<40	<10	**20**	<60	<80	**130**	<3	<50	<20	<0.2	<50	<100	<10	<100	<50

Notes and Abbreviations:
µg/L = micrograms per liter
NA = Not Available

MCLs = SF RWQCB California Primary Maximum Contaminant Level - Table F-3 Summary of Drinking Water Screening Levels

ESLs = San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels: Table F-1a - Groundwater Screening Levels - Where Groundwater is a Current or Potential Source of Drinking Water (Revised May 2008)

<X = concentration not detected above laboratory reporting limit of X

APPENDIX E

95% UCLS FOR COMPOUNDS EXCEEDING ESLS

Zone 2 - Unexposed soil along soundwall, northern 29th Ave. interchange, and northern 23rd Ave. interchange

Sample ID	TPH-D	TPH-G
SB-3 @ 0.5	<1.0	<0.5
SB-3 @ 2	<1.0	<0.5
SB-4 @ 0.5	<1.0	<0.5
SB-4 @ 2	<1.0	<0.5
SB-5 @ 0.5	<1.0	<0.5
SB-5 @ 2	<1.0	<0.5
SB-5 @ 5	<1.0	<0.5
SB-6 @ 0.5	<1.0	<0.5
SB-6 @ 2	<1.0	<0.5
SB-8 @ 0.5	<1.0	<0.5
SB-8 @ 2	<1.0	<0.5
SB-9 @ 0.5	<1.0	<0.5
SB-9 @ 2	<1.0	<0.5
SB-9 @ 5	<1.0	<0.5
SB-10 @ 0.5	<1.0	<0.5
SB-10 @ 2	<1.0	<0.5
SB-11 @ 0.5	<1.0	<0.5
SB-11 @ 2	<1.0	<0.5
SB-11 @ 5	<1.0	<0.5
SB-12 @ 0.5	<1.0	<0.5
SB-12 @ 2	<1.0	<0.5
SB-12 @ 5	<1.0	<0.5
SB-13 @ 0.5	<1.0	<0.5
SB-13 @ 2	<1.0	<0.5
SB-14 @ 0.5	<1.0	<0.5
SB-14 @ 2	<1.0	<0.5
SB-14 @ 5	<1.0	<0.5
SB-15 @ 0.5	<1.0	<0.5
SB-15 @ 2	<1.0	<0.5
SB-15 @ 5	<1.0	<0.5
SB-16 @ 0.5	<1.0	<0.5
SB-16 @ 2	<1.0	<0.5
SB-16 @ 5	<1.0	<0.5
SB-17 @ 0.5	<1.0	<0.5
SB-17 @ 2	<1.0	<0.5
SB-17 @ 5	<1.0	<0.5
SB-22 @ 0.5	**150**	**1,900**
SB-22 @ 2	<1.0	<0.5
SB-23 @ 0.5	<1.0	<0.5
SB-23 @ 2	<1.0	<0.5
SB-24 @ 0.5	<1.0	<0.5
SB-24 @ 2	<1.0	<0.5
SB-25 @ 0.5	<1.0	<0.5
SB-25 @ 2	<1.0	<0.5
SB-26 @ 0.5	<1.0	<0.5
SB-26 @ 2	<1.0	<0.5
SB-27 @ 0.5	<1.0	<0.5
SB-27 @ 2	<1.0	<0.5

95% UCL TPH-D = 17.19
99% UCL TPH-G = 433.6

95% UCL TPH-D Statistical analysis

Data File		Variable:	0.5
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	48	Shapiro-Wilk Test Statisitic	0.14662
Number of Unique Samples	2	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.5	Data not normal at 5% significance level	
Maximum	150		
Mean	3.614583	95% UCL (Assuming Normal Distribution)	
Median	0.5	Student's-t UCL	8.840625
Standard Deviation	21.57847		
Variance	465.6302	Gamma Distribution Test	
Coefficient of Variation	5.969835	A-D Test Statistic	19.98494
Skewness	6.928203	A-D 5% Critical Value	0.84772
		K-S Test Statistic	0.60261
Gamma Statistics		K-S 5% Critical Value	0.137799
k hat	0.360007	Data do not follow gamma distribution	
k star (bias corrected)	0.351395	at 5% significance level	
Theta hat	10.04032		
Theta star	10.28637	95% UCLs (Assuming Gamma Distribution)	
nu hat	34.56067	Approximate Gamma UCL	5.684659
nu star	33.73396	Adjusted Gamma UCL	5.766463
Approx.Chi Square Value (.05)	21.44969		
Adjusted Level of Significance	0.045	Lognormal Distribution Test	
Adjusted Chi Square Value	21.1454	Shapiro-Wilk Test Statisitic	0.14662
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-0.693147		
Maximum of log data	5.010635	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.574318	95% H-UCL	1.022674
Standard Deviation of log data	0.82327	95% Chebyshev (MVUE) UCL	1.239165
Variance of log data	0.677774	97.5% Chebyshev (MVUE) UCL	1.436575
		99% Chebyshev (MVUE) UCL	1.824347
		95% Non-parametric UCLs	
		CLT UCL	8.737617
		Adj-CLT UCL (Adjusted for skewness)	12.06559
		Mod-t UCL (Adjusted for skewness)	9.359722
		Jackknife UCL	8.840625
		Standard Bootstrap UCL	N/R
		Bootstrap-t UCL	N/R
RECOMMENDATION		Hall's Bootstrap UCL	N/A
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	N/R
		BCA Bootstrap UCL	N/R
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	17.19074
		97.5% Chebyshev (Mean, Sd) UCL	23.06515
		99% Chebyshev (Mean, Sd) UCL	34.6043

95% UCL TPH-G Statistical analysis

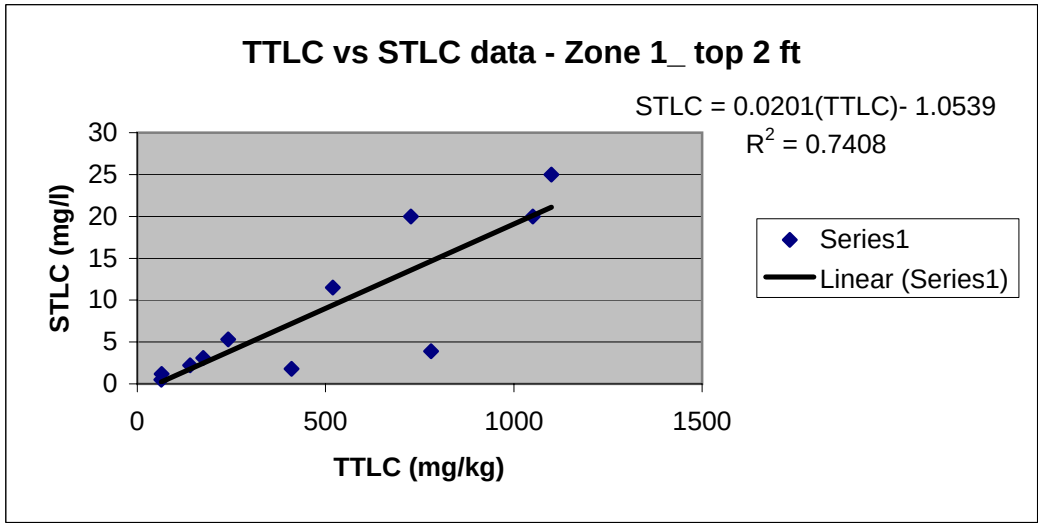
Data File		Variable:	0.25
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	48	Shapiro-Wilk Test Statisitic	0.14662
Number of Unique Samples	2	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.25	Data not normal at 5% significance level	
Maximum	1900		
Mean	39.82813	95% UCL (Assuming Normal Distribution)	
Median	0.25	Student's-t UCL	106.2373
Standard Deviation	274.2053		
Variance	75188.54	Gamma Distribution Test	
Coefficient of Variation	6.884715	A-D Test Statistic	20.47384
Skewness	6.928203	A-D 5% Critical Value	0.935049
		K-S Test Statistic	0.615595
Gamma Statistics		K-S 5% Critical Value	0.143348
k hat	0.156388	Data do not follow gamma distribution	
k star (bias corrected)	0.160503	at 5% significance level	
Theta hat	254.6751		
Theta star	248.1463	95% UCLs (Assuming Gamma Distribution)	
nu hat	15.01325	Approximate Gamma UCL	81.33445
nu star	15.40825	Adjusted Gamma UCL	83.22036
Approx.Chi Square Value (.05)	7.545164		
Adjusted Level of Significance	0.045	Lognormal Distribution Test	
Adjusted Chi Square Value	7.374178	Shapiro-Wilk Test Statisitic	0.14662
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.386294		
Maximum of log data	7.549609	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.20013	95% H-UCL	1.139184
Standard Deviation of log data	1.289787	95% Chebyshev (MVUE) UCL	1.357841
Variance of log data	1.663549	97.5% Chebyshev (MVUE) UCL	1.654947
		99% Chebyshev (MVUE) UCL	2.238555
		95% Non-parametric UCLs	
		CLT UCL	104.9283
		Adj-CLT UCL (Adjusted for skewness)	147.2181
		Mod-t UCL (Adjusted for skewness)	112.8337
		Jackknife UCL	106.2373
		Standard Bootstrap UCL	N/R
		Bootstrap-t UCL	N/R
RECOMMENDATION		Hall's Bootstrap UCL	N/A
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	N/R
		BCA Bootstrap UCL	N/R
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	212.3452
		97.5% Chebyshev (Mean, Sd) UCL	286.9934
		99% Chebyshev (Mean, Sd) UCL	433.6255

APPENDIX F

ADL STATISTICAL ANALYSIS RESULTS FROM PSI & ADL REPORT

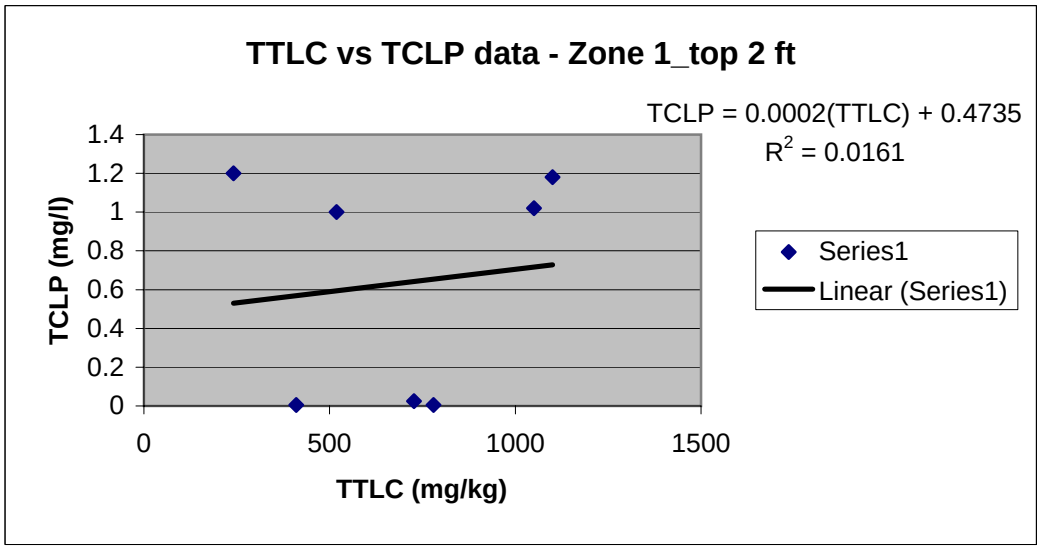
Zone 1 - top 2 feet

Location	TTLC	STLC
ADL-1	519	11.5
ADL-2	175	3.1
ADL-2	241	5.3
ADL-3	1050	20
ADL-3	1100	25
ADL-4	727	20
ADL-4	64.0	0.5
ADL-5	65.0	1.2
ADL-5	140	2.2
ADL-19	780	3.90
ADL-19	410	1.80



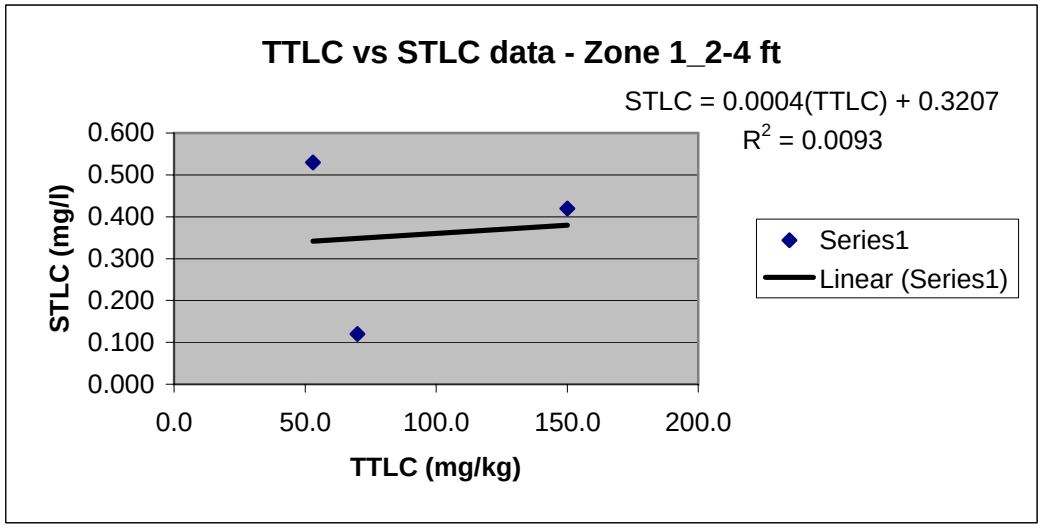
Zone 1 - top 2 feet

Location	TTLC	TCLP
ADL-1	519	1
ADL-2	241	1.2
ADL-3	1050	1.02
ADL-3	1100	1.18
ADL-4	727	0.025
ADL-19	780	0.005
ADL-19	410	0.005



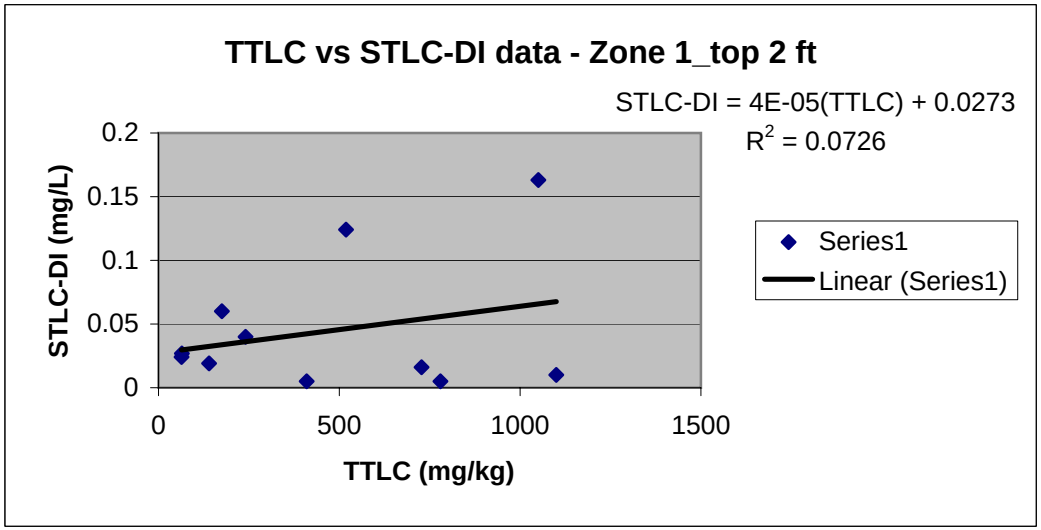
Zone 1 - 2-4 feet

Location	TTLC	STLC
ADL-5	53.0	0.530
ADL-19	150	0.420
ADL-19	70	0.120



Zone 1 - top 2 feet

Location	TTLC	STLC-DI
ADL-1	519	0.124
ADL-2	175	0.06
ADL-2	241	0.04
ADL-3	1050	0.163
ADL-3	1100	0.01
ADL-4	727	0.016
ADL-4	64.0	0.024
ADL-5	65.0	0.027
ADL-5	140	0.019
ADL-19	780	0.005
ADL-19	410	0.005



Zone 1 - exposed soil _ top 2 ft

Location	TTLC	STLC	STLC-DI	TCLP
ADL-1	519	11.5	0.124	1
ADL-1	13.0			
ADL-2	175	3.1	0.06	
ADL-2	241	5.3	0.04	1.2
ADL-3	1050	20	0.163	1.02
ADL-3	1100	25	0.01	1.18
ADL-4	727	20	0.016	<0.05
ADL-4	64.0	0.5	0.024	
ADL-5	65.0	1.2	0.027	
ADL-5	140	2.2	0.019	
ADL-19	780	3.90	0.005	<0.010
ADL-19	410	1.80	0.005	<0.010
SB-7 @ 0.5	16			

90 % UCL
TTLC = 545.7112

STLC = 0.0201(TTLC)- 1.0539

90% UCL
STLC = 9.914895

TCLP = 0.0002(TTLC) + 0.4735

90% UCL
TCLP = 0.582642

95 % UCL
TTLC = 579.8

STLC-DI = 4E-05(TTLC) + 0.0273

95% UCL
STLC-DI = 0.050492

Soil Classification = Cal-Haz non RCRA

Variance Applies - Use onsite, place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil.

90% UCL TTLC Statistical analysis - top 2 ft

Data File — Variable: 519

Raw Statistics	
Number of Valid Samples	13
Number of Unique Samples	13
Minimum	13
Maximum	1100
Mean	407.6923
Median	241
Standard Deviation	391.9155
Variance	153597.7
Coefficient of Variation	0.961302
Skewness	0.725597

Gamma Statistics	
k hat	0.818449
k star (bias corrected)	0.680858
Theta hat	498.1282
Theta star	598.7921
nu hat	21.27966
nu star	17.70231
Approx.Chi Square Value(.10)	10.63153
Adjusted Level of Significance	0.07666
Adjusted Chi Square Value	10.02651

Log-transformed Statistics	
Minimum of log data	2.564949
Maximum of log data	7.003065
Mean of log data	5.287533
Standard Deviation of log data	1.505238
Variance of log data	2.26574

NO RECOMMENDATION AVAILABLE

Select 95% Confidence Coefficient

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.870044
Shapiro-Wilk 5% Critical Value	0.866
Data are normal at 5% significance level	
90% UCL (Assuming Normal Distribution)	
Student's-t UCL	555.1101
Gamma Distribution Test	
A-D Test Statistic	0.293807
A-D 5% Critical Value	0.766775
K-S Test Statistic	0.132851
K-S 5% Critical Value	0.245092
Data follow gamma distribution	
at 5% significance level	
90% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	678.8385
Adjusted Gamma UCL	719.8015
Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.910212
Shapiro-Wilk 5% Critical Value	0.866
Data are lognormal at 5% significance level	
90% UCLs (Assuming Lognormal Distribution)	
90% H-UCL	1976.408
90% Chebyshev (MVUE) UCL	1259.968
95% Chebyshev (MVUE) UCL	1592.188
97.5% Chebyshev (MVUE) UCL	2053.297
99% Chebyshev (MVUE) UCL	2959.056
90% Non-parametric UCLs	
CLT UCL	546.9941
Adj-CLT UCL (Adjusted for skewness)	562.6155
Mod-t UCL (Adjusted for skewness)	558.7559
Jackknife UCL	555.1101
Standard Bootstrap UCL	545.7112
Bootstrap-t UCL	567.1452
Hall's Bootstrap UCL	547.922
Percentile Bootstrap UCL	544.0769
BCA Bootstrap UCL	548.2308
90% Chebyshev (Mean, Sd) UCL	733.7857
95% Chebyshev (Mean, Sd) UCL	881.495
97.5% Chebyshev (Mean, Sd) UCL	1086.51
99% Chebyshev (Mean, Sd) UCL	1489.222

Zone 1

95% UCL TTLC Statistical analysis - top 2 ft

General Statistics			
Number of Valid Observations	13	Number of Distinct Observations	13
Raw Statistics		Log-transformed Statistics	
Minimum	13	Minimum of Log Data	2.565
Maximum	1100	Maximum of Log Data	7.003
Mean	407.7	Mean of log Data	5.288
Median	241	SD of log Data	1.505
SD	391.9		
Coefficient of Variation	0.961		
Skewness	0.726		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.87	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.866	Shapiro Wilk Critical Value	0.866
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	601.4	95% H-UCL	3193
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1592
95% Adjusted-CLT UCL	609.9	97.5% Chebyshev (MVUE) UCL	2053
95% Modified-t UCL	605.1	99% Chebyshev (MVUE) UCL	2959
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.681	Data appear Normal at 5% Significance Level	
Theta Star	598.8		
nu star	17.7		
Approximate Chi Square Value (.05)	9.176	Nonparametric Statistics	
Adjusted Level of Significance	0.0301	95% CLT UCL	586.5
Adjusted Chi Square Value	8.314	95% Jackknife UCL	601.4
		95% Standard Bootstrap UCL	579.8
Anderson-Darling Test Statistic	0.294	95% Bootstrap-t UCL	641
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	586
Kolmogorov-Smirnov Test Statistic	0.133	95% Percentile Bootstrap UCL	582.1
Kolmogorov-Smirnov 5% Critical Value	0.245	95% BCA Bootstrap UCL	602.7
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	881.5
		97.5% Chebyshev(Mean, Sd) UCL	1087
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1489
95% Approximate Gamma UCL	786.5		
95% Adjusted Gamma UCL	868.1		

Zone 1 _ 2-4 ft

Location	TTLC	STLC	DI-STLC
ADL-1	14.0		
ADL-1	15.0		
ADL-1	7.40		
ADL-2	16.0		
ADL-2	12.0		
ADL-2	11.0		
ADL-3	23.0		
ADL-3	12.0		
ADL-4	31.0		
ADL-4	12.0		
ADL-4	9.10		
ADL-5	53.0	0.530	0.0900
ADL-5	11.0		
ADL-5	9.94		
ADL-19	150	0.420	<0.010
ADL-19	70	0.120	<0.010
SB-7 @ 2	15		

95% UCL TTLC = 41.77997

STLC = 0.0004(TTLC) + 0.3207

95% UCL STLC = 0.337412

Soil Calssification = non Haz

95% UCL TTLC Statistical analysis - 2-4 ft

Data File — Variable: 14

Raw Statistics	
Number of Valid Samples	17
Number of Unique Samples	13
Minimum	7.4
Maximum	150
Mean	27.73176
Median	14
Standard Deviation	35.73996
Variance	1277.344
Coefficient of Variation	1.288773
Skewness	2.90076

Gamma Statistics	
k hat	1.339288
k star (bias corrected)	1.142159
Theta hat	20.70635
Theta star	24.28013
nu hat	45.5358
nu star	38.8334
Approx.Chi Square Value (.05)	25.55773
Adjusted Level of Significance	0.03461
Adjusted Chi Square Value	24.43134

Log-transformed Statistics	
Minimum of log data	2.00148
Maximum of log data	5.010635
Mean of log data	2.904911
Standard Deviation of log data	0.813481
Variance of log data	0.661752

RECOMMENDATION
Data are Non-parametric (0.05)

Use 95% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.573754
Shapiro-Wilk 5% Critical Value	0.892
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	42.86545

Gamma Distribution Test	
A-D Test Statistic	1.82589
A-D 5% Critical Value	0.75898
K-S Test Statistic	0.316712
K-S 5% Critical Value	0.213624
Data do not follow gamma distribution at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	42.13671
Adjusted Gamma UCL	44.0794

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.828796
Shapiro-Wilk 5% Critical Value	0.892
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	41.55863
95% Chebyshev (MVUE) UCL	47.77846
97.5% Chebyshev (MVUE) UCL	57.718
99% Chebyshev (MVUE) UCL	77.24228

95% Non-parametric UCLs	
CLT UCL	41.98971
Adj-CLT UCL (Adjusted for skewness)	48.50595
Mod-t UCL (Adjusted for skewness)	43.88186
Jackknife UCL	42.86545
Standard Bootstrap UCL	41.77997
Bootstrap-t UCL	66.84186
Hall's Bootstrap UCL	87.31869
Percentile Bootstrap UCL	42.57294
BCA Bootstrap UCL	49.37647
95% Chebyshev (Mean, Sd) UCL	65.51563
97.5% Chebyshev (Mean, Sd) UCL	81.86473
99% Chebyshev (Mean, Sd) UCL	113.9794

Zone 2 - Unexposed soil along soundwall, northern 29th Ave. interchange, and northern 23rd Ave. interchange - top 2.5 ft

Sample ID	TTLC
SB-3 @ 0.5	19
SB-3 @ 2	12
SB-4 @ 0.5	37
SB-4 @ 2	7.7
SB-5 @ 0.5	311
SB-5 @ 2	7.2
SB-6 @ 0.5	136
SB-6 @ 2	4.4
SB-8 @ 0.5	4.1
SB-8 @ 2	10
SB-9 @ 0.5	7.2
SB-9 @ 2	5.8
SB-10 @ 0.5	8.9
SB-10 @ 2	6.8
SB-11 @ 0.5	7.8
SB-11 @ 2	64
SB-12 @ 0.5	22
SB-12 @ 2	6.4
SB-13 @ 0.5	12
SB-13 @ 2	7.7
SB-14 @ 0.5	74
SB-14 @ 2	9
SB-15 @ 0.5	50
SB-15 @ 2	18
SB-16 @ 2	6.9
SB-16 @ 0.5	52
SB-16 @ 2	6.9
SB-17 @ 0.5	9.4
SB-17 @ 2	8.2
SB-22 @ 0.5	31
SB-22 @ 2	11
SB-23 @ 0.5	10
SB-23 @ 2	9.2
SB-24 @ 0.5	3.9
SB-24 @ 2	6.8
SB-25 @ 0.5	11
SB-25 @ 2	8.9
SB-26 @ 0.5	3.6
SB-26 @ 2	8.7
SB-27 @ 0.5	8.1
SB-27 @ 2	9.5

90% UCL TTLC = 35.78
95% UCL TTLC = 39.12
Soil Classification = non Haz

90% UCL TTLC Statistical analysis - top 2.5 ft

Data File		Variable: 19	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	41	Shapiro-Wilk Test Statisitic	0.428788384
Number of Unique Samples	33	Shapiro-Wilk 5% Critical Value	0.941
Minimum	3.6	Data not normal at 5% significance level	
Maximum	311		
Mean	25.68537	90% UCL (Assuming Normal Distribution)	
Median	9	Student's-t UCL	36.28401246
Standard Deviation	52.08015		
Variance	2712.342	Gamma Distribution Test	
Coefficient of Variation	2.02762	A-D Test Statistic	4.7197387
Skewness	4.576254	A-D 5% Critical Value	0.78576163
		K-S Test Statistic	0.322364349
Gamma Statistics		K-S 5% Critical Value	0.1429581
k hat	0.829598	Data do not follow gamma distribution	
k star (bias corrected)	0.785156	at 5% significance level	
Theta hat	30.96122		
Theta star	32.71372	90% UCLs (Assuming Gamma Distribution)	
nu hat	68.02703	Approximate Gamma UCL	32.85451601
nu star	64.38277	Adjusted Gamma UCL	33.09186914
Approx.Chi Square Value(.10)	50.33388		
Adjusted Level of Significance	0.093561	Lognormal Distribution Test	
Adjusted Chi Square Value	49.97285	Shapiro-Wilk Test Statisitic	0.83663805
		Shapiro-Wilk 5% Critical Value	0.941
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	1.280934		
Maximum of log data	5.739793	90% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.53391	90% H-UCL	26.89654471
Standard Deviation of log data	0.983435	90% Chebyshev (MVUE) UCL	30.85890622
Variance of log data	0.967144	95% Chebyshev (MVUE) UCL	35.73401707
		97.5% Chebyshev (MVUE) UCL	42.50048193
		99% Chebyshev (MVUE) UCL	55.79189191
		90% Non-parametric UCLs	
		CLT UCL	36.10893384
		Adj-CLT UCL (Adjusted for skewness)	40.26012417
		Mod-t UCL (Adjusted for skewness)	37.25284179
		Jackknife UCL	36.28401246
		Standard Bootstrap UCL	35.78459382
		Bootstrap-t UCL	53.28441968
NO RECOMMENDATION AVAILABLE		Hall's Bootstrap UCL	87.54734565
		Percentile Bootstrap UCL	36.25121951
		BCA Bootstrap UCL	42.27560976
		90% Chebyshev (Mean, Sd) UCL	50.08602584
		95% Chebyshev (Mean, Sd) UCL	61.13870287
		97.5% Chebyshev (Mean, Sd) UCL	76.47939012
		99% Chebyshev (Mean, Sd) UCL	106.6131997

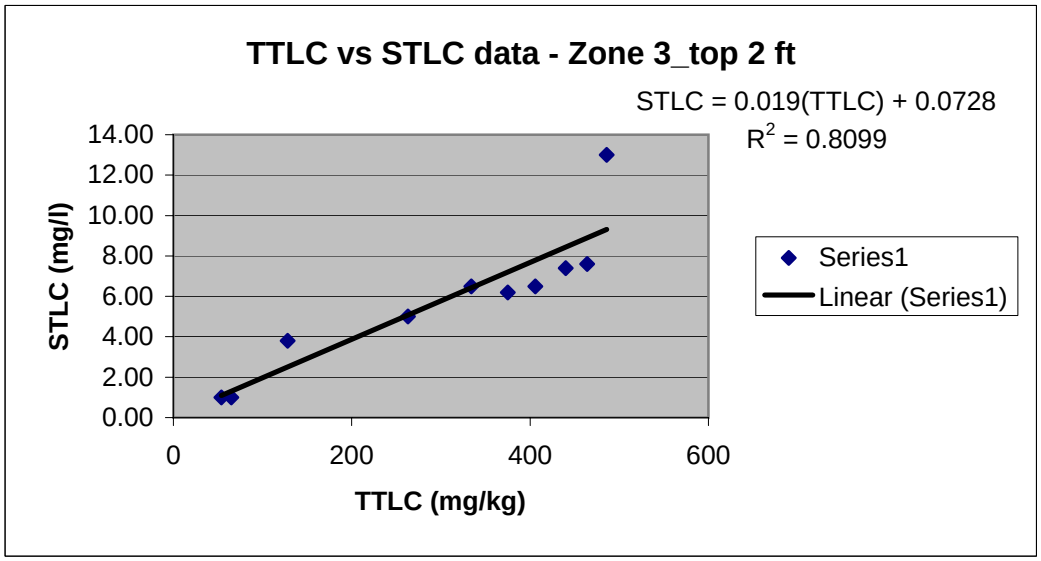
Zone 2

95% UCL TTLC Statistical analysis - top 2.5 ft

General Statistics			
Number of Valid Observations	41	Number of Distinct Observations	33
Raw Statistics		Log-transformed Statistics	
Minimum	3.6	Minimum of Log Data	1.281
Maximum	311	Maximum of Log Data	5.74
Mean	25.69	Mean of log Data	2.534
Median	9	SD of log Data	0.983
SD	52.08		
Coefficient of Variation	2.028		
Skewness	4.576		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.429	Shapiro Wilk Test Statistic	0.837
Shapiro Wilk Critical Value	0.941	Shapiro Wilk Critical Value	0.941
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	39.38	95% H-UCL	29.38
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	35.73
95% Adjusted-CLT UCL	45.28	97.5% Chebyshev (MVUE) UCL	42.5
95% Modified-t UCL	40.35	99% Chebyshev (MVUE) UCL	55.79
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.785	Data do not follow a Discernable Distribution (0.05)	
Theta Star	32.71		
nu star	64.38		
Approximate Chi Square Value (.05)	46.92	Nonparametric Statistics	
Adjusted Level of Significance	0.0441	95% CLT UCL	39.06
Adjusted Chi Square Value	46.38	95% Jackknife UCL	39.38
		95% Standard Bootstrap UCL	39.12
Anderson-Darling Test Statistic	4.72	95% Bootstrap-t UCL	60.71
Anderson-Darling 5% Critical Value	0.786	95% Hall's Bootstrap UCL	89.53
Kolmogorov-Smirnov Test Statistic	0.322	95% Percentile Bootstrap UCL	40.33
Kolmogorov-Smirnov 5% Critical Value	0.143	95% BCA Bootstrap UCL	46.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	61.14
		97.5% Chebyshev(Mean, Sd) UCL	76.48
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	106.6
95% Approximate Gamma UCL	35.24		
95% Adjusted Gamma UCL	35.66		

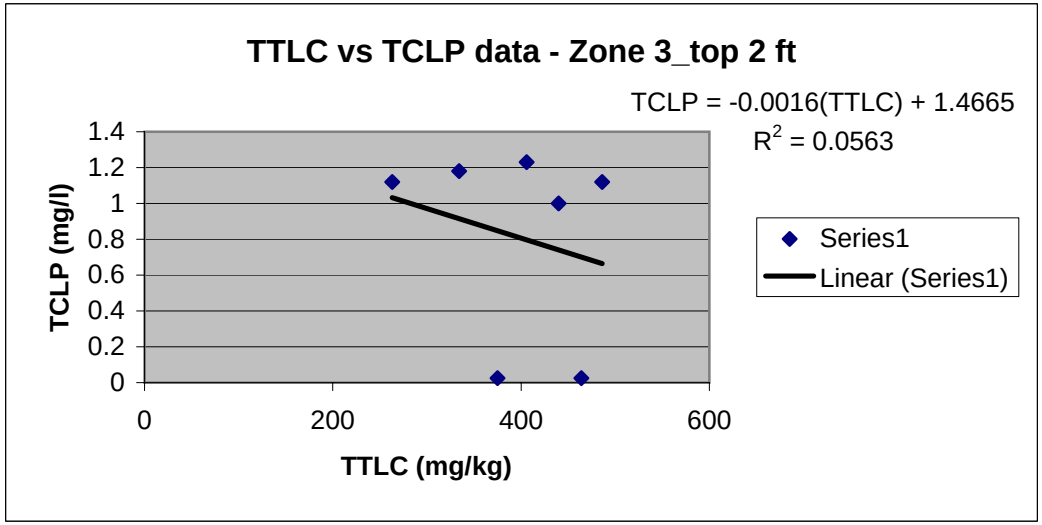
Zone 3 - top 2 feet

Location	TTLC	STLC
ADL-9	128	3.80
ADL-9	54.0	1.00
ADL-10	440	7.40
ADL-10	65.0	1.00
ADL-11	334	6.50
ADL-11	486	13.00
ADL-12	375	6.20
ADL-12	263	5.00
ADL-13	406	6.50
ADL-13	464	7.60



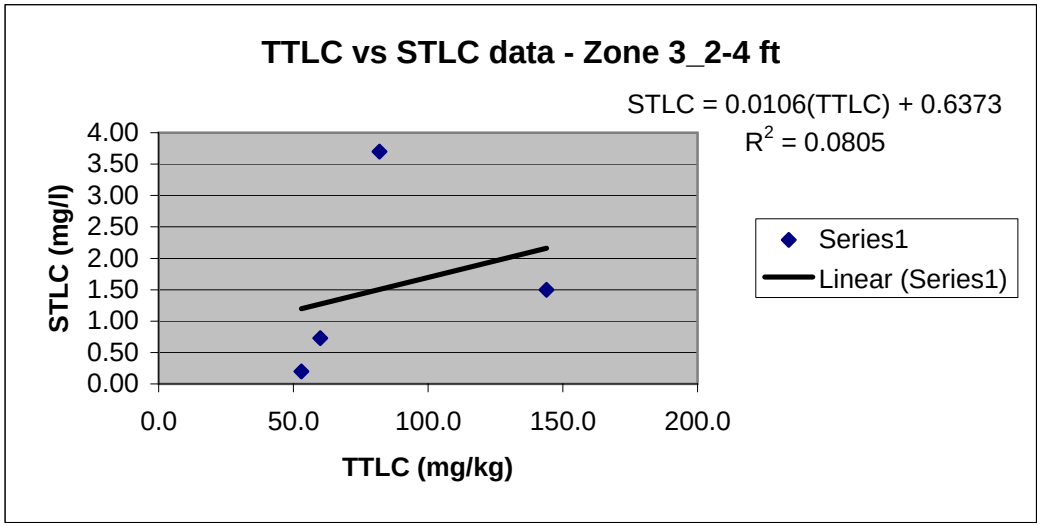
Zone 3 - top 2 feet

Location	TTLC	TCLP
ADL-10	440	1
ADL-11	334	1.18
ADL-11	486	1.12
ADL-12	375	0.025
ADL-12	263	1.12
ADL-13	406	1.23
ADL-13	464	0.025



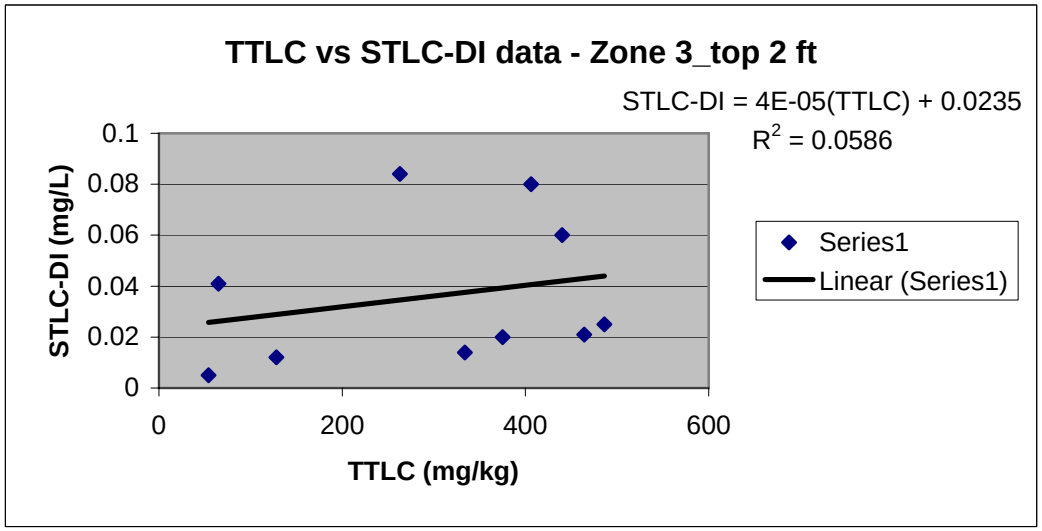
Zone 3 _ 2-4 feet

Location	TTLC	STLC
ADL-9	82.0	3.70
ADL-10	144	1.50
ADL-10	60.0	0.730
ADL-11	53.0	0.200



Zone 3 - top 2 feet

Location	TTLC	STLC-DI
ADL-9	128	0.012
ADL-9	54.0	0.005
ADL-10	440	0.06
ADL-10	65.0	0.041
ADL-11	334	0.014
ADL-11	486	0.025
ADL-12	375	0.02
ADL-12	263	0.084
ADL-13	406	0.08
ADL-13	464	0.021



Zone 3 - exposed soil - top 2 ft

Location	TTLC	STLC	STLC-DI	TCLP
SB-20 @ 0.5	8.1			
SB-21 @ 0.5	12			
ADL-9	128	3.80	0.012	
ADL-9	54.0	1.00	0.005	
ADL-10	440	7.40	0.06	1
ADL-10	65.0	1.00	0.041	
ADL-11	334	6.50	0.014	1.18
ADL-11	486	13.00	0.025	1.12
ADL-12	375	6.20	0.02	<0.05
ADL-12	263	5.00	0.084	1.12
ADL-13	406	6.50	0.08	1.23
ADL-13	464	7.60	0.021	<0.05

90% UCL TTLC = 320.5345

STLC = 0.019(TTLC) + 0.0728

90% UCL STLC = 6.162956

TCLP = -0.0016(TTLC) + 1.4665

90% UCL TLCP = 0.953645

95% UCL TTLC = 339.2

STLC-DI = 4E-05(TTLC) + 0.0235

95% UCL STLC-DI = 0.037068

Soil Classification = Cal-Haz non RCRA

Variance Applies - Use onsite, place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil.

90% UCL TTLC Statistical analysis - top 2 ft

Data File — Variable: 8.1

Raw Statistics	
Number of Valid Samples	12
Number of Unique Samples	12
Minimum	8.1
Maximum	486
Mean	252.925
Median	298.5
Standard Deviation	187.6554
Variance	35214.54
Coefficient of Variation	0.741941
Skewness	-0.174404

Gamma Statistics	
k hat	0.981153
k star (bias corrected)	0.79142
Theta hat	257.7834
Theta star	319.5836
nu hat	23.54768
nu star	18.99409
Approx.Chi Square Value(.10)	11.64559
Adjusted Level of Significance	0.07524
Adjusted Chi Square Value	10.96706

Log-transformed Statistics	
Minimum of log data	2.091864
Maximum of log data	6.186209
Mean of log data	4.943468
Standard Deviation of log data	1.452742
Variance of log data	2.110458

NO RECOMMENDATION AVAILABLE

Select 95% Confidence Coefficient

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.873066
Shapiro-Wilk 5% Critical Value	0.859
Data are normal at 5% significance level	
90% UCL (Assuming Normal Distribution)	
Student's-t UCL	326.784
Gamma Distribution Test	
A-D Test Statistic	0.790008
A-D 5% Critical Value	0.757408
K-S Test Statistic	0.233154
K-S 5% Critical Value	0.252535
Data follow approximate gamma distibution at 5% significance level	
90% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	412.5237
Adjusted Gamma UCL	438.0461
Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.813666
Shapiro-Wilk 5% Critical Value	0.859
Data not lognormal at 5% significance level	
90% UCLs (Assuming Lognormal Distribution)	
90% H-UCL	1295.532
90% Chebyshev (MVUE) UCL	824.4826
95% Chebyshev (MVUE) UCL	1040.821
97.5% Chebyshev (MVUE) UCL	1341.091
99% Chebyshev (MVUE) UCL	1930.913
90% Non-parametric UCLs	
CLT UCL	322.3485
Adj-CLT UCL (Adjusted for skewness)	320.4008
Mod-t UCL (Adjusted for skewness)	326.3294
Jackknife UCL	326.784
Standard Bootstrap UCL	320.5345
Bootstrap-t UCL	322.5861
Hall's Bootstrap UCL	315.58
Percentile Bootstrap UCL	319.5833
BCA Bootstrap UCL	314.5917
90% Chebyshev (Mean, Sd) UCL	415.4393
95% Chebyshev (Mean, Sd) UCL	489.0528
97.5% Chebyshev (Mean, Sd) UCL	591.2255
99% Chebyshev (Mean, Sd) UCL	791.924

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Zone 3

95% UCL TTLC Statistical analysis - top 2 ft

General Statistics			
Number of Valid Observations	12	Number of Distinct Observations	12
Raw Statistics		Log-transformed Statistics	
Minimum	8.1	Minimum of Log Data	2.092
Maximum	486	Maximum of Log Data	6.186
Mean	252.9	Mean of log Data	4.943
Median	298.5	SD of log Data	1.453
SD	187.7		
Coefficient of Variation	0.742		
Skewness	-0.174		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.873	Shapiro Wilk Test Statistic	0.814
Shapiro Wilk Critical Value	0.859	Shapiro Wilk Critical Value	0.859
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	350.2	95% H-UCL	2126
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1041
95% Adjusted-CLT UCL	339.1	97.5% Chebyshev (MVUE) UCL	1341
95% Modified-t UCL	349.8	99% Chebyshev (MVUE) UCL	1931
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.791	Data appear Normal at 5% Significance Level	
Theta Star	319.6		
nu star	18.99		
Approximate Chi Square Value (.05)	10.11	Nonparametric Statistics	
Adjusted Level of Significance	0.029	95% CLT UCL	342
Adjusted Chi Square Value	9.139	95% Jackknife UCL	350.2
		95% Standard Bootstrap UCL	339.2
Anderson-Darling Test Statistic	0.79	95% Bootstrap-t UCL	344.5
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	331.4
Kolmogorov-Smirnov Test Statistic	0.233	95% Percentile Bootstrap UCL	337.6
Kolmogorov-Smirnov 5% Critical Value	0.253	95% BCA Bootstrap UCL	333.3
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	489.1
		97.5% Chebyshev(Mean, Sd) UCL	591.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	791.9
95% Approximate Gamma UCL	475		
95% Adjusted Gamma UCL	525.7		
Potential UCL to Use		Use 95% Student's-t UCL	350.2

Zone 3 _ 2-4 ft

Location	TTLC	STLC	TCLP
SB-20 @ 2	24		
SB-21 @ 2	48		
ADL-9	82.0	3.70	0.130
ADL-9	11.0	-	-
ADL-9	45.0	-	-
ADL-10	144	1.50	0.160
ADL-10	24.0	-	-
ADL-10	60.0	0.730	0.0160
ADL-11	53.0	0.200	0.0190
ADL-11	20.0	-	-
ADL-11	13.0	-	-
ADL-12	24.0	-	-
ADL-12	12.0	-	-
ADL-12	11.0	-	-
ADL-13	30.0	-	-
ADL-13	18.0	-	-
ADL-13	13.0	-	-

95% UCL TTLC = 50.53668

STLC = 0.0106(TTLC) + 0.6373

95% UCL STLC = 1.172989

Soil Classification = non Haz

95% UCL TTLC Statistical analysis - 2-4 ft

Data File — Variable: 24

Raw Statistics	
Number of Valid Samples	17
Number of Unique Samples	13
Minimum	11
Maximum	144
Mean	37.17647
Median	24
Standard Deviation	34.25864
Variance	1173.654
Coefficient of Variation	0.921514
Skewness	2.161938
Gamma Statistics	
k hat	1.810479
k star (bias corrected)	1.530198
Theta hat	20.53406
Theta star	24.2952
nu hat	61.55627
nu star	52.02673
Approx.Chi Square Value (.05)	36.45667
Adjusted Level of Significance	0.03461
Adjusted Chi Square Value	35.09249
Log-transformed Statistics	
Minimum of log data	2.397895
Maximum of log data	4.969813
Mean of log data	3.31477
Standard Deviation of log data	0.764871
Variance of log data	0.585027

RECOMMENDATION

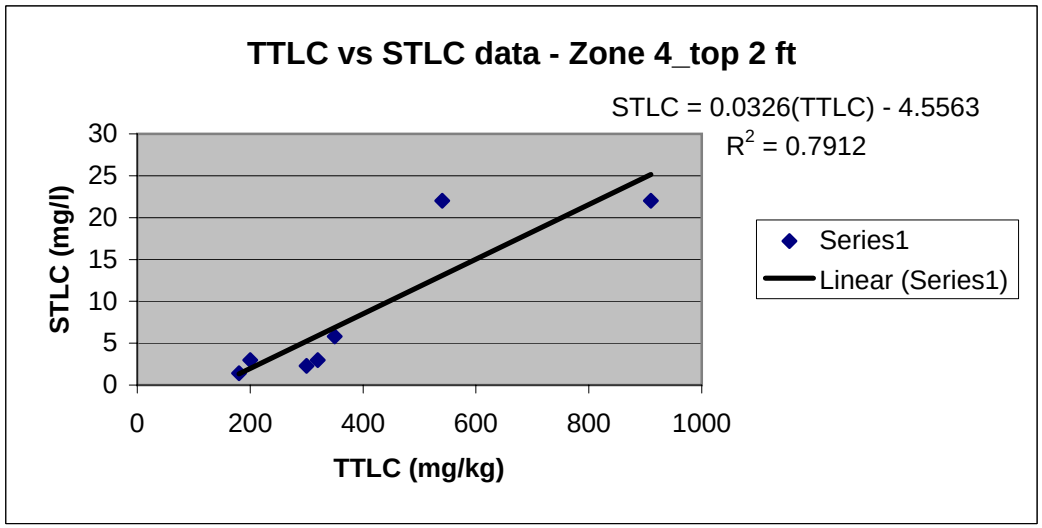
Data follow gamma distribution (0.05)

Use Approximate Gamma UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.747911
Shapiro-Wilk 5% Critical Value	0.892
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	51.68291
Gamma Distribution Test	
A-D Test Statistic	0.626377
A-D 5% Critical Value	0.751791
K-S Test Statistic	0.202773
K-S 5% Critical Value	0.212148
Data follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	53.05395
Adjusted Gamma UCL	55.11636
Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.931907
Shapiro-Wilk 5% Critical Value	0.892
Data are lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	57.78797
95% Chebyshev (MVUE) UCL	67.29938
97.5% Chebyshev (MVUE) UCL	80.80373
99% Chebyshev (MVUE) UCL	107.3304
95% Non-parametric UCLs	
CLT UCL	50.84346
Adj-CLT UCL (Adjusted for skewness)	55.49873
Mod-t UCL (Adjusted for skewness)	52.40904
Jackknife UCL	51.68291
Standard Bootstrap UCL	50.53668
Bootstrap-t UCL	62.1838
Hall's Bootstrap UCL	109.2394
Percentile Bootstrap UCL	51.47059
BCA Bootstrap UCL	55.52941
95% Chebyshev (Mean, Sd) UCL	73.3943
97.5% Chebyshev (Mean, Sd) UCL	89.06579
99% Chebyshev (Mean, Sd) UCL	119.8494

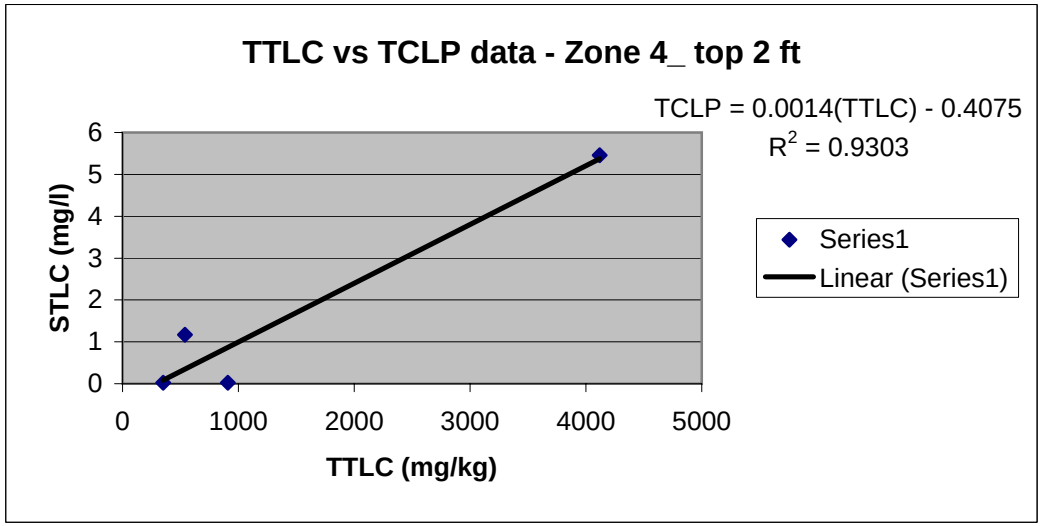
Zone 4 - top 2 feet

Location	TTLC	STLC
ADL-14	910	22
ADL-15	540	22
ADL-15	200	3
ADL-16	350	5.8
ADL-16	180	1.4
ADL-17	320	3
ADL-17	300	2.3



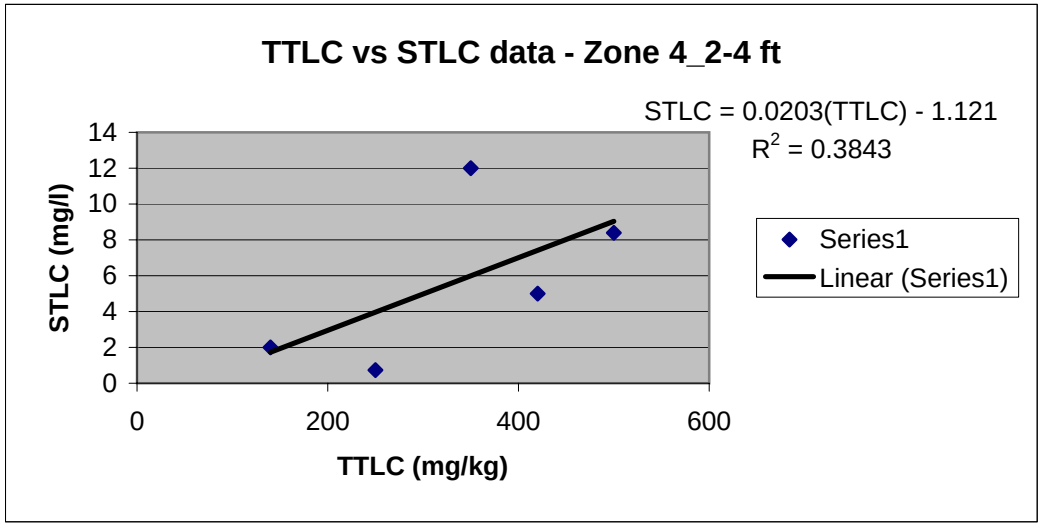
Zone 4 - top 2 feet

Location	TTLC	TCLP
ADL-14	4120	5.46
ADL-14	910	0.025
ADL-15	540	1.17
ADL-16	350	0.025



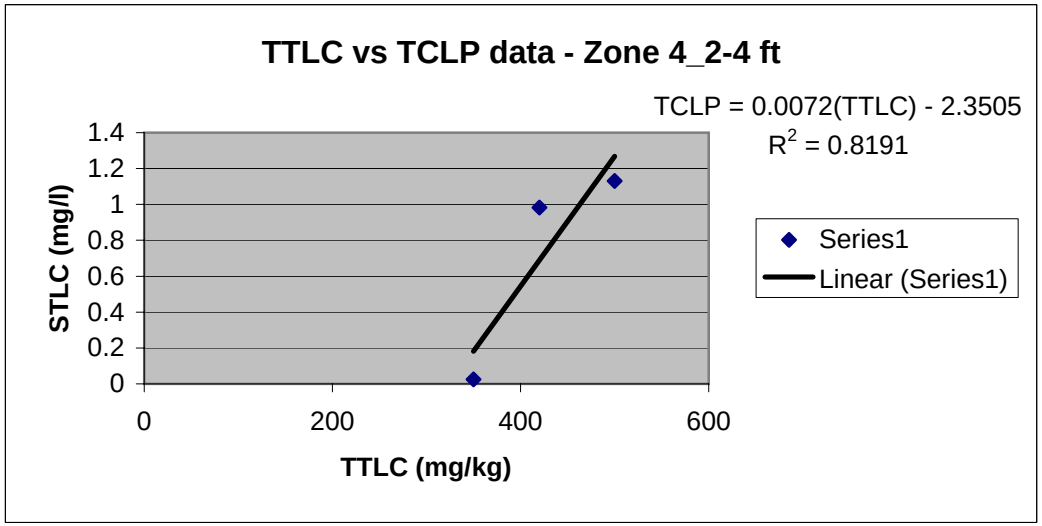
Zone 4 _ 2-4 feet

Location	TTLC	STLC
ADL-14	500	8.4
ADL-15	420	5.00
ADL-15	350	12.0
ADL-16	140	2.00
ADL-16	250	0.730



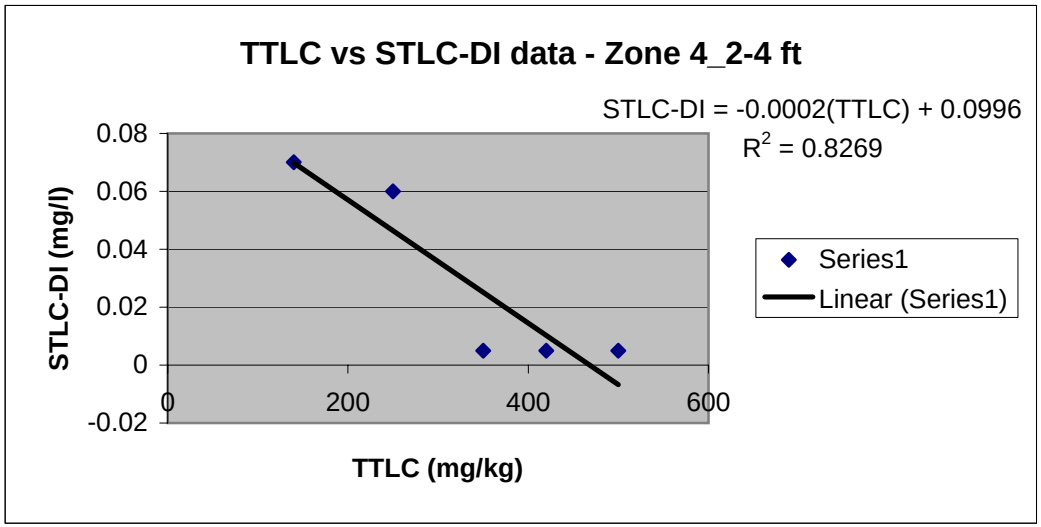
Zone 4_2-4 feet

Location	TTLC	TCLP
ADL-14	500	1.13
ADL-15	420	0.983
ADL-15	350	0.025



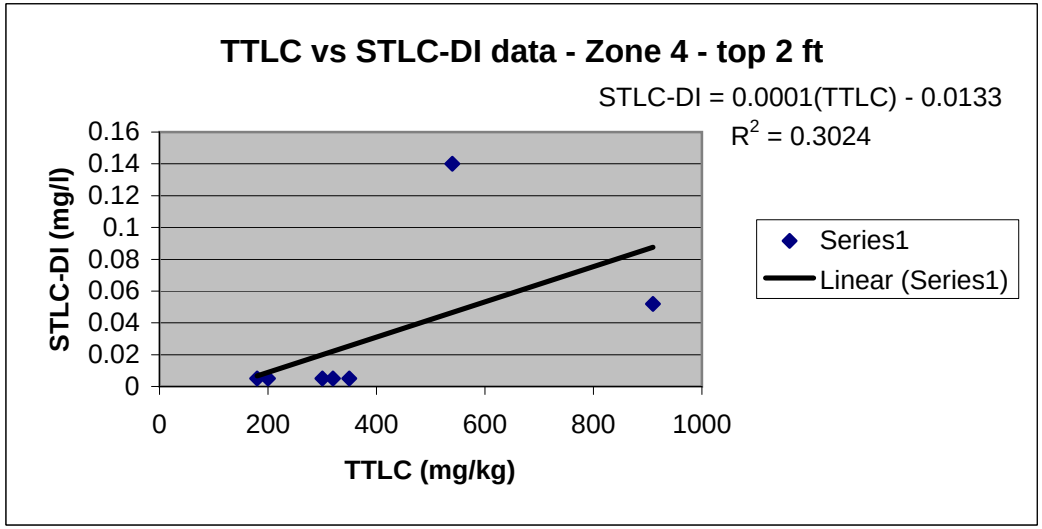
Zone 4_2-4 feet

Location	TTLC	STLC-DI
ADL-14	500	0.005
ADL-15	420	0.005
ADL-15	350	0.005
ADL-16	140	0.0700
ADL-16	250	0.0600



Zone 4 - top 2 feet

Location	TTLC	STLC-DI
ADL-14	910	0.052
ADL-15	540	0.14
ADL-15	200	0.005
ADL-16	350	0.005
ADL-16	180	0.005
ADL-17	320	0.005
ADL-17	300	0.005



Zone 4 - exposed soil - top 2 ft

Location	TTLC	STLC	STLC-DI	TCLP
SB-30 @ 0.5	1050			
SB-31 @ 0.5	115			
ADL-14	4120	-	-	5.46
ADL-14	910	22	0.052	<0.05
ADL-15	540	22	0.14	1.17
ADL-15	200	3	0.005	
ADL-16	350	5.8	0.005	<0.05
ADL-16	180	1.4	0.005	
ADL-17	320	3	0.005	
ADL-17	300	2.3	0.005	

90% UCL TTLC = 1267.826

STLC = 0.0326(TTLC) - 4.5563

90% UCL STLC = 36.77484

TCLP = 0.0014(TTLC) - 0.4075

90% UCL TCLP = 1.367457

95% UCL TTLC = 1409.939

STLC-DI = 0.0001(TTLC) - 0.0133

95% UCL STLC-DI = 0.127694

Soil Classification = Cal-Haz non RCRA

Variance Applies - Use onsite, place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil.

90% UCL TTLC Statistical analysis - top 2 ft

Data File — Variable: 1050

Raw Statistics	
Number of Valid Samples	10
Number of Unique Samples	10
Minimum	115
Maximum	4120
Mean	808.5
Median	335
Standard Deviation	1204.6393
Variance	1451155.8
Coefficient of Variation	1.4899682
Skewness	2.7933382

Gamma Statistics	
k hat	0.9659222
k star (bias corrected)	0.7428122
Theta hat	837.02391
Theta star	1088.4312
nu hat	19.318444
nu star	14.856244
Approx.Chi Square Value(.10)	8.4369316
Adjusted Level of Significance	0.0724
Adjusted Chi Square Value	7.7979856

Log-transformed Statistics	
Minimum of log data	4.7449321
Maximum of log data	8.3236084
Mean of log data	6.0951411
Standard Deviation of log data	1.0461993
Variance of log data	1.094533

NO RECOMMENDATION AVAILABLE

Select 95% Confidence Coefficient

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.586379
Shapiro-Wilk 5% Critical Value	0.842
Data not normal at 5% significance level	
90% UCL (Assuming Normal Distribution)	
Student's-t UCL	1335.351
Gamma Distribution Test	
A-D Test Statistic	0.72905
A-D 5% Critical Value	0.749456
K-S Test Statistic	0.241662
K-S 5% Critical Value	0.274054
Data follow gamma distribution	
at 5% significance level	
90% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	1423.654
Adjusted Gamma UCL	1540.305
Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.934525
Shapiro-Wilk 5% Critical Value	0.842
Data are lognormal at 5% significance level	
90% UCLs (Assuming Lognormal Distribution)	
90% H-UCL	1668.784
90% Chebyshev (MVUE) UCL	1453.754
95% Chebyshev (MVUE) UCL	1789.897
97.5% Chebyshev (MVUE) UCL	2256.449
99% Chebyshev (MVUE) UCL	3172.9
90% Non-parametric UCLs	
CLT UCL	1296.695
Adj-CLT UCL (Adjusted for skewness)	1536.995
Mod-t UCL (Adjusted for skewness)	1391.434
Jackknife UCL	1335.351
Standard Bootstrap UCL	1267.826
Bootstrap-t UCL	2690.684
Hall's Bootstrap UCL	3438.566
Percentile Bootstrap UCL	1284
BCA Bootstrap UCL	1590.5
90% Chebyshev (Mean, Sd) UCL	1951.321
95% Chebyshev (Mean, Sd) UCL	2468.981
97.5% Chebyshev (Mean, Sd) UCL	3187.472
99% Chebyshev (Mean, Sd) UCL	4598.809

Zone 4

95% UCL TTLC Statistical analysis - top 2 ft

Data File		Variable: 1050	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	10	Shapiro-Wilk Test Statisitic	0.5863785
Number of Unique Samples	10	Shapiro-Wilk 5% Critical Value	0.842
Minimum	115	Data not normal at 5% significance level	
Maximum	4120		
Mean	808.5	95% UCL (Assuming Normal Distribution)	
Median	335	Student's-t UCL	1506.8067
Standard Deviation	1204.639		
Variance	1451156	Gamma Distribution Test	
Coefficient of Variation	1.489968	A-D Test Statistic	0.7290499
Skewness	2.793338	A-D 5% Critical Value	0.7494559
		K-S Test Statistic	0.2416621
Gamma Statistics		K-S 5% Critical Value	0.274054
k hat	0.965922	Data follow gamma distribution	
k star (bias corrected)	0.742812	at 5% significance level	
Theta hat	837.0239		
Theta star	1088.431	95% UCLs (Assuming Gamma Distribution)	
nu hat	19.31844	Approximate Gamma UCL	1677.4398
nu star	14.85624	Adjusted Gamma UCL	1920.3415
Approx.Chi Square Value (.05)	7.16048		
Adjusted Level of Significance	0.0267	Lognormal Distribution Test	
Adjusted Chi Square Value	6.254759	Shapiro-Wilk Test Statisitic	0.9345249
		Shapiro-Wilk 5% Critical Value	0.842
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	4.744932		
Maximum of log data	8.323608	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	6.095141	95% H-UCL	2339.7791
Standard Deviation of log data	1.046199	95% Chebyshev (MVUE) UCL	1789.8965
Variance of log data	1.094533	97.5% Chebyshev (MVUE) UCL	2256.4487
		99% Chebyshev (MVUE) UCL	3172.9
		95% Non-parametric UCLs	
		CLT UCL	1435.0912
		Adj-CLT UCL (Adjusted for skewness)	1794.6426
		Mod-t UCL (Adjusted for skewness)	1562.8895
		Jackknife UCL	1506.8067
		Standard Bootstrap UCL	1409.9386
		Bootstrap-t UCL	3180.72
RECOMMENDATION		Hall's Bootstrap UCL	3547.7933
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	1497.5
		BCA Bootstrap UCL	1839
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	2468.9807
		97.5% Chebyshev (Mean, Sd) UCL	3187.472
		99% Chebyshev (Mean, Sd) UCL	4598.8091

Zone 4 _ 2-4 ft

Location	TTLC	STLC	STLC-DI	TCLP
SB-30 @ 2	20			
SB-31 @ 2	322			
ADL-14	25	-	-	-
ADL-14	500	8.4	<0.010	1.13
ADL-15	420	5.00	<0.010	0.983
ADL-15	350	12.0	<0.010	<0.05
ADL-16	140	2.00	0.0700	-
ADL-16	250	0.730	0.0600	-
ADL-16	10	-	-	-

95% UCL
TTLC = 320.8809

STLC = 0.0203(TTLC) - 1.121

95% UCL
STLC = 5.392882

TCLP = 0.0072(TTLC) - 2.3505

95% UCL
TLCP = -0.040158

STLC-DI = -0.0002(TTLC) + 0.0996

95% UCL
STLC -DI= 0.035424

Soil Classification = Cal-Haz non RCRA
Variance Applies - Use on site. place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil.

95% UCL TTLC Statistical analysis - 2-4 ft

Data File — Variable: 20

Raw Statistics	
Number of Valid Samples	9
Number of Unique Samples	9
Minimum	10
Maximum	500
Mean	226.3333
Median	250
Standard Deviation	185.3267
Variance	34346
Coefficient of Variation	0.818822
Skewness	0.071365

Gamma Statistics	
k hat	0.888611
k star (bias corrected)	0.666481
Theta hat	254.7047
Theta star	339.5944
nu hat	15.99499
nu star	11.99666
Approx.Chi Square Value (.05)	5.223825
Adjusted Level of Significance	0.02308
Adjusted Chi Square Value	4.319914

Log-transformed Statistics	
Minimum of log data	2.302585
Maximum of log data	6.214608
Mean of log data	4.763072
Standard Deviation of log data	1.505367
Variance of log data	2.266129

RECOMMENDATION
Data are normal (0.05)

Use Student's-t UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.908867
Shapiro-Wilk 5% Critical Value	0.829
Data are normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	341.208

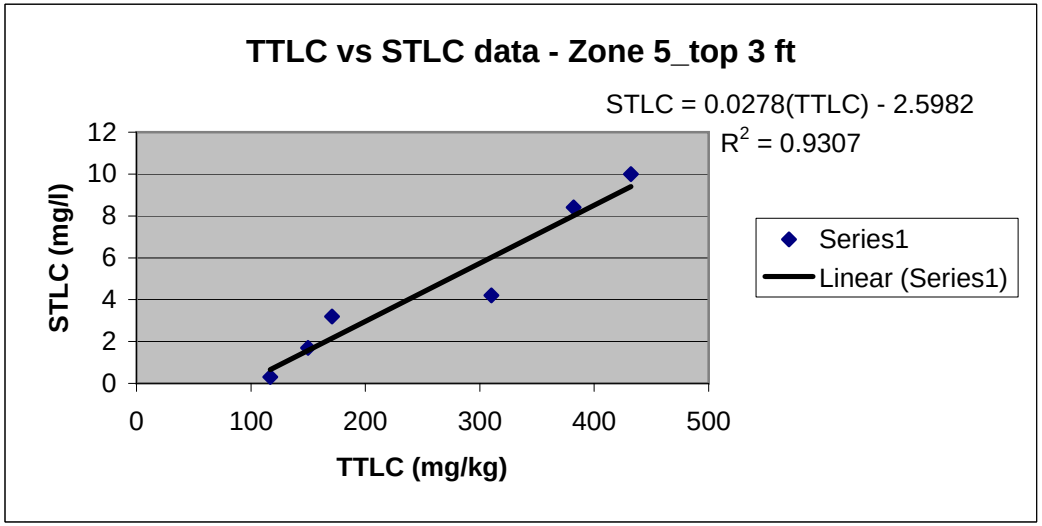
Gamma Distribution Test	
A-D Test Statistic	0.614279
A-D 5% Critical Value	0.74703
K-S Test Statistic	0.22951
K-S 5% Critical Value	0.28796
Data follow gamma distribution at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	519.7809
Adjusted Gamma UCL	628.5414

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.835288
Shapiro-Wilk 5% Critical Value	0.829
Data are lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	4088.249
95% Chebyshev (MVUE) UCL	960.8912
97.5% Chebyshev (MVUE) UCL	1249.067
99% Chebyshev (MVUE) UCL	1815.134

95% Non-parametric UCLs	
CLT UCL	327.9451
Adj-CLT UCL (Adjusted for skewness)	329.5153
Mod-t UCL (Adjusted for skewness)	341.4529
Jackknife UCL	341.208
Standard Bootstrap UCL	320.8809
Bootstrap-t UCL	348.9125
Hall's Bootstrap UCL	316.1813
Percentile Bootstrap UCL	322.7778
BCA Bootstrap UCL	322.2222
95% Chebyshev (Mean, Sd) UCL	495.6068
97.5% Chebyshev (Mean, Sd) UCL	612.1217
99% Chebyshev (Mean, Sd) UCL	840.9926

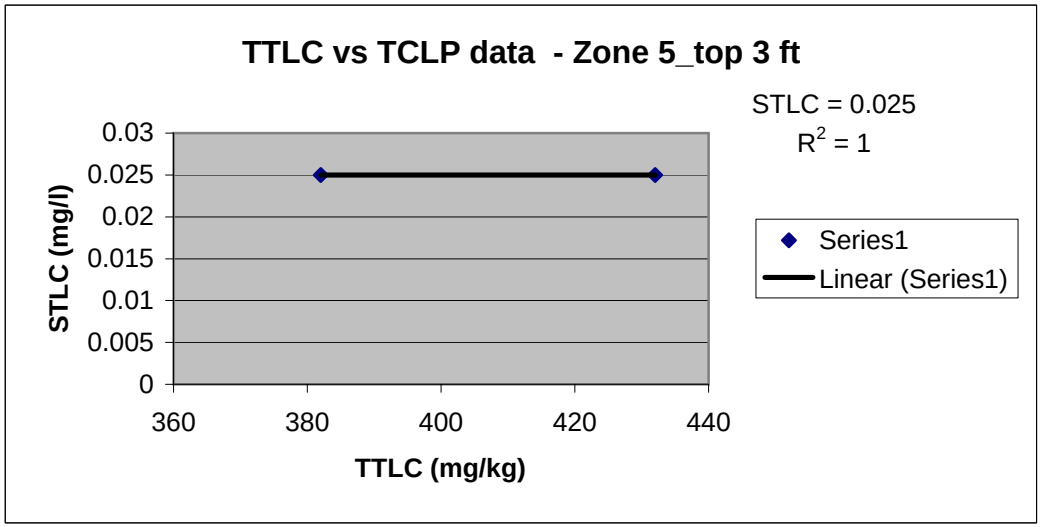
Zone 5 - top 3 feet

Location	TTLC	STLC
ADL-7	150	1.7
ADL-7	171	3.2
ADL-7	117	0.31
ADL-8	310	4.2
ADL-8	432	10
ADL-8	382	8.4



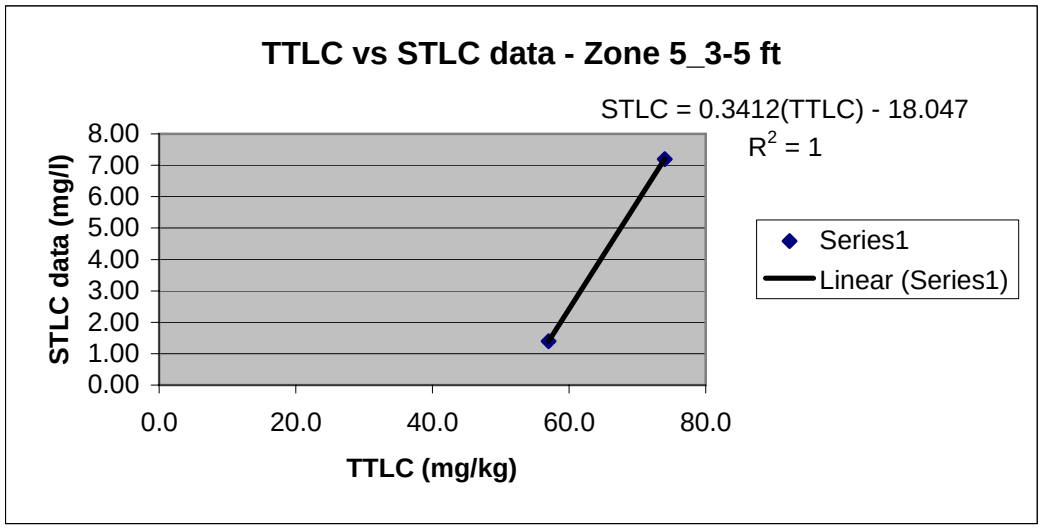
Zone 5 - top 3 feet

Location	TTLC	TCLP
ADL-8	432	0.025
ADL-8	382	0.025



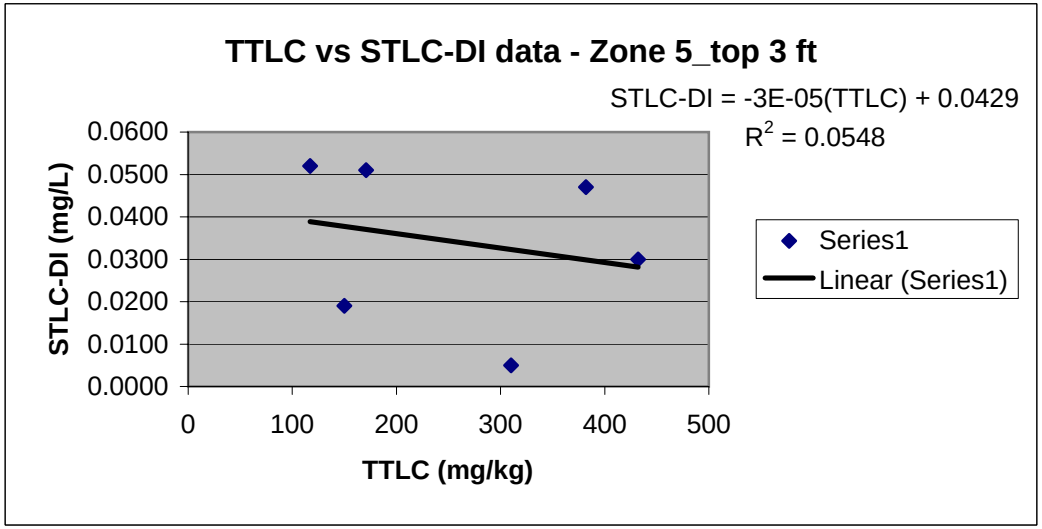
Zone 5 - 3-5 ft

Location	TTLC	STLC
ADL-7	57.0	1.40
ADL-7	74.0	7.20



Zone 5 - top 3 ft

Sample ID	TTLC	STLC-DI
ADL-7	150	0.0190
ADL-7	171	0.0510
ADL-7	117	0.0520
ADL-8	310	0.005
ADL-8	432	0.03
ADL-8	382	0.047



Zone 5 - exposed soil - top 3 ft

Location	TTLC	STLC	STLC-DI	TCLP
ADL-7	150	1.7	0.0190	
ADL-7	171	3.2	0.0510	
ADL-7	117	0.31	0.0520	
ADL-8	310	4.2	0.005	
ADL-8	432	10	0.03	<0.05
ADL-8	382	8.4	0.047	<0.05
SB-37 @ 0.5	123			
SB-37 @ 2	52			

90% UCL TTLC = 275.212

STLC = 0.0278(TTLC) - 2.5982

90% UCL STLC = 5.052692

95% UCL TTLC = 291.1

STLC-DI = -3E-05(TTLC) + 0.0429

95% UCL STLC-DI = 0.051633

Soil Classification = Cal-Haz non RCRA

Variance Applies - Use onsite, place a minimum of 5 ft above maximum water table elevation and cover with at least 1 foot of non-hazardous soil

90% UCL TTLC Statistical analysis - top 3 ft

Data File — Variable: 150

Raw Statistics	
Number of Valid Samples	8
Number of Unique Samples	8
Minimum	52
Maximum	432
Mean	217.125
Median	160.5
Standard Deviation	138.752
Variance	19252.13
Coefficient of Variation	0.639042
Skewness	0.603494

Gamma Statistics	
k hat	2.630799
k star (bias corrected)	1.727583
Theta hat	82.53195
Theta star	125.6814
nu hat	42.09279
nu star	27.64133
Approx.Chi Square Value(.10)	18.64188
Adjusted Level of Significance	0.06072
Adjusted Chi Square Value	17.15957

Log-transformed Statistics	
Minimum of log data	3.951244
Maximum of log data	6.068426
Mean of log data	5.17854
Standard Deviation of log data	0.710612
Variance of log data	0.50497

NO RECOMMENDATION AVAILABLE

Select 95% Confidence Coefficient

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.896537
Shapiro-Wilk 5% Critical Value	0.818
Data are normal at 5% significance level	
90% UCL (Assuming Normal Distribution)	
Student's-t UCL	286.5359

Gamma Distribution Test	
A-D Test Statistic	0.321108
A-D 5% Critical Value	0.722393
K-S Test Statistic	0.189264
K-S 5% Critical Value	0.296728
Data follow gamma distribution	
at 5% significance level	
90% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	321.943
Adjusted Gamma UCL	349.7536

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.941384
Shapiro-Wilk 5% Critical Value	0.818
Data are lognormal at 5% significance level	
90% UCLs (Assuming Lognormal Distribution)	
90% H-UCL	383.2475
90% Chebyshev (MVUE) UCL	388.8167
95% Chebyshev (MVUE) UCL	465.2165
97.5% Chebyshev (MVUE) UCL	571.2566
99% Chebyshev (MVUE) UCL	779.5518

90% Non-parametric UCLs	
CLT UCL	279.9931
Adj-CLT UCL (Adjusted for skewness)	287.4679
Mod-t UCL (Adjusted for skewness)	288.2804
Jackknife UCL	286.5359
Standard Bootstrap UCL	275.212
Bootstrap-t UCL	297.338
Hall's Bootstrap UCL	274.3013
Percentile Bootstrap UCL	283.75
BCA Bootstrap UCL	279.875
90% Chebyshev (Mean, Sd) UCL	364.2937
95% Chebyshev (Mean, Sd) UCL	430.9562
97.5% Chebyshev (Mean, Sd) UCL	523.4812
99% Chebyshev (Mean, Sd) UCL	705.2285

Zone 5

95% UCL TTLC Statistical analysis - top 3 ft

General Statistics			
Number of Valid Observations	8	Number of Distinct Observations	8
Raw Statistics		Log-transformed Statistics	
Minimum	52	Minimum of Log Data	3.951
Maximum	432	Maximum of Log Data	6.068
Mean	217.1	Mean of log Data	5.179
Median	160.5	SD of log Data	0.711
SD	138.8		
Coefficient of Variation	0.639		
Skewness	0.603		
Warning: There are only 8 Values in this data			
Note: It should be noted that even though bootstrap methods may be performed on this data set,			
the resulting calculations may not be reliable enough to draw conclusions			
The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.			
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.897	Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	310.1	95% H-UCL	478.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	465.2
95% Adjusted-CLT UCL	309	97.5% Chebyshev (MVUE) UCL	571.3
95% Modified-t UCL	311.8	99% Chebyshev (MVUE) UCL	779.6
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.728	Data appear Normal at 5% Significance Level	
Theta Star	125.7		
nu star	27.64		
Approximate Chi Square Value (.05)	16.65	Nonparametric Statistics	
Adjusted Level of Significance	0.0195	95% CLT UCL	297.8
Adjusted Chi Square Value	14.53	95% Jackknife UCL	310.1
		95% Standard Bootstrap UCL	291.1
Anderson-Darling Test Statistic	0.321	95% Bootstrap-t UCL	336.7
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	294.4
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL	296.9
Kolmogorov-Smirnov 5% Critical Value	0.297	95% BCA Bootstrap UCL	298.5
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	431
		97.5% Chebyshev(Mean, Sd) UCL	523.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	705.2
95% Approximate Gamma UCL	360.5		
95% Adjusted Gamma UCL	412.9		
Potential UCL to Use		Use 95% Student's-t UCL	310.1

Zone 5 _ 3-5 ft

Location	TTLC	STLC	TCLP
ADL-7	57.0	1.40	
ADL-7	74.0	7.20	<0.05
ADL-8	17.0	-	
ADL-8	12.0	-	
SB-37 @ 5	6.7		

95% UCL TTLC = 53.10873

STLC = 0.3412(TTLC) - 18.047

95% UCL STLC = 0.073698

Soil Classification = non Haz

95% UCL TTLC Statistical analysis - 3-5 ft

Data File — Variable: 57

Raw Statistics	
Number of Valid Samples	5
Number of Unique Samples	5
Minimum	6.7
Maximum	74
Mean	33.34
Median	17
Standard Deviation	30.18738
Variance	911.278
Coefficient of Variation	0.90544
Skewness	0.719131

Gamma Statistics	
k hat	1.414852
k star (bias corrected)	0.699274
Theta hat	23.56431
Theta star	47.67802
nu hat	14.14852
nu star	6.99274
Approx.Chi Square Value (.05)	2.165968
Adjusted Level of Significance	0.0086
Adjusted Chi Square Value	1.184169

Log-transformed Statistics	
Minimum of log data	1.902108
Maximum of log data	4.304065
Mean of log data	3.113469
Standard Deviation of log data	1.027457
Variance of log data	1.055668

RECOMMENDATION
Data are normal (0.05)

Use Student's-t UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.847659
Shapiro-Wilk 5% Critical Value	0.762
Data are normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	62.12036

Gamma Distribution Test	
A-D Test Statistic	0.385233
A-D 5% Critical Value	0.687233
K-S Test Statistic	0.264622
K-S 5% Critical Value	0.362137
Data follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	107.6368
Adjusted Gamma UCL	196.879

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.92123
Shapiro-Wilk 5% Critical Value	0.762
Data are lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	503.6883
95% Chebyshev (MVUE) UCL	97.46062
97.5% Chebyshev (MVUE) UCL	125.1646
99% Chebyshev (MVUE) UCL	179.5836

95% Non-parametric UCLs	
CLT UCL	55.54587
Adj-CLT UCL (Adjusted for skewness)	60.18507
Mod-t UCL (Adjusted for skewness)	62.84398
Jackknife UCL	62.12036
Standard Bootstrap UCL	53.10873
Bootstrap-t UCL	186.904
Hall's Bootstrap UCL	266.2788
Percentile Bootstrap UCL	53.74
BCA Bootstrap UCL	54.8
95% Chebyshev (Mean, Sd) UCL	92.18604
97.5% Chebyshev (Mean, Sd) UCL	117.6488
99% Chebyshev (Mean, Sd) UCL	167.6654

Federal Aviation Administration

« OE/AAA

My Cases in DETERMINED Status

Please refer to the assigned ASN on all inquiries to the FAA

All Cases	Filter by Case Status	Cases Requiring Action
Show All Cases (16)	Draft (0) | Accepted (0) | Work in Progress (0) Interim (0) | Determined (16) | Circularized (0) | Terminated (0)	7460-2 Required (0) | Add Letter (0) Cases Due to Expire (0)

Records 1 to 16 of 16 Page 1 of 1

View Folder | Create Folder | Manage Folders | Transfer Cases

ASN	Folder Name	Project Name	Structure Name	Status	Date Accepted	Date Determined	7460-2 Received	City	State
2012-AWP-3881-OE		ALAME-000205175-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3882-OE		ALAME-000205175-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3895-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3896-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3897-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3898-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3899-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3900-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3901-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3902-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3903-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3904-OE		ALAME-000205225-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3906-OE		ALAME-000205230-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3907-OE		ALAME-000205230-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3908-OE		ALAME-000205230-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA
2012-AWP-3909-OE		ALAME-000205230-12	Temporary Crane	Determined	05/07/2012	05/23/2012		Oakland	CA

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Rows per Page: 20

Records 1 to 16 of 16 **Page: 1** Page 1 of 1

Draft: Cases that have been saved by the user but have not been submitted to the FAA.
Accepted: Cases that have been submitted to the FAA.
Add Letter: Cases that have been reviewed by the FAA and require additional information from the user.
Work in Progress: Cases that are being evaluated by the FAA.
Interim: Cases that have been reviewed by the FAA and require resolution from the user.
Determined: Cases that have a completed aeronautical study and an FAA determination.
Terminated: Cases that are no longer valid.
Please allow the FAA a minimum of 45 days to complete a study.

Case Transfer:

- **Use the check box(es) to select the case(s) you want to transfer.**
- **Select the "Transfer Cases button" to open the "Manage Transfer Cases" screen.**

Note: Drafts and cases in Add and Terminated status can not be transferred.

Click here to contact the appropriate representative.

I-880 Operational and Safety Improvements at 29th Avenue and 23rd Avenue

	T.C.E. Property Information				
No.	Caltrans Parcel No.	Assessor Parcel No.	Site Address	T.C.E. SF	Sheet #
1	62326-2	025-0680-001-006	Fruitvale Station LLC 1100 29th Avenue Oakland, CA 94601	33,646	C-2
2	62327	019-0085-021	Oakley Station, LLC (formerly Gray and Reynolds Properties, Inc.) 29th Avenue Oakland, CA 94601	N/A (full take)	N/A (full take)
3	62328-1	019-0084-035-01	Bansal, Inc.(formerly Equilon Enterprises, LLC) 834 Portwood Avenue Oakland, CA 94601	2,070	C-4, C-7
4	62329-1	019-0084-015-01	Bernal Investment, Inc. 811 Portwood Avenue Oakland, CA 94601	363	C-7
5	62329-2	019-0084-019-02	Bernal Investment, Inc. 2800 E. 8th Street & 815 Portwood Avenue Oakland, CA 94601	66	C-7
6	62330-1	019-0084-020-01	Judy Mapp 2784 East 8th Street Oakland, CA 94601	52	C-7, C-8
7	62331-1	019-0084-021-01	Judy M. Mapp Trust 812 Lisbon Avenue Oakland, CA 94601	34	C-8
8	62333-3	019-0083-016-03	Robert Bellelli (formerly Crabtree) 816 27th Avenue Oakland, CA 94601	8,617	C-8
9	62334-3, & -5	019-0082-006-01	EBPM Holding Co., Inc. 823 27th Avenue Oakland, CA 94601	750 541	C-8, C-9
10	6233-4, & -6	019-0082-005-01	EBPM Holding Co., Inc. 829 27th Avenue Oakland, CA 94601	3,103 850	C-9
11	62410-2	019-0068-002	Fidelity Holdings, Inc. 646 Kennedy Street Oakland, CA	3,158	C-16, C-17

Legend:
T.C.E.- Temporary Construction Easement

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
1	019 004900302	2124	LIVINGSTON ST		OAKLAND	94606	BAUER BRUCE F & ELAINE L TRS		25515 DARIO TER		HAYWARD CA	94541
2	019 004900307	2100	LIVINGSTON ST		OAKLAND	94606	2100 LIVINGSTON STREET LAND LLC	RAYMOND J GALLAGHER	255 3RD ST	102	OAKLAND CA	94607
3	019 005602600	1078	CALCOT PL		OAKLAND	94606	CHEN WEI W & CHIENG JENNY		1078 CALCOT PL		OAKLAND CA	94606
4	019 006600702		FREDERICK ST		OAKLAND	94608	EAST BAY MUNICIPAL UTILITY DISTRICT		375 11TH ST		OAKLAND CA	94607
5	019 006700300	800	KENNEDY ST		OAKLAND	94606	HOLT EARLE F & MARIANNE D TRS		23 GREENTREE CT		LAFAYETTE CA	94549
6	019 007100500	401	KENNEDY ST		OAKLAND	94606	RIGHT AWAY REDY MIX INC		401 KENNEDY ST		OAKLAND CA	94606
7	019 007201000	333	23RD AVE		OAKLAND	94606	LONESTAR CALIFORNIA INC	CEMEX, INC.	1501 BELVEDERE RD		WEST PALM BEACH FL	33406
8	019 007201200	333	KENNEDY ST		OAKLAND	94606	BBIC ASSOCIATES LLC		333 KENNEDY ST		OAKLAND CA	94606
9	019 007800500	29TH	AV		OAKLAND	94606	S P CO 872-1-75A-8	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
10	019 005602700	1082	CALCOT PL		OAKLAND	94606	EANDI FAMILY PROPERTIES LP		4201 BEMIS ST		OAKLAND CA	94605
11	019 007100300		E 7TH ST		OAKLAND	94606	S P CO 872-1-75C-POR 14	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
12	019 007901200	438	23RD AVE		OAKLAND	94606	MARZOLF WAYNE H & NANCY T REED TRS & MARZOLF ETAL		1044 CENTRAL AVE		ALAMEDA CA	94501
13	019 007902200	2821	CHAPMAN ST		OAKLAND	94601	DUNETZ DAVID		2821 CHAPMAN ST	A-B	OAKLAND CA	94601
14	019 008001200	516	23RD AVE		OAKLAND	94606	OAKLAND 23RD AVENUE ASSOCIATES LLC	CLO CAPPA	1441 LIVORNA RD		ALAMO CA	94507
15	019 008002300	2809	E 7TH ST		OAKLAND	94601	HUANG ZHI Q		2809 E 7TH STREET		OAKLAND CA	94601
16	019 008002700	2846	CHAPMAN ST		OAKLAND	94601	CAMBIO CORSA LLC	MICHAEL T ALDERS	PO BOX 7698		OAKLAND CA	94601
17	019 008102100	2830	E 7TH ST		OAKLAND	94601	KWON HWA S & SOON I		600 MOUNTAIN BLVD		OAKLAND CA	94611
18	019 008100400	2804	E 7TH ST		OAKLAND	94601	2810 7TH STREET LLC	TSZKEUNG WONG	2810 E 7TH ST		OAKLAND CA	94601
19	019 008300300	2715	E 9TH ST		OAKLAND	94601	GASPAR ALFRED A & BEVERLY TRS		200 MAITLAND DR		ALAMEDA CA	94502
20	019 008401300	825	PORTWOOD AVE		OAKLAND	94601	CASILLAS GERARDO		825 PORTWOOD AVE		OAKLAND CA	94601
21	019 008401400	821	PORTWOOD AVE		OAKLAND	94601	MORA ANGELINA & MORA ANGELINA CUST FOR YESSIC ETAL		821 PORTWOOD AVE		OAKLAND CA	94601
22	019 008300500	2729	E 9TH ST		OAKLAND	94601	VIERRA ROSALENE & FRANK JR		2729 E 9TH ST		OAKLAND CA	94601
23	019 008401200	833	PORTWOOD AVE		OAKLAND	94601	FLORES ELISEO & CARMEN		833 PORTWOOD AVE		OAKLAND CA	94601
24	019 008402101	812	LISBON AVE		OAKLAND	94601	THOMAS JOYCE HEIRS OF EST ETAL		487 A ST		HAYWARD CA	94541
25	019 008400800	2833	E 9TH ST		OAKLAND	94601	SERRANO ARTURO C & GLORIA		1126 103RD AVE		OAKLAND CA	94603
26	019 008502001	2861	E 10TH ST		OAKLAND	94601	HEATON JAN J & VALENZUELA CAROLINA		2861 E 10TH ST		OAKLAND CA	94601
27	019 008500700	2800	E 9TH ST		OAKLAND	94601	GARCIA ALBERTO & ESPERANZA		378 JACK LONDON AVE		ALAMEDA CA	94501
28	019 008601401	2744	E 9TH ST		OAKLAND	94601	TRINDADE ELSIE & MELVIN		2744 E 9TH ST		OAKLAND CA	94601
29	019 008601500	2734	E 9TH ST		OAKLAND	94601	WEST GERALDINE TR		3291 SYCAMORE PL		CARMEL CA	93923
30	019 008600200	2705	E 10TH ST		OAKLAND	94601	ZAMORA DANIEL & ALICIA & SONIA		2705 E 10TH ST		OAKLAND CA	94601
31	019 008701100	2642	E 9TH ST		OAKLAND	94601	BENHAD PROPERTIES		15436 N FLORIDA AVE	200	TAMPA FL	33613
32	019 008700800	921	27TH AVE		OAKLAND	94601	HERRERA BLANCA E		2419 ST HELENA DR	4	HAYWARD CA	94542
33	019 008501300		E 10TH ST		OAKLAND	94601	SCHWARTZ PHILLIP & SUSAN TRS		4589 MOHR AVE		PLEASANTON CA	94566
34	019 008500900	2808	E 9TH ST		OAKLAND	94601	DAVIS TERRY C		2808 E 9TH ST		OAKLAND CA	94601
35	019 009001400	2524	E 10TH ST		OAKLAND	94601	ORELLANA ALEX & MARCOS T		2524 E 10TH ST		OAKLAND CA	94601
36	019 009100300	2623	E 11TH ST		OAKLAND	94601	KIDSPART LLC		2530 E 11TH ST		OAKLAND CA	94601
37	019 009100600	2635	E 11TH ST		OAKLAND	94601	GOODE STEPHANIE A & PASQUALINO PHILIP P III		2635 E 11TH ST		OAKLAND CA	94601
38	019 009201400	2714	E 10TH ST		OAKLAND	94601	MORA J R & AGUILAR CECILIA		2714 EASTH 10TH ST		OAKLAND CA	94601
39	019 009301601	1125	29TH AVE		OAKLAND	94601	LUCASEY MANUFACTURING CORPORATION		2744 E 14TH ST		OAKLAND CA	94601
40	019 009301900	1016	SAN FRANCISCO CT		OAKLAND	94601	JUAREZ OSCAR R		1016 SAN FRANCISCO CT		OAKLAND CA	94601
41	019 009302600	1086	SAN FRANCISCO CT		OAKLAND	94601	RUAN DA C & OU LI P	SHU Z. LAO	1086 SAN FRANCISCO CT		OAKLAND CA	94601
42	019 009303400	1017	SAN FRANCISCO CT		OAKLAND	94601	MENDOZA LUZ M		1017 SAN FRANCISCO CT		OAKLAND CA	94601
43	019 009200400	2721	E 11TH ST		OAKLAND	94601	ARANAYDO CANUTO		2721 E 11TH ST		OAKLAND CA	94601
44	019 009304600	1084	SANTA MARIA CT		OAKLAND	94601	VUONG TU & CHAU LIEN		1084 SANTA MARIA CT		OAKLAND CA	94601
45	019 009305100	1045	SANTA MARIA CT		OAKLAND	94601	HON HENRY K & MAK CECILIA S		1045 SANTA MARIA CT		OAKLAND CA	94601

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
46	019 009305500	1005	SANTA MARIA CT		OAKLAND	94601	LE HUONG & XUYEN		1005 SANTA MARIA CT		OAKLAND CA	94601
47	019 009305900	1012	SANTA INES CT		OAKLAND	94601	RAMOS MONICA B		1012 SANTA INES CT		OAKLAND CA	94601
48	019 009306800	1021	SANTA INES CT		OAKLAND	94601	GOMEZ JOSE D SR & DEGOMEZ ANA C		1021 SANTA INES CT		OAKLAND CA	94601
49	019 009602100	27TH	AV		OAKLAND	94601	S P CO 872-1-106D-POR 9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
50	025 066800500	3027	E 7TH ST		OAKLAND	94601	BLOCH DOUGLAS A & MEHRENS DERECKA A		3027 E 7TH ST		OAKLAND CA	94601
51	025 067101500	2981	E 7TH ST		OAKLAND	94601	WRIGHT T B & DOLORES G TRS & GARCIA ARMIDA	DOLOROS G. WRIGHT	2077 WASHINGTON AVE	313	SAN LEANDRO CA	94577
52	025 067101600	2986	CHAPMAN ST		OAKLAND	94601	COCHRAN RICHARD S & SUSAN L TRS & RICHARD S		24 BONITA AVE		PIEDMONT CA	94611
53	025 067300200	2915	FORD ST		OAKLAND	94601	SILVEIRA WILLIAM J		499 EMBARCADERO		OAKLAND CA	94606
54	025 067501300	2875	GLASCOCK ST	110	OAKLAND	94601	FOSTER KRISTIN & MARTINDALE GARRETT		2875 GLASCOCK ST	110	OAKLAND CA	94601
55	025 067501900	2875	GLASCOCK ST	203	OAKLAND	94601	NICOLAY SANDRA & PHILIPPE		2416 STOCKBRIDGE DR		OAKLAND CA	94611
56	025 067000600	2942	E 7TH ST		OAKLAND	94601	ZAMORA ANTONIO C & MARLENE C ETAL		431 ARKANSAS		SAN FRANCISCO CA	94107
57	025 067100401	2911	E 7TH ST		OAKLAND	94601	HOLT DARRELL G		42 HAYS CT		ALAMEDA CA	94502
58	025 067500500	2875	GLASCOCK ST	102	OAKLAND	94601	HUGHES WILLIS E JR TR		2250 LAKESHORE AVE	#2	OAKLAND CA	94606
59	025 067701401	2868	FORD ST		OAKLAND	94601	HOLT DARRELL G		508 29TH AVE		OAKLAND CA	94601
60	025 067900703	719	PETERSON ST		OAKLAND	94601	HAFFERMAN JOHN G & LINDA V & CARRANZA ANTONIO		719 PETERSON ST		OAKLAND CA	94601
61	025 068000802		FRUITVALE AVE		OAKLAND	94601	S P CO 872-1-107A-17	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
62	025 073701000		REGATTA DR		OAKLAND	94601	ESTUARY OWNERS ASSOCIATION		4670 WILLOW RD	200	PLEASANTON CA	94588
63	025 073801700	2933	GLASCOCK ST		OAKLAND	94601	GONZALEZ JEFFREY S		3090 GLASCOCK ST	305	OAKLAND CA	94601
64	025 073900300	2927	GLASCOCK ST	119	OAKLAND	94601	CAMPBELL JEFFREY B & TAVISORA LILY M		2927 GLASCOCK ST		OAKLAND CA	94601
65	025 073900200	2929	GLASCOCK ST	118	OAKLAND	94601	NGUYEN ANNA & PAUL		2929 GLASCOCK ST		OAKLAND CA	94601
66	025 073902300	339	CHANNEL WAY	138	OAKLAND	94601	JOHNSTON DANIEL S		339 CHANNEL WAY		OAKLAND CA	94601
67	025 073802100	2869	REGATTA DR		OAKLAND	94601	PERRY MATTHEW C		370 TUMBLEWEED CT		FREMONT CA	94539
68	025 073901600	2901	GLASCOCK ST	132	OAKLAND	94601	ANGROS BEVERLYANN		2601 BLANDING AVE	C261	ALAMEDA CA	94501
69	025 073902000	345	CHANNEL WAY	135	OAKLAND	94601	ROCHA GUADALUPE & OSCAR		345 CHANNEL WAY		OAKLAND CA	94601
70	025 073903400	311	BOWSMAN CT	148	OAKLAND	94601	NG NORMAN & CHU LINH		311 BOWSMAN CT		OAKLAND CA	94601
71	025 073903600	315	BOWSMAN CT	150	OAKLAND	94601	MCCLOUD ERIC		315 BOWSMAN CT		OAKLAND CA	94601
72	025 073904700	2815	REGATTA DR		OAKLAND	94601	NEBOZUK BRIAN D		669 ABBIE ST		PLEASANTON CA	94566
73	025 073905100	2823	REGATTA DR		OAKLAND	94601	FONG DENNIS & KAM POLLY TRS		1692 STORY RD	218	SAN JOSE CA	95122
74	025 073904100	2803	REGATTA DR		OAKLAND	94601	KAZMAIER KELLY S & MOORE WILLIAM & SHARON TRS		1276 LINDELL DR		WALNUT CREEK CA	94596
75	025 073905900	2837	REGATTA DR		OAKLAND	94601	REAL ESTATE ALLIANCES LLC		P O BOX 771		ROCKLIN CA	95677
76	025 073906400	2847	REGATTA DR		OAKLAND	94601	PACHECO NATHAN & SARA T TRS		2847 REGATTA DR		OAKLAND CA	94601
77	025 073901200	2909	GLASCOCK ST	128	OAKLAND	94601	SPINOLA DONNA		2909 GLASCOCK ST		OAKLAND CA	94601
78	019 009001001	2559	E 11TH ST		OAKLAND	94601	KIDSPART LLC		PO BOX 7509		OAKLAND CA	94601
79	025 067001100	2968	E 7TH ST		OAKLAND	94601	DURAN DAN TR		2178 PACHECO ST	5	CONCORD CA	94520
80	019 007100105		E 7TH ST		OAKLAND	94606	CITY OF OAKLAND		505 14TH ST	609	OAKLAND CA	94612
81	019 010200500	23RD	AV		OAKLAND	94601	S P CO 872-1-106D-POR 9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
82	019 004900309	2028	LIVINGSTON ST		OAKLAND	94606	NAGEL LOUIS F & LUDMILLA V TRS		PO BOX 1071		ALAMEDA CA	94501
83	019 005401201	1901	LIVINGSTON ST		OAKLAND	94606	CITY OF OAKLAND	REAL ESTATE DIVISION	250 FRANK H OGAWA PLZ	4	OAKLAND CA	94612
84	019 005602002	1042	CALCOT PL		OAKLAND	94606	MITCHELL DAVID		1042 CALCOT PL		OAKLAND CA	94606
85	019 005602200	1050	CALCOT PL		OAKLAND	94606	BUCHANAN HEIDI & VINCE		P.O. BOX 1179		OAKLEY CA	94561
86	019 006601900	909	KING ST		OAKLAND	94606	ROCHA GUADALUPE TR		909 KING ST		OAKLAND CA	94606
87	019 006700500		KENNEDY ST		OAKLAND	94608	HOLT EARLE F & MARIANNE D TRS		23 GREENTREE CT		LAFAYETTE CA	94549

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
88	019 007800107	324	23RD AVE		OAKLAND	94606	MURPHY MARK V & JOHNSTON NANCY TRS		424 SINEX AVE		PACIFIC GROVE CA	93950
89	019 007902300	2821	CHAPMAN ST		OAKLAND	94601	DUNETZ DAVID		2821 CHAPMAN ST	B	OAKLAND CA	94601
90	019 007902500	2821	CHAPMAN ST		OAKLAND	94601	HERKINS PATRICIA L & LISA S TRS		2821 CHAPMAN ST	E	OAKLAND CA	94601
91	019 008001701	534	23RD AVE		OAKLAND	94606	OAKLAND 23RD AVENUE ASSOCIATES LLC	BARBARA CAPPA	1441 LIVORNA RD		ALAMO CA	94507
92	019 008101100	2744	E 7TH ST		OAKLAND	94601	LCTC PROPERTIES LLC	CAROL CAMPANELLA	3384 CLOUDVIEW CT		TRACY CA	95377
93	019 008101200	2738	E 7TH ST		OAKLAND	94601	LCTC PROPERTIES LLC	CAROL CAMPANELLA	3384 CLOUDVIEW CT		TRACY CA	95377
94	019 008102200	2822	E 7TH ST		OAKLAND	94601	GALICIA JOSE A ETAL		2822 E 7TH ST		OAKLAND CA	94601
95	019 008200501	825	27TH AVE		OAKLAND	94601	EBPM HOLDING COMPANY, INC	PROVIDENT FINANCIAL	2850 OCEAN PARK BLVD	300	SANTA MONICA CA	90405
96	019 008301300	823	LISBON AVE		OAKLAND	94601	RAMOS ARMANDO & MARIA		823 LISBON AVE		OAKLAND CA	94601
97	019 008301800	828	27TH AVE		OAKLAND	94601	MUNOZ ROBERT C		828 27TH AVE		OAKLAND CA	94601
98	019 008300600	2731	E 9TH ST		OAKLAND	94601	SANTOS EMMA HEIRS OF EST	VARGAS LAVERNE	4614 VIRGINIA AVE		OAKLAND CA	94619
99	019 008300700	2737	E 9TH ST		OAKLAND	94601	ZAMORA DANIEL & ALICIA & SONIA		2705 E 10TH ST		OAKLAND CA	94601
100	019 008400100	2801	E 9TH ST		OAKLAND	94601	RAMIREZ JOSE A & MARICELA		2801 E 9TH ST		OAKLAND CA	94601
101	019 008401101	2845	E 9TH ST		OAKLAND	94601	LEI JIAN M & LI YUE P		2845 E 9TH ST		OAKLAND CA	94601
102	019 008200100	2611	E 9TH ST		OAKLAND	94601	ROMAN CATHOLIC BISHOP OF OAKLAND	ATTN CONTROLLER	2121 HARRISON ST	100	OAKLAND CA	94612
103	019 008401501	811	PORTWOOD AVE		OAKLAND	94601	BERNAL INVESTMENT INC		PO BOX 2434		DUBLIN CA	94568
104	019 008400400	2815	E 9TH ST		OAKLAND	94601	DELEON GREGORIO T & IRENE		2708 E 10TH ST		OAKLAND CA	94601
105	019 008404000	2809	E 9TH ST	2811	OAKLAND	94601	YU RAYMOND W & GRACE S TRS		2807 MACARTHUR BLVD		OAKLAND CA	94602
106	019 008501100	2801	E 10TH ST		OAKLAND	94601	NAVARRO JOSE		2801 E 10TH ST		OAKLAND CA	94601
107	019 008501500	2829	E 10TH ST		OAKLAND	94601	HERNANDEZ JESUS & BERTHA A		2715 BEACHWOOD CT		HAYWARD CA	94545
108	019 008502200	2878	E 9TH ST		OAKLAND	94601	VICOCHEA ANDREW		2878 E 9TH ST		OAKLAND CA	94601
109	019 008500500	2830	E 9TH ST		OAKLAND	94601	MADDOX CAROL L		2830 E 9TH ST		OAKLAND CA	94601
110	019 008500600	2824	E 9TH ST		OAKLAND	94601	GARCIA ALBERTO & ESPERANZA		378 JACK LONDON AVE		ALAMEDA CA	94501
111	019 008600300	2709	E 10TH ST		OAKLAND	94601	ZAMORA DANIEL & ALICIA		2709 E 10TH ST		OAKLAND CA	94601
112	019 008701200	2636	E 9TH ST		OAKLAND	94601	DIAZ BENITO		2506 E 10TH ST		OAKLAND CA	94601
113	019 008501801	2855	E 10TH ST		OAKLAND	94601	ANDERSON DOUGLAS L & JUDITH S		7309 HANSEN DR		DUBLIN CA	94568
114	019 009001500	2518	E 10TH ST		OAKLAND	94601	NAVARRO EVA		3977 ADAMS AVE		FREMONT CA	94538
115	019 009001600	2512	E 10TH ST		OAKLAND	94601	MORA JOSE P & NAVARROMORA IRMA		2512 E 10TH ST		OAKLAND CA	94601
116	019 009000600	2537	E 11TH ST		OAKLAND	94601	LIEBA STEVE F & LIEBA MARK R HEIRS OF EST ETAL		2537 E 11TH ST		OAKLAND CA	94601
117	019 009000800	2551	E 11TH ST		OAKLAND	94601	MARTIN CARL L		2551 E 11TH ST		OAKLAND CA	94601
118	019 009101501	2601	E 11TH ST		OAKLAND	94606	KIDSPART LLC	DREISBACH ENTERPRISE	PO BOX 7509		OAKLAND CA	94601
119	019 009101601	2601	E 11TH ST		OAKLAND	94606	KIDSPART LLC	DREISBACH ENTERPRISE	PO BOX 7509		OAKLAND CA	94601
120	019 009201000	2742	E 10TH ST		OAKLAND	94601	FULTON JAMES W & ARLENE		2529 E 10TH ST		OAKLAND CA	94601
121	019 009201600	2702	E 10TH ST		OAKLAND	94601	MARTINEZ MARGARITA & JUAN ETAL		2702 E 10TH ST		OAKLAND CA	94601
122	019 009301100	27TH	AV		OAKLAND	94601	S P CO 872-1-106D-POR 9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
123	019 009302800	1077	SAN FRANCISCO CT		OAKLAND	94601	ZAMORA JOSE L & MARIA S		1077 SAN FRANCISCO CT		OAKLAND CA	94601
124	019 009303000	1057	SAN FRANCISCO CT		OAKLAND	94601	FLORES EMILIO V		1057 SAN FRANCISCO CT		OAKLAND CA	94601
125	019 009303200	1037	SAN FRANCISCO CT		OAKLAND	94601	SECK MOUHAMADOU M ETAL		1037 SAN FRANCISCO CT		OAKLAND CA	94601
126	019 009201202	2728	E 10TH ST		OAKLAND	94601	DELEON JESUS J & MARIA		2720 E 10TH ST		OAKLAND CA	94601
127	019 009201500	2708	E 10TH ST		OAKLAND	94601	DELEON GREGORIO T & IRENE		2708 E 10TH ST		OAKLAND CA	94601
128	019 009304000	1024	SANTA MARIA CT		OAKLAND	94601	MAK KWOK C & HAZEL C		1024 SANTA MARIA CT		OAKLAND CA	94601
129	019 009304700	1085	SANTA MARIA CT		OAKLAND	94601	LEE JANET I		1085 SANTA MARIA CT		OAKLAND CA	94601
130	019 009306300	1052	SANTA INES CT		OAKLAND	94601	CHICK LITING & ZHONG LI		1052 SANTA INES CT		OAKLAND CA	94601
131	019 009306500	1072	SANTA INES CT		OAKLAND	94601	SANTOS FRANCISCO A & FARRAND SARA		1072 SANTA INES CT		OAKLAND CA	94601
132	019 009701100	25TH	AV		OAKLAND	94601	S P CO 872-1-106D-POR 9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
133	019 009800600	1134	MILLER AVE		OAKLAND	94601	KIDSPART LLC		PO BOX 7509		OAKLAND CA	94601

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ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
134	025 066900100	718	DERBY AVE		OAKLAND	94601	RAMIREZ TOMAS F & FLORES PATRICIA E		2821 ATWELL AVE		OAKLAND CA	94601
135	025 066901002	3052	E 7TH ST		OAKLAND	94601	VANIER DAVID H & LINDA D TRS		3052 E 7TH ST		OAKLAND CA	94601
136	025 066901500	3010	E 7TH ST		OAKLAND	94601	GELLING SHAUN		PO BOX 410987		SAN FRANCISCO CA	94141
137	025 067102100	2932	CHAPMAN ST		OAKLAND	94601	TELLES WALTER	MANUEL J PIRES	2040 E 15TH ST		OAKLAND CA	94606
138	025 067102503	2916	CHAPMAN ST		OAKLAND	94601	PARISH SUSAN M & MOYSKI SUSAN M		2916 CHAPMAN ST		OAKLAND CA	94601
139	025 067200100	2910	FORD ST		OAKLAND	94601	FORGERON EDWARD J & HELEN E TRS		5313 LITTLEBOW RD		RANCHO PALOS VERDES CA	90275
140	025 067502400	2875	GLASCOCK ST	208	OAKLAND	94601	RAMOS EDWARD C & TAMARA C		134 OLDCASTLE LN		ALAMEDA CA	94502
141	025 067502800	2875	GLASCOCK ST	212	OAKLAND	94601	WETTRICH ANN & ROLOFF JOHN		2875 GLASCOCK ST	212	OAKLAND CA	94601
142	025 067500700	2875	GLASCOCK ST	104	OAKLAND	94601	CHAN STEVEN F & LAURA TRS		111 PROMINORITY LN		LAFAYETTE CA	94549
143	025 067001000	2962	E 7TH ST		OAKLAND	94601	BURTON THELMA		2962 E 7TH ST		OAKLAND CA	94601
144	025 067100100	2904	CHAPMAN ST		OAKLAND	94601	ESPOSITO PLATING & POLISHING CO		2904 CHAPMAN ST		OAKLAND CA	94601
145	025 067100200	2901	E 7TH ST		OAKLAND	94601	BUTLER LLOYD E JR		2901 E 7TH ST		OAKLAND CA	94601
146	025 067500300	2875	GLASCOCK ST	100	OAKLAND	94601	JEANS PAUL C JR TR		2875 GLASCOCK ST	100	OAKLAND CA	94601
147	025 067500400	2875	GLASCOCK ST	101	OAKLAND	94601	SILER KYLE E		37060 N HWY 1		WESTPORT CA	95488
148	025 067701200	2880	FORD ST		OAKLAND	94601	PELAYO FRANCISCO		7508 INTERLACHEN AVE		SAN RAMON CA	94583
149	025 067701800	514	29TH AVE		OAKLAND	94601	HOLT DARRELL G		508 29TH AVE		OAKLAND CA	94601
150	025 067701900	518	29TH AVE		OAKLAND	94601	GREBMEIER LINNEA TRUST		365 VAN BUREN AVE		OAKLAND CA	94610
151	025 067702000	524	29TH AVE		OAKLAND	94601	SHUPE ROMA I & JAMES P TRS		1220 HIGH ST		ALAMEDA CA	94501
152	025 067700402	2883	CHAPMAN ST		OAKLAND	94601	AYANIAN ZAVEN S & JOAN M TRS		481 DEWEY BLVD		SAN FRANCISCO CA	94116
153	025 067800102	2871	E 7TH ST		OAKLAND	94601	CROLL R O & JANICE I TRS ETAL		15920 VIA MARLIN		SAN LORENZO CA	94580
154	025 067800700	2884	CHAPMAN ST		OAKLAND	94601	CHAPMAN GROUP	CHRIS COLLARD, G. P.	1813 HIBBARD ST		ALAMEDA CA	94501
155	025 067900400	705	PETERSON ST		OAKLAND	94601	THON TONY		1824 CENTRAL AVE		ALAMEDA CA	94501
156	025 073800800	2951	GLASCOCK ST		OAKLAND	94601	QUAYLE SYLVIA & REYNADO LADY G ETAL		2951 GLASCOCK ST		OAKLAND CA	94601
157	025 073800200	2963	GLASCOCK ST		OAKLAND	94601	SIU RAYMOND K		18 BLISS CT		PLEASANT HILL CA	94523
158	025 073801900	2865	REGATTA DR		OAKLAND	94601	DINH PHOUNG M		2865 REGATTA DR		OAKLAND CA	94601
159	025 073902200	341	CHANNEL WAY	137	OAKLAND	94601	ANGROS BEVERLYANN TR		2601 BLANDING AVE	261	ALAMEDA CA	94501
160	025 073802600	2879	REGATTA DR		OAKLAND	94601	KRETLOW LYNDA M & TIMNEY SUSAN		2879 REGATTA DR		OAKLAND CA	94601
161	025 073904800	2817	REGATTA DR		OAKLAND	94601	HASSEL ARTHUR J & JENNIFER P		2817 REGATTA DR		OAKLAND CA	94601
162	025 073904000	2801	REGATTA DR		OAKLAND	94601	WILLIAMS CONSTANCE		2801 REGATTA DR		OAKLAND CA	94601
163	025 073907200	2863	REGATTA DR		OAKLAND	94601	MICHINO ELLEN R & JAMES M		7219 OPAEKAA ST		HONOLULU HI	96825
164	025 073905000	2821	REGATTA DR		OAKLAND	94601	PHILLIPS BRUCE		2821 REGATTA DR		OAKLAND CA	94601
165	025 073906100	2841	REGATTA DR		OAKLAND	94601	HUYNH LINDA B		2841 REGATTA DR		OAKLAND CA	94601
166	025 067600301	2869A	FORD ST		OAKLAND	94601	TORRES FRANK J		2449 ROYAL ANN DR		UNION CITY CA	94587
167	019 008301403	817	LISBON AVE		OAKLAND	94601	SEIDEL JOHN & JOHN E		817 LISBON AVE		OAKLAND CA	94601
168	019 006600605	807	KENNEDY ST		OAKLAND	94606	RATTO LAND CO ETAL & LINDQUIST ELSIE H TR ETAL	LEN RATTO	P O BOX 764		SALIDA CA	95368
169	019 005400305	2105	LIVINGSTON ST		OAKLAND	94606	CONLEY FAMILY LP		PO BOX 24333		OAKLAND CA	94623
170	019 005400307		DENNISON ST		OAKLAND	94606	CONLEY FAMILY LP		PO BOX 24333		OAKLAND CA	94623
171	019 007000105	2121	DIESEL ST		OAKLAND	94606	CITY OF OAKLAND		505 14TH ST	609	OAKLAND CA	94612
172	019 007201400	333	23RD AVE		OAKLAND	94606	LONESTAR CALIFORNIA INC	CEMEX INC - PROPERTY	1501 BELVEDERE RD		WEST PALM BEACH FL	33406
173	019 005603000	1041	E 23RD ST		OAKLAND	94606	CITY OF OAKLAND	REAL ESTATE DIVISION	250 FRANK H OGAWA PLZ	4	OAKLAND CA	94612
174	019 006000112	1905	DENNISON ST		OAKLAND	94606	WAREHOUSE INVESTMENT CO	CHARLES RODONDI	303 2ND ST	950N	SAN FRANCISCO CA	94107

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ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
175	019 006600710	2211	FREDERICK ST		OAKLAND	94606	PRESLEY PROPERTIES LLC & CRAIG JOHN N & PETER ETAL		1721 BROADWAY	202	OAKLAND CA	94612
176	019 006800203	646	KENNEDY ST		OAKLAND	94606	FIDELITY HOLDINGS INC		PO BOX 715		ORINDA CA	94563
177	019 007100106	2201	E 7TH ST		OAKLAND	94606	CONAGRA MONTANA INC	CC-362-152/1751	1 CONAGRA DR		OMAHA NE	68102
178	019 007201100	333	23RD AVE		OAKLAND	94606	LONESTAR CALIFORNIA INC	CEMEX INC - PROPERTY	1501 BELVEDERE RD		WEST PALM BEACH FL	33406
179	019 008002500	2821	E 7TH ST		OAKLAND	94601	COSTELLO MARTIN C & MARY J TRUST & COSTELLO G ETAL		809 LASUEN DR		SAN LEANDRO CA	94578
180	019 008000600	2818	CHAPMAN ST		OAKLAND	94601	TELLES WALTER P		2040 E 15TH ST		OAKLAND CA	94606
181	019 008101001	2754	E 7TH ST		OAKLAND	94601	RAUK JAMES E & DONNA L		3327 FERNSIDE BLVD		ALAMEDA CA	94501
182	019 008101700	2720	E 7TH ST		OAKLAND	94601	CAMPANELLA DIANA TR & CAMPANELLA LYNN ETAL		1409 MOCCASIN DR		MODESTO CA	95351
183	019 008100300	2810	E 7TH ST		OAKLAND	94601	2810 7TH STREET LLC	TSZKEUNG WONG	2810 E 7TH ST		OAKLAND CA	94601
184	019 008200301	2639	E 9TH ST		OAKLAND	94601	ROSE VENTURES LLC	CHARLOTTE & DAVID S	4 COMMODORE DR	D435	EMERYVILLE CA	94608
185	019 008402001	2784	E 8TH ST		OAKLAND	94601	MAPP JUDY		487 A ST		HAYWARD CA	94541
186	019 008102401	2700	E 7TH ST		OAKLAND	94601	CAMPANELLA DIANA TR & CAMPANELLA LYNN ETAL		1409 MOCCASIN DR		MODESTO CA	95351
187	019 008200400	829	27TH AVE		OAKLAND	94601	EBPM HOLDING COMPANY, INC	PROVIDENT FINANCIAL	2850 OCEAN PARK BLVD	300	SANTA MONICA CA	90405
188	019 008300200	2711	E 9TH ST		OAKLAND	94601	CONWAY PETERSON & WENDY TRS		P.O. BOX 22205		CARMEL CA	93922
189	019 008402800	2859	E 9TH ST		OAKLAND	94601	TAYLOR GEORGIA TR		3128 G ST		ANTIOCH CA	94509
190	019 008402900	2863	E 9TH ST		OAKLAND	94601	CITY OF OAKLAND	REAL ESTATE DIVISION	250 FRANK H OGAWA PLZ	4	OAKLAND CA	94612
191	019 008400900	2837	E 9TH ST		OAKLAND	94601	AGUILAR ALFONSO & LUZ		2622 E 10TH ST		OAKLAND CA	94601
192	019 008501203	2815	E 10TH ST		OAKLAND	94601	SCHWARTZ PHILLIP & SUSAN TRS		4589 MOHR AVE		PLEASANTON CA	94566
193	019 008500301	2844	E 9TH ST		OAKLAND	94601	MATHEWS HILDA F TR		2844 E 9TH ST		OAKLAND CA	94601
194	019 008600100	2701	E 10TH ST		OAKLAND	94601	ESPINOZA VENTURA & ANA R		2701 E 10TH ST		OAKLAND CA	94601
195	019 008601700	2720	E 9TH ST		OAKLAND	94601	TELLES WALTER P		2040 E 15TH ST		OAKLAND CA	94606
196	019 008601900	2704	E 9TH ST		OAKLAND	94606	RAMIREZ IGNACIO & JUANA		14753 CRAFT AVE		SAN LEANDRO CA	94578
197	019 008701400	2602	E 9TH ST		OAKLAND	94606	ROMAN CATHOLIC BISHOP OF OAKLAND	ATTN CONTROLLER	2121 HARRISON ST	100	OAKLAND CA	94612
198	019 008701600	930	26TH AVE		OAKLAND	94601	LI SHU Q ETAL	SHU QUAN LI	930 26TH AVE		OAKLAND CA	94601
199	019 008801204	2505	E 10TH ST		OAKLAND	94606	LEE DAVID C & EN SOPHON TRS		916 23RD AVE		OAKLAND CA	94606
200	019 008800700	917	26TH AVE		OAKLAND	94601	SANTOS MARIO & ABELLANIRA		917 26TH AVE		OAKLAND CA	94601
201	019 008800500	2529	E 10TH ST		OAKLAND	94601	ROSS JOHN M & ARLENE M		2529 E 10TH ST		OAKLAND CA	94601
202	019 008800800	913	26TH AVE		OAKLAND	94601	NAVARRO ROSA M		2801 E 10TH ST		OAKLAND CA	94601
203	019 009001700	2506	E 10TH ST		OAKLAND	94601	DIAZ JUAN		2506 E 10TH ST		OAKLAND CA	94601
204	019 009001801	2502	E 10TH ST		OAKLAND	94601	PEREIRA JOHN F & DELEON MARY G		2502 E 10TH ST		OAKLAND CA	94601
205	019 009002100	1028	25TH AVE		OAKLAND	94601	WEST JONATHAN & HAEGERMARKWEST ASA		901 DEL MAR AVE		ALAMEDA CA	94501
206	019 009200500	2731	E 11TH ST		OAKLAND	94601	CARO FELIX & TONI J		2731 E 11TH ST		OAKLAND CA	94601
207	019 009301300	2744	E 11TH ST		OAKLAND	94601	LUCASEY MANUFACTURING CORPORATION		PO BOX 14023		OAKLAND CA	94614
208	019 009302400	1066	SAN FRANCISCO CT		OAKLAND	94601	ORTEGA GILBERTO B & LOPEZ LUZ		1066 SAN FRANCISCO CT		OAKLAND CA	94601
209	019 009302900	1067	SAN FRANCISCO CT		OAKLAND	94601	HERNANDEZ MAURILIO		1067 SAN FRANCISCO CT		OAKLAND CA	94601
210	019 009303800	1004	SANTA MARIA CT		OAKLAND	94601	TSOSIE CAROLYN J		1004 SANTA MARIA CT		OAKLAND CA	94601
211	019 009304300	1054	SANTA MARIA CT		OAKLAND	94601	YOUNG LORRAINE TR		1054 SANTA MARIA CT		OAKLAND CA	94601
212	019 009304500	1074	SANTA MARIA CT		OAKLAND	94601	YU STEVEN M & JENNY T		1074 SANTA MARIA CT		OAKLAND CA	94601
213	019 009304800	1075	SANTA MARIA CT		OAKLAND	94601	WILLIAMS MONRELLE T		1075 SANTA MARIA CT		OAKLAND CA	94601
214	019 009306600	1082	SANTA INES CT		OAKLAND	94601	WONG JULIUS & WEI F		1082 SANTA INES CT		OAKLAND CA	94601
215	019 009306700	1031	SANTA INES CT		OAKLAND	94601	XU DE F & HO CHIU Y		1031 SANTA INES CT		OAKLAND CA	94601

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
216	019 009701008	137	25TH AVE		OAKLAND	94601	RMJ EAST 11TH STREET LLC	DREISBACH ENTERPRISE	PO BOX 7509		OAKLAND CA	94601
217	019 009800504	2430	E 11TH ST		OAKLAND	94601	WILLIAMS LEE		2430 E 11TH ST		OAKLAND CA	94601
218	019 009307100		LISBON AVE		OAKLAND	94601	JINGLETOWN HOMEOWNERS ASSOCIATION		7033 VILLAGE PKWY	212	DUBLIN CA	94568
219	025 066901200	3024	E 7TH ST		OAKLAND	94601	ALAMEDA COUNTY FLOOD CONTROL		3024 E 7TH ST		OAKLAND CA	94601
220	025 066902400	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
221	025 067000101	2908	E 7TH ST		OAKLAND	94601	SMALLEY PETER K & GRAYBEAL ANN		2010 FRANCISCO ST	A	BERKELEY CA	94709
222	025 067000402	2932	E 7TH ST		OAKLAND	94601	ZAMORA MARLENE C & DUENAS MARIA		2932 E 17TH ST		OAKLAND CA	94601
223	025 067101900	2940	CHAPMAN ST		OAKLAND	94601	BOYTES MANUEL M & GONZALEZ YOLANDA		2940 CHAPMAN ST		OAKLAND CA	94601
224	025 067502100	2875	GLASCOCK ST	205	OAKLAND	94601	CHIANG WARREN & CHIN JULIE		458 GRAVATT DR		BERKELEY CA	94705
225	025 067502900	2875	GLASCOCK ST	214	OAKLAND	94601	SIBIA MANINDER S & SANDHU SABEEN		2875 GLASCOCK ST	214	OAKLAND CA	94601
226	025 067100800	2939	E 7TH ST		OAKLAND	94601	SUN MARK		590 WESLEY AVE		OAKLAND CA	94606
227	025 067300400	2921	FORD ST		OAKLAND	94601	SILVEIRA WILLIAM J		499 EMBARCADERO		OAKLAND CA	94606
228	025 067600502	415	PETERSON ST		OAKLAND	94601	SISCO CATHARINE M TR		6701 AUBURN ST	35	BAKERSFIELD CA	93306
229	025 067701100	2884	FORD ST		OAKLAND	94601	CONTRERAS JUAN G & GUADALUPE O		2884 FORD ST		OAKLAND CA	94601
230	025 067700300	2867	CHAPMAN ST		OAKLAND	94601	SANCHEZ DONNA A		2867 CHAPMAN ST		OAKLAND CA	94601
231	025 067800500	2891	E 7TH ST		OAKLAND	94601	DIAZ ELEODORO		2891 E 7TH ST		OAKLAND CA	94601
232	025 067700801	2896	FORD ST		OAKLAND	94601	RATTO REAL ESTATE LLC		2896 FORD ST		OAKLAND CA	94601
233	025 068000106	1100	29TH AVE		OAKLAND	94601	FRUITVALE STATION LLC	LORI MORFORD	150 PELICAN WAY		SAN RAFAEL CA	94901
234	025 073800600	2955	GLASCOCK ST		OAKLAND	94601	DOUGLAS CRAIG B & BERNADETTE A		11700 OLD GEORGETOWN RD	1511	ROCKVILLE MD	20852
235	025 073802400	2875	REGATTA DR		OAKLAND	94601	MARRAVILLA CAREN A & ROCHA MARIO N		2875 REGATTA DR		OAKLAND CA	94601
236	025 073803000	2887	REGATTA DR		OAKLAND	94601	KAMMERER ELAINE V TR		2887 REGATTA DR		OAKLAND CA	94601
237	025 073902400	337	CHANNEL WAY	139	OAKLAND	94601	CHI YONG C & KAY S		337 CHANNEL WAY		OAKLAND CA	94601
238	025 073900100	2931	GLASCOCK ST	117	OAKLAND	94601	KIRSCHENHEUTER CHRIS & MARYANN ETAL		1368 EASTSHORE DR		ALAMEDA CA	94501
239	025 073902100	343	CHANNEL WAY	136	OAKLAND	94601	GIL GLORIA B & PHILLIP A		343 CHANNEL WAY		OAKLAND CA	94601
240	025 073901800	349	CHANNEL WAY	133	OAKLAND	94601	NAVARRA CARLO J & EDDY PAULA L TRS		2855 REGATTA DR		OAKLAND CA	94601
241	025 073903200	307	BOWSMAN CT	146	OAKLAND	94601	SEMITSU KAZUO		307 BOWSMAN CT		OAKLAND CA	94601
242	025 073904500	2811	REGATTA DR		OAKLAND	94601	CASCIANA JOSEPH C & PEREIRA LETICIA S		PO BOX 1344		ALAMEDA CA	94501
243	025 073906500	2849	REGATTA DR		OAKLAND	94601	LANDECKER TOM F & ALBERT SHARON		2849 REGATTA DR		OAKLAND CA	94601
244	025 073906700	2853	REGATTA DR		OAKLAND	94601	WARD MARETTA D		2853 REGATTA DR		OAKLAND CA	94601
245	025 073905700	2833	REGATTA DR		OAKLAND	94601	HOM ANDREW & S M		1108 ISLAND DR		ALAMEDA CA	94502
246	025 073905800	2835	REGATTA DR		OAKLAND	94601	HERNANDEZ ANTONIO J & BOGOSIAN CHRISTINE		2835 REGATTA DR		OAKLAND CA	94601
247	019 008000300	2836	CHAPMAN ST		OAKLAND	94601	CURIEL JOSE A		2836 CHAPMAN ST		OAKLAND CA	94601
248	019 008601600	2722	E 9TH ST		OAKLAND	94601	DELEON ESTHER		2722 E 9TH ST		OAKLAND CA	94601
249	019 004900311	2140	LIVINGSTON ST		OAKLAND	94606	WENDELMITCHELL DIANE & BAUER BRUCE F & ELAINE ETAL		2124 LIVINGSTON ST		OAKLAND CA	94606
250	019 004900306	910	22ND AVE		OAKLAND	94606	LIVINGSTON LOFTS LLC		PO BOX 1071		ALAMEDA CA	94501
251	019 005400701	2100	DENNISON ST		OAKLAND	94606	CONLEY FAMILY LP		PO BOX 24333		OAKLAND CA	94623
252	019 005602100	1048	CALCOT PL		OAKLAND	94606	EANDI ROGER E & LORETTA L		976 23RD AVE		OAKLAND CA	94606
253	019 005602400	1072	CALCOT PL		OAKLAND	94606	KWONG MONA		715 E 12TH ST		OAKLAND CA	94606
254	019 005600602	1067	CALCOT PL		OAKLAND	94606	EANDI ROGER E & LORETTA L		976 23RD AVE		OAKLAND CA	94606
255	019 006000113		DENNISON ST		OAKLAND	94606	CITY OF OAKLAND		505 14TH ST	609	OAKLAND CA	94612
256	019 007800107	324	23RD AVE		OAKLAND	94606	MURPHY MARK V & JOHNSTON NANCY TRS		424 SINEX AVE		PACIFIC GROVE CA	93950
257	019 007901903	2828	FORD ST		OAKLAND	94601	STRAUS THOMAS E & PATRICIA A TRS		15 OLIVE AVE		PIEDMONT CA	94611
258	019 006600704	727	KENNEDY ST		OAKLAND	94606	HORNSTEIN MICHAEL E & ELLEN F TRS	JS MATTISON & CO	50 CALIFORNIA ST	1500	SAN FRANCISCO CA	94111
259	019 006700202	718	KENNEDY ST		OAKLAND	94606	MINK STEPHEN & FLAUTT SUSAN M TRS		718 KENNEDY ST		OAKLAND CA	94606

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260	019 007902103	2830	FORD ST		OAKLAND	94601	TOY TOMMY		707 MERCURY ST		SAN FRANCISCO CA	94124
261	019 008001900	2755	E 7TH ST		OAKLAND	94601	HERNANDEZ JUAN & CONSUELO TRS		2755 E 7TH ST		OAKLAND CA	94601
262	019 008101301	2734	E 7TH ST		OAKLAND	94601	LCTC PROPERTIES LLC	CAROL CAMPANELLA	3384 CLOUDVIEW CT		TRACY CA	95377
263	019 008101600	2724	E 7TH ST		OAKLAND	94601	NAVARRO ANTONIO & MORGANNAVARRO LESLIE B		2835 E 10TH ST		OAKLAND CA	94601
264	019 008300101	2701	E 9TH ST		OAKLAND	94601	HERNANDEZ JESUS & BERTHA A		2715 BEACHWOOD CT		HAYWARD CA	94545
265	019 008401902	815	PORTWOOD AVE		OAKLAND	94601	BERNAL INVESTMENT INC		PO BOX 2434		SAN RAMON CA	94583
266	019 008403700	826	LISBON AVE		OAKLAND	94601	CARRENO FRANCISCO & JOSE F		826 LISBON AVE		OAKLAND CA	94601
267	019 008403900	2809	E 9TH ST	2809	OAKLAND	94601	YU RAYMOND W & GRACE S TRS		2807 MACARTHUR BLVD		OAKLAND CA	94602
268	019 008501400	2823	E 10TH ST		OAKLAND	94601	VARELA SALOMON & NATIVIDAD TRS		952 CHENAULT WAY		HAYWARD CA	94541
269	019 008502300	2872	E 9TH ST		OAKLAND	94601	RODRIGUEZ ARMANDO R		2872 E 9TH ST		OAKLAND CA	94601
270	019 008600800	2737	E 10TH ST		OAKLAND	94601	RODRIGUEZ MARIA G TR		1500 48TH AVE		OAKLAND CA	94601
271	019 008501000	2804	E 9TH ST		OAKLAND	94601	NAVARRO FRANCISCO J & ROSA M		2801 E 10TH ST		OAKLAND CA	94601
272	019 008501700	2841	E 10TH ST		OAKLAND	94601	NAVARRO ANTONIO & MORGANNAVARRO LESLIE B		2835 E 10TH ST		OAKLAND CA	94601
273	019 009001300	2530	E 10TH ST		OAKLAND	94601	CORNELIO ARMANDO		14493 CYPRESS ST		SAN LEANDRO CA	94579
274	019 009002000	1024	25TH AVE		OAKLAND	94601	CORONA JOEL M		1024 25TH AVE		OAKLAND CA	94601
275	019 009101000	2634	E 10TH ST		OAKLAND	94601	HOANG XOA T		2160 ENCINAL AVE		ALAMEDA CA	94501
276	019 009201201	2732	E 10TH ST		OAKLAND	94601	DAVALOS ALICIA R & JOSE J		2732 E 10TH ST		OAKLAND CA	94601
277	019 009200200	2709	E 11TH ST		OAKLAND	94601	OZUNA KARLA K		2709 E 11TH ST		OAKLAND CA	94601
278	019 009303300	1027	SAN FRANCISCO CT		OAKLAND	94601	MENDOZA ALVARO & DORIS		1027 SAN FRANCISCO CT		OAKLAND CA	94601
279	019 009303700	2830	E 10TH ST		OAKLAND	94601	DAVIS LEONARD D		2830 E 10TH ST		OAKLAND CA	94601
280	019 009303900	1014	SANTA MARIA CT		OAKLAND	94601	MUNOZ DORIS Z		1014 SANTA MARIA CT		OAKLAND CA	94601
281	019 009304100	1034	SANTA MARIA CT		OAKLAND	94601	CALLEN DEBRA A		1034 SANTA MARIA CT		OAKLAND CA	94601
282	019 009304200	1044	SANTA MARIA CT		OAKLAND	94601	HATTORI MITSUKO		1044 SANTA MARIA CT		OAKLAND CA	94601
283	019 009304400	1064	SANTA MARIA CT		OAKLAND	94601	PEINADO NICANDRO & LOLITA		1064 SANTA MARIA CT		OAKLAND CA	94601
284	019 009305200	1035	SANTA MARIA CT		OAKLAND	94601	CHICK RAYMOND C & LITING Z		1035 SANTA MARIA CT		OAKLAND CA	94601
285	025 066000100	3105	ELMWOOD AVE		OAKLAND	94601	RAMOS LUZON S & ZENAIDA D		3105 ELMWOOD AVE		OAKLAND CA	94601
286	025 066800100	3001	E 7TH ST		OAKLAND	94601	TELLES WALTER		2040 E 15TH ST		OAKLAND CA	94606
287	025 066800800	3051	E 7TH ST		OAKLAND	94601	CASAREZ EMILIANO & YOLANDA		3051 E 7TH ST		OAKLAND CA	94601
288	025 066901003	3054	E 7TH ST		OAKLAND	94601	VANIER DAVID H & LINDA D TRS		3052 E 7TH ST		OAKLAND CA	94601
289	025 066902500	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
290	025 067000700	2948	E 7TH ST		OAKLAND	94601	CARILLO DAVID & SALINAS YOLANDA		2946 E 7TH ST		OAKLAND CA	94601
291	025 067101101	2951	E 7TH ST		OAKLAND	94601	HERNANDEZ J S & CARMEN		2951 E 7TH ST		OAKLAND CA	94601
292	025 067102600	2908	CHAPMAN ST		OAKLAND	94601	ESPOSITO PLATING & POLISHING CO		2908 CHAPMAN ST		OAKLAND CA	94601
293	025 067100500	2915	E 7TH ST		OAKLAND	94601	VOONG NA C & LOC A		1265 XAVIER AVE		HAYWARD CA	94545
294	025 067501500	2875	GLASCOCK ST	112	OAKLAND	94601	SHARONE ZEEV & ARMSTRONG LOIS A		2875 GLASCOCK ST	112	OAKLAND CA	94601
295	025 067501700	2875	GLASCOCK ST	201	OAKLAND	94601	OTO JEFFREY TR		2875 GLASCOCK ST	201	OAKLAND CA	94601
296	025 067502300	2875	GLASCOCK ST	207	OAKLAND	94601	US BANK NATIONAL ASSOCIATION TR	CA6-914-01-94	1800 TAPO CANYON RD		SIMI VALLEY CA	93063
297	025 067600302	2875	FORD ST		OAKLAND	94601	THOMAS JANET TR		3614 SHANTUNG CT		ENCINO HILLS CA	91709
298	025 067700100	530	29TH AVE		OAKLAND	94601	HITCH BONNIE & WORTH JAMES M		530 29TH AVE		OAKLAND CA	94601
299	025 067701000	2888	FORD ST		OAKLAND	94601	STEVENS GREGORY W & LISA K TRS		PO BOX 6746		OAKLAND CA	94603
300	025 067701702	504	29TH AVE		OAKLAND	94601	HOLT DARRELL G		508 29TH AVE		OAKLAND CA	94601
301	025 067700200	2857	CHAPMAN ST		OAKLAND	94601	SHUPE ROMA I & JAMES P TRS		1220 HIGH ST		ALAMEDA CA	94501
302	025 067800400	2885	E 7TH ST		OAKLAND	94601	CORONA FRANCES & RUBENE		2885 E 7TH ST		OAKLAND CA	94601
303	025 073801300	2941	GLASCOCK ST		OAKLAND	94601	CLEMENS ALEXANDER & PRIYA S TRS		308 LINA AVE		ALAMEDA CA	94501

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304	025 073901500	2903	GLASCOCK ST	131	OAKLAND	94601	TRIPP JOI & PETER		2903 GLASCOCK ST		OAKLAND CA	94601
305	025 073801400	2939	GLASCOCK ST		OAKLAND	94601	ROSSON TERRY K & BOHNERT CHRISTOPHER F		2939 GLASCOCK ST		OAKLAND CA	94601
306	025 073800900	2949	GLASCOCK ST		OAKLAND	94601	WOOD THOMAS C		2949 GLASCOCK ST		OAKLAND CA	94601
307	025 073803100	2889	REGATTA DR		OAKLAND	94601	PERRY MATTHEW C		2889 REGATTA DR		OAKLAND CA	94601
308	025 073803200	2891	REGATTA DR		OAKLAND	94601	KIRKISH KATHLEEN M & LUCAS DONNA M		149 THOUSAND OAKS ST		OAKLAND CA	94605
309	025 073802900	2885	REGATTA DR		OAKLAND	94601	PLUCHE CORINNE & ROCHARD OLIVIER		2885 REGATTA DR		OAKLAND CA	94601
310	025 073900400	2925	GLASCOCK ST	120	OAKLAND	94601	LAM AMY		2925 GLASCOCK ST		OAKLAND CA	94601
311	025 073900600	2921	GLASCOCK ST	122	OAKLAND	94601	MASON JAMES G & NANCY O TRS		2966 NORTHWOOD DR		ALAMEDA CA	94501
312	025 073902600	333	CHANNEL WAY	141	OAKLAND	94601	COUGIAS DORIAN J & HEIBERGER ELISABETH L		333 CHANNEL WAY		OAKLAND CA	94601
313	025 073904900	2819	REGATTA DR		OAKLAND	94601	BRETT KAREN B & MATTHEW K		2700 HIGH RIDGE RD		CHARLOTTE NC	28270
314	025 073905400	2829	REGATTA DR		OAKLAND	94601	MARRERO HOLDINGS LLC		484 LAKE PARK AVE	132	OAKLAND CA	94610
315	025 073906000	2839	REGATTA DR		OAKLAND	94601	MARTIN PATRICK		2839 REGATTA DR		OAKLAND CA	94601
316	025 073903800	319	BOWSMAN CT	152	OAKLAND	94601	LIM CHRISTOPHER & JENNY		201 SANSOME ST	1101	SAN FRANCISCO CA	94104
317	025 073905300	2827	REGATTA DR		OAKLAND	94601	GROMAN REGINA F & WILLIAM C TRS		2827 REGATTA DRIVE		OAKLAND CA	94601
318	025 073904400	2809	REGATTA DR		OAKLAND	94601	STAMOS RUTH I		2809 REGATTA DR		OAKLAND CA	94601
319	025 073906600	2851	REGATTA DR		OAKLAND	94601	WEAVER JOHN JR TR		2851 REGATTA DR		OAKLAND CA	94601
320	019 008800302	2515	E 10TH ST		OAKLAND	94601	LE TUAN A & NGUYENLE TRANG D		2515 E 10TH ST		OAKLAND CA	94601
321												
322	019 009306200	1042	SANTA INES CT		OAKLAND	94601	ZENG JIA Y & GAO WAN M		15861 VIA MARTIN		SAN LORENZO CA	94580
323	019 008300104	860	27TH AVE		OAKLAND	94601	SPINARDI INVESTMENT CORPORATION		2815 MARINA DR		ALAMEDA CA	94501
324	018 050500100	2090	DIESEL ST		OAKLAND	94606	CITY OF OAKLAND		505 14TH ST	609	OAKLAND CA	94612
325	019 010300500	23RD	AV		OAKLAND	94601	S P CO 872-1-106D-POR 9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
326	019 004900310	2020	LIVINGSTON ST		OAKLAND	94606	WAGNER GALE & ROLOFF JOHN ETAL		2020 LIVINGSTON ST		OAKLAND CA	94606
327	019 004900303	920	22ND AVE		OAKLAND	94606	TWO O FOUR O LIVINGSTON		PO BOX 1024		SAN LEANDRO CA	94577
328	019 005401400		LIVINGSTON ST		OAKLAND	94606	S P CO 872-1-106B-2	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
329	019 005500200	23RD	AV		OAKLAND	94606	S P CO 872-1-106D-POR 9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
330	019 005600102	1092	CALCOT PL		OAKLAND	94606	ACKER GEORGE L & GUERRERO BENJAMIN & CARMEN B TRS	CARMEN GUERRERO	1092 CALCOT PL		OAKLAND CA	94606
331	019 005600502	1071	CALCOT PL		OAKLAND	94606	EANDI ROGER E & LORETTA L		976 23RD AVE		OAKLAND CA	94606
332	019 006000106	1901	DENNISON ST		OAKLAND	94606	CITY OF OAKLAND		505 14TH ST	609	OAKLAND CA	94612
333	019 006600705	655	KENNEDY ST		OAKLAND	94606	FERRANDO SANDRA E TR		305 SELBY LN		ATHERTON CA	94027
334	019 007000104	2121	DIESEL ST		OAKLAND	94606	2100 EMBARCADERO LLC		255 THIRD ST	102	OAKLAND CA	94607
335	019 007201300	333	KENNEDY ST		OAKLAND	94606	BBIC ASSOCIATES LLC		333 KENNEDY ST		OAKLAND CA	94606
336	019 007200900	23RD	AV		OAKLAND	94606	S P CO 872-1-75C-POR 14	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
337	019 007300201	515	23RD AVE		OAKLAND	94606	PACIFIC STAR PROPERTIES		PO BOX 881		BELLEVUE WA	98009
338	019 005602300	1066	CALCOT PL		OAKLAND	94606	TING CHAO W		1066 CALCOT PL		OAKLAND CA	94606
339	019 005600703	1041	CALCOT PL		OAKLAND	94606	EANDI ROGER E & LORETTA L		976 23RD AVE		OAKLAND CA	94606
340	019 005800101	955	KENNEDY ST		OAKLAND	94606	KILPATRICKS BAKERIES	THOMSON REUTERS PTS	PO BOX 111397		CARROLLTON TX	75011
341	019 006000111	909	KING ST		OAKLAND	94606	KILPATRICKS BAKERIES		PO BOX 2093		OAKLAND CA	94604
342	019 006600715	2109	FREDERICK ST		OAKLAND	94606	MCENTEE BRENDAN J & SUSAN H TRS		260 LAFAYETTE CIR		LAFAYETTE CA	94549
343	019 006600719	2105	FREDERICK ST		OAKLAND	94606	HORNSTEIN MICHAEL E & ELLEN F TRS		50 CALIFORNIA ST	1500	SAN FRANCISCO CA	94111
344	019 007300805	421	23RD AVE		OAKLAND	94606	CP HOLDING CO LLC	CLAUDE D PERASSO	41 PENINSULA RD		BELVEDERE CA	94920
345	019 007902400	2821	CHAPMAN ST		OAKLAND	94601	BURG GREGORY		2821 CHAPMAN ST	D	OAKLAND CA	94601
346	019 008001800	2749	E 7TH ST		OAKLAND	94601	OAKLAND 23RD AVENUE ASSOCIATES LLC	GARY CAPPA	2001 CROW CANYON RD		SAN RAMON CA	94583

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347	019 008000201	2840	CHAPMAN ST		OAKLAND	94601	CAMBIO CORSA LLC	MICHAEL T. ALDERS	PO BOX 14086		OAKLAND CA	94614
348	019 008000500	2824	CHAPMAN ST		OAKLAND	94601	BRISENO SILVIA A		455 SUPERIOR AVE		SAN LEANDRO CA	94577
349	019 008101500	2730	E 7TH ST		OAKLAND	94601	SCHRODER WILLIAM P TR		PO BOX 2511		ALAMEDA CA	94501
350	019 008100200	2814	E 7TH ST		OAKLAND	94601	2810 7TH STREET LLC		2810 EAST 7TH ST		OAKLAND CA	94601
351	019 008102000	2834	E 7TH ST		OAKLAND	94601	KWON HWA S & SOON I		600 MOUNTAIN BLVD		OAKLAND CA	94611
352	019 008100801	2758	E 7TH ST		OAKLAND	94601	LCTC PROPERTIES LLC	CAROL CAMPANELLA	3384 CLOUDVIEW CT		TRACY CA	95377
353	019 008200201	2629	E 9TH ST		OAKLAND	94601	TRAUM HEINZ & RENATE TRS		PO BOX 4243		SAN LEANDRO CA	94579
354	019 008301200	831	LISBON AVE		OAKLAND	94601	CONTRERAS ADALBERTO & SOCORRO		831 LISBON AVE		OAKLAND CA	94601
355	019 008400200	2805	E 9TH ST		OAKLAND	94601	ROSALES ENEIDA & JUAN M		2805 E 9TH ST		OAKLAND CA	94601
356	019 008300900	2749	E 9TH ST		OAKLAND	94601	CONTRERAS FLORENTINO & MARIA C		2749 E 9TH ST		OAKLAND CA	94601
357	019 008501600	2835	E 10TH ST		OAKLAND	94601	NAVARRO ANTONIO & MORGANNAVARRO LESLIE B		2835 E 10TH ST		OAKLAND CA	94601
358	019 008601000	2749	E 10TH ST		OAKLAND	94601	DELEON GREGORIO T ETAL		2708 E 10TH ST		OAKLAND CA	94601
359	019 008601100	2752	E 9TH ST		OAKLAND	94601	CASTILLO JOSE M		1193 HURON LN		HAYWARD CA	94545
360	019 008600700	2733	E 10TH ST		OAKLAND	94601	AGUILAR ANTONIO M & SEGURA MARIA E		2733 E 10TH ST		OAKLAND CA	94601
361	019 008600900	2745	E 10TH ST		OAKLAND	94601	NAVARRO ALICIA		2745 E 10TH ST		OAKLAND CA	94601
362	019 008700100	936	26TH AVE		OAKLAND	94601	GARCIA RAUL M & MUNOZ MARIA R		936 26TH AVE		OAKLAND CA	94601
363	019 008701000	2646	E 9TH ST		OAKLAND	94601	RAMIREZ MARIA E TRUST		2707 E 9TH ST		OAKLAND CA	94601
364	019 008701300	2628	E 9TH ST		OAKLAND	94601	DELEON SAMUEL		2429 SQUALL WAY		STOCKTON CA	95206
365	019 008701500	920	26TH AVE		OAKLAND	94601	MAK KAI M & CHU OI L		920 26TH AVE		OAKLAND CA	94601
366	019 008700700	925	27TH AVE		OAKLAND	94601	RAMIREZ JOSE L		925 27TH AVE		OAKLAND CA	94601
367	019 008700900	915	27TH AVE		OAKLAND	94601	MORA J R & AGUILAR CECILIA		2714 E 10TH ST		OAKLAND CA	94601
368	019 008601200	2748	E 9TH ST		OAKLAND	94601	VONMOSCH ELIZABETH A		2748 E 9TH ST		OAKLAND CA	94601
369	019 009001900	1020	25TH AVE		OAKLAND	94601	TONEY R L & MANEELY CINDY & A & WHITSON CRYSTAL M		1020 25TH AVE		OAKLAND CA	94601
370	019 009000400	2525	E 11TH ST		OAKLAND	94601	PELAYO ESPERANZA		2525 E 11TH ST		OAKLAND CA	94601
371	019 009101100	2630	E 10TH ST		OAKLAND	94601	VAZQUEZ MARTIN & EVANGELINA		2630 E 10TH ST		OAKLAND CA	94601
372	019 009101300	2601	E 11TH ST		OAKLAND	94606	KIDSPART LLC	DREISBACH ENTERPRISE	PO BOX 7509		OAKLAND CA	94601
373	019 009100800	2648	E 10TH ST		OAKLAND	94601	SANDOVAL ALFONSO A & MARIA D		2622 E 10TH ST		OAKLAND CA	94601
374	019 009200100	2705	E 11TH ST		OAKLAND	94601	LUPIAN JORGE		2705 E 11TH ST		OAKLAND CA	94601
375	019 009200600	2735	E 11TH ST		OAKLAND	94601	LUPIAN JOSE L 3RD & SOPHIA		2711 E 9TH ST		OAKLAND CA	94601
376	019 009200800	2743	E 11TH ST		OAKLAND	94601	NAVARRO MARIA		2743 E 11TH ST		OAKLAND CA	94601
377	019 009200900	2748	E 10TH ST		OAKLAND	94601	DAVALOS JAVIER		2748 E 10TH ST		OAKLAND CA	94601
378	019 009302000	1026	SAN FRANCISCO CT		OAKLAND	94601	GARCIA SALVADOR & ELODIA		1026 SAN FRANCISCO CT		OAKLAND CA	94601
379	019 009302500	1076	SAN FRANCISCO CT		OAKLAND	94601	GLOVER PAMELA R		1076 SAN FRANCISCO CT		OAKLAND CA	94601
380	019 009303100	1047	SAN FRANCISCO CT		OAKLAND	94601	YU JIAN C & HUI L		1047 SAN FRANCISCO CT		OAKLAND CA	94601
381	019 009303500	1007	SAN FRANCISCO CT		OAKLAND	94601	MENDOZA ATHALA		1007 SAN FRANCISCO CT		OAKLAND CA	94601
382	019 009101200	2622	E 10TH ST		OAKLAND	94601	SANDOVAL ALFONSO A & MARIA L		2622 E 10TH ST		OAKLAND CA	94601
383	019 009305300	1025	SANTA MARIA CT		OAKLAND	94601	SERRANO LORETA M		1025 SANTA MARIA CT		OAKLAND CA	94601
384	019 009306400	1062	SANTA INES CT		OAKLAND	94601	WHITE MARY L		1062 SANTA INES CT		OAKLAND CA	94601
385	019 009306900	1011	SANTA INES CT		OAKLAND	94601	MEZA HECTOR G & GOMEZ MARIA G		1011 SANTA INES CT		OAKLAND CA	94601
386	019 009307000	1001	SANTA INES CT		OAKLAND	94601	HO ETON & VANESSA		10288 BEVERLY ST		BELLFLOWER CA	90706
387	019 009307400		SANTA MARIA CT		OAKLAND	94601	JINGLETOWN HOMEOWNERS ASSOCIATION	PREFERRED PROPERTY M	7033 VILLAGE PARKWAY	212	DUBLIN CA	94568
388	019 009602005	2636	E 11TH ST		OAKLAND	94606	KIDSPART LLC	AL PELTON	PO BOX 7509		OAKLAND CA	94601
389	019 009800506	2434	E 11TH ST		OAKLAND	94601	KIDSPART LLC		PO BOX 7509		OAKLAND CA	94601
390	019 009307600		SAN FRANCISCO CT		OAKLAND	94601	JINGLETOWN HOMEOWNERS ASSOCIATION	PREFERRED PROPERTY M	7033 VILLAGE PKWY	212	DUBLIN CA	94568

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
391	025 066801701	3014	CHAPMAN ST		OAKLAND	94601	REMBERT CHRISTOPHER P & REMBERT PAUL & ALEXAN ETAL		715 LAURENT ST		SANTA CRUZ CA	95060
392	025 066801801	616	DERBY AVE		OAKLAND	94601	COCHRAN RICHARD S & SUSAN L TRS		24 BONITA AVE		PIEDMONT CA	94611
393	025 066800700	3047A	E 7TH ST		OAKLAND	94601	PEREZ RAMON P & BLANCA E		3993 STAR RIDGE RD		HAYWARD CA	94542
394	025 066901600	700	DERBY AVE		OAKLAND	94601	ARTLIP JAMES		700 DERBY AVE		OAKLAND CA	94601
395	025 066902300	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
396	025 067001200	2972	E 7TH ST		OAKLAND	94601	WONG WAYNE & SHIRLEY S		912 DEVONSHIRE AVE		SAN LEANDRO CA	94579
397	025 067000301	2922	E 7TH ST		OAKLAND	94601	ANDRADE MARVIN J & MOLLY A TRS		1730 ARROWHEAD DR		OAKLAND CA	94611
398	025 067102000	2936	CHAPMAN ST		OAKLAND	94601	BOYTES MANUEL M & GONZALEZ YOLANDA		2940 CHAPMAN ST		OAKLAND CA	94601
399	025 067300700	2985	FORD ST		OAKLAND	94601	8855 SAN LEANDRO STREET LLC		401 ROLAND WAY	220	OAKLAND CA	94621
400	025 067502500	2875	GLASCOCK ST	209	OAKLAND	94601	OLIVIA NINA LLC		5923 MARIE WAY		OAKLAND CA	94618
401	025 067500900	2875	GLASCOCK ST	106	OAKLAND	94601	TAYLOR MARION E TR		2875 GLASCOCK ST	106	OAKLAND CA	94601
402	025 067101301	2960	CHAPMAN ST		OAKLAND	94601	MUSSELLS JAMES H & ANTOINETTE K		2960 CHAPMAN ST		OAKLAND CA	94601
403	025 067200404	525	DERBY AVE		OAKLAND	94601	2934 FORD STREET ASSOCIATES LLC & FOLDED HILL ETAL	TED PETERSON	1939 HARRISON ST	605	OAKLAND CA	94612
404	025 067501200	2875	GLASCOCK ST	109	OAKLAND	94601	ECKFORD F J & CATHI B		2875 GLASCOCK ST	109	OAKLAND CA	94601
405	025 067600100	2855	FORD ST		OAKLAND	94601	BERGER PAUL E & DIANA L TRS		455 HAIGHT AVE		ALAMEDA CA	94501
406	025 067601100	414	29TH AVE		OAKLAND	94601	29TH AVENUE GROUP LLC	CARLOS PLAZOLA	3146 BONA ST		OAKLAND CA	94601
407	025 067600400	2875	FORD ST		OAKLAND	94601	SISCO CATHARINE M TR		6701 AUBURN ST	35	BAKERSFIELD CA	93306
408	025 067801001	2870	CHAPMAN ST		OAKLAND	94601	CHAPMAN GROUP	CHRIS COLLARD G.P.	1813 HIBBARD ST		ALAMEDA CA	94501
409	025 067800300	2877	E 7TH ST		OAKLAND	94601	MELENDEZ JORGE		2879 E 7TH ST		OAKLAND CA	94601
410	025 067900600	2852	E 7TH ST		OAKLAND	94601	ZHANG GINI L		232 WILDWOOD AVE		PIEDMONT CA	94610
411	025 067900500	2872	E 7TH ST		OAKLAND	94601	CROLL JOHN A & CHANDLERCROLL GAIL J TRS & CRO ETAL		15920 VIA MARLIN		SAN LORENZO CA	94580
412	025 073801000	2947	GLASCOCK ST		OAKLAND	94601	GUANCE MARY V	KIM D NGUYEN	5171 AMBERWOOD DR		FREMONT CA	94555
413	025 073901100	2911	GLASCOCK ST	127	OAKLAND	94601	HWANG CHIPING		2911 GLASCOCK ST		OAKLAND CA	94601
414	025 073800700	2953	GLASCOCK ST		OAKLAND	94601	PATRICK ROBERT & CONTRERAS JORGE		2953 GLASCOCK ST		OAKLAND CA	94601
415	025 073800300	2961	GLASCOCK ST		OAKLAND	94601	PELLICCI CHARLES		2961 GLASOCK ST		OAKLAND CA	94601
416	025 073802300	2873	REGATTA DR		OAKLAND	94601	SIDDIQUI ALI		2873 REGATTA DR		OAKLAND CA	94601
417	025 073802500	2877	REGATTA DR		OAKLAND	94601	HSUEH MIN Y & WANG YI Y		2877 REGATTA DR		OAKLAND CA	94601
418	025 073902900	301	BOWSMAN CT	143	OAKLAND	94601	VIVEKANANDAN JANAHAN		PO BOX 28		PALO ALTO CA	94302
419	025 073905500	2831	REGATTA DR		OAKLAND	94601	MACDONALD TOM & BERG LEANN TRS		24190 FAWNSKIN DR		CORONA CA	92883
420	025 073906300	2845	REGATTA DR		OAKLAND	94601	WAN DANNY W & LI		2845 REGATTA DR		OAKLAND CA	94601
421	025 073906200	2843	REGATTA DR		OAKLAND	94601	KRETLOW LYNDA M TR ETAL		2843 REGATTA DR		OAKLAND CA	94601
422	019 008600500	2721	E 10TH ST		OAKLAND	94601	ZENDEJAS RIGOBERTO & BERTHA		2721 E 10TH ST		OAKLAND CA	94601
423	019 004900201	1000	22ND AVE		OAKLAND	94606	COTTONMILL PROPERTIES LLC	KORDULA M. GARDNER	2228 LIVINGSTON ST		OAKLAND CA	94606
424	019 005400200	1039	COTTON ST		OAKLAND	94606	CONLEY FAMILY LP		PO BOX 24333		OAKLAND CA	94623
425	019 005501000	1091	CALCOT PL		OAKLAND	94606	1091 CALCOT LLC		2200 ADELINE ST	350	OAKLAND CA	94607
426	019 005501100		CALCOT PL		OAKLAND	94606	EAST BAY LOFTS LLC		36966 PINTO PALM ST		RANCHO MIRAGE CA	92270
427	019 005602800	1088	CALCOT PL		OAKLAND	94606	ACKER GEORGE L & GUERRERO BENJAMIN & CARMEN B TRS		563 LEWIS AVE		SAN LEANDRO CA	94577
428	019 005602900		CALCOT PL		OAKLAND	94606	CITY OF OAKLAND	REAL ESTATE DIVISION	250 FRANK H OGAWA PLZ	4	OAKLAND CA	94612
429	019 006600400	821	KENNEDY ST		OAKLAND	94606	MORENO TERESA E		821 KENNEDY ST		OAKLAND CA	94606
430	019 007300100	510	KENNEDY ST		OAKLAND	94606	EXCHANGE LLC		2530 E 11TH ST		OAKLAND CA	94601
431	019 008000100	2819	E 7TH ST		OAKLAND	94601	COSTELLO MARTIN C & MARY J TRUST & COSTELLO G ETAL		809 LASUEN DR		SAN LEANDRO CA	94578

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
432	019 008002000	2761	E 7TH ST		OAKLAND	94601	YAN DEMETRIO & HUYNH LE N		1625 13TH AVE		OAKLAND CA	94606
433	019 008002102	2769	E 7TH ST		OAKLAND	94601	SIO KAM K & LI LI		600 EAST 15TH ST		OAKLAND CA	94606
434	019 008002103	2801	E 7TH ST		OAKLAND	94601	SIO OSCAR F	SIO KAM K	600 EAST 15TH ST		OAKLAND CA	94606
435	019 008002600	2825	E 7TH ST		OAKLAND	94601	FERRER OLGA M		2825 E 7TH ST		OAKLAND CA	94601
436	019 008000400	2832	CHAPMAN ST		OAKLAND	94601	ROSAS ANTONIO & MAHEDA NORMA L		2832 CHAPMAN ST		OAKLAND CA	94601
437	019 008000700	2816	CHAPMAN ST		OAKLAND	94601	CONTRERAS MARCELINO & FELIPA & CATARINO & EVELIA		2816 CHAPMAN ST		OAKLAND CA	94601
438	019 008000800	2810	CHAPMAN ST		OAKLAND	94601	PEREZ JOSE L & CONTRERASPEREZ LORENA		3531 CARRILLO DR		SAN LEANDRO CA	94578
439	019 008100100	2818	E 7TH ST		OAKLAND	94601	CRUMPACKER DARREL & BETSY		2818 E 7TH ST		OAKLAND CA	94601
440	019 008300400		E 9TH ST		OAKLAND	94608	TRINDADE ELSIE & VIERRA ROSALENE & FRANK JR		2729 E 9TH ST		OAKLAND CA	94601
441	019 008300800	2745	E 9TH ST		OAKLAND	94601	CONTRERAS FLORENTINO & MARIA		2745 E 9TH ST		OAKLAND CA	94601
442	019 008403600	832	LISBON AVE		OAKLAND	94601	HERNANDEZ JESUS & BERTHA A		2715 BEACHWOOD CT		HAYWARD CA	94545
443	019 008400600	2823	E 9TH ST		OAKLAND	94601	BUENO GUADALUPE A & ELVIRA M		2823 E 9TH ST		OAKLAND CA	94601
444	019 008400700	2829	E 9TH ST		OAKLAND	94601	VARELA HUMBERTO & ZAMORA BERTHA A		2829 E 9TH ST		OAKLAND CA	94601
445	019 008500101	2845	E 10TH ST		OAKLAND	94601	ATIENZA ROSITA S TR		2845 E 10TH ST		OAKLAND CA	94601
446	019 008502401	2866	E 9TH ST		OAKLAND	94601	SOLOMONSON JOEL P & HAYES JESSICA		2866 E 9TH ST		OAKLAND CA	94601
447	019 008601800	2712	E 9TH ST		OAKLAND	94601	MEJIA ANTONIO & MARIA T TRS		1124 GARFIELD AVE		ALBANY CA	94706
448	019 008600400	2715	E 10TH ST		OAKLAND	94601	AHUMADA JESUS & HERMALINDA		2715 E 10TH ST		OAKLAND CA	94601
449	019 008700300	2621	E 10TH ST		OAKLAND	94601	NG MARY & ALICE K ETAL		2621 E 10TH STREET		OAKLAND CA	94601
450	019 008700400	2627	E 10TH ST		OAKLAND	94601	NAVARRO JOSE J		2627 E 10TH ST		OAKLAND CA	94601
451	019 008700500	2635	E 10TH ST		OAKLAND	94601	NAVARRO JOSE J		2635 E 10TH ST		OAKLAND CA	94601
452	019 009000200	2513	E 11TH ST		OAKLAND	94601	ROSAS JOSE M & MARICELA		2513 E 11TH ST		OAKLAND CA	94601
453	019 009201300	2720	E 10TH ST		OAKLAND	94601	DELEON J J & MARIA D TRS		2720 E 10TH ST		OAKLAND CA	94601
454	019 009100701	2649	E 11TH ST		OAKLAND	94601	CHAVEZ MARIA J TR	JOSE CERDA	2708 ALIDA ST		OAKLAND CA	94602
455	019 009100900	2642	E 10TH ST		OAKLAND	94601	NAVARRO EVA		2642 E 10TH ST		OAKLAND CA	94601
456	019 009305600	2826	E 10TH ST		OAKLAND	94601	LEE KAREN R		2826 E 10TH ST		OAKLAND CA	94601
457	019 009305800	1002	SANTA INES CT		OAKLAND	94601	LOE KOCK S & KAY W		1002 SANTA INES CT		OAKLAND CA	94601
458	019 009307200		SANTA YNEZ CT		OAKLAND	94601	JINGLETOWN HOMEOWNERS ASSOCIATION	PREFERRED PROPERTY M	7033 VILLAGE PKWY	212	DUBLIN CA	94568
459	025 066801001	603	LANCASTER ST		OAKLAND	94601	SHERMAN BRUCE S TR & RUSHING ROBERT R		438 TAYLOR AVE		ALAMEDA CA	94501
460	025 066800200	3005	E 7TH ST		OAKLAND	94601	ZAMORA CHRISTOPHER		3009 E 7TH ST		OAKLAND CA	94601
461	025 066900401	3021	ELMWOOD AVE		OAKLAND	94601	RAMIREZ TOMAS F		718 DERBY AVE		OAKLAND CA	94601
462	025 066900700	3051	ELMWOOD AVE		OAKLAND	94601	GOMEZ VERONICA		3051 ELMWOOD AVE		OAKLAND CA	94601
463	025 067101200	2957	E 7TH ST		OAKLAND	94601	VILLAGRANA ERMA & ANTHONY M & RITA A		2957 E 7TH ST		OAKLAND CA	94601
464	025 067501100	2875	GLASCOCK ST	108	OAKLAND	94601	ATHERTON FRANCES		2875 GLASCOCK ST	108	OAKLAND CA	94601
465	025 067501800	2875	GLASCOCK ST	202	OAKLAND	94601	NUSSEL BARBARA		2875 GLASCOCK ST	202	OAKLAND CA	94601
466	025 067502200	2875	GLASCOCK ST	206	OAKLAND	94601	HAMILL NORMAN J & JENNIFER P		2875 GLASCOCK ST	206	OAKLAND CA	94601
467	025 067501000	2875	GLASCOCK ST	107	OAKLAND	94601	RAMOS EDWARD C & TAMARA C		134 OLDCASTLE LN		ALAMEDA CA	94502
468	025 067501600	2875	GLASCOCK ST	114	OAKLAND	94601	GREEN RICHARD M		2875 GLASCOCK ST	114	OAKLAND CA	94601
469	025 067601200	418	29TH AVE		OAKLAND	94601	29TH AVENUE GROUP LLC	CARLOS PLAZOLA	19 EMBARCADERO CV		OAKLAND CA	94606
470	025 067800106	630	29TH AVE		OAKLAND	94601	ALDERS MICHAEL & PETER		7380 CLAREMONT AVE		BERKELEY CA	94705
471	025 067900300	713	PETERSON ST		OAKLAND	94601	CASTANEDA JOSEPH N & JOLINE		713 PETERSON ST		OAKLAND CA	94601
472	025 068000601		FRUITVALE AVE		OAKLAND	94601	S P CO 872-1-107G-POR 39	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
473	025 068001001		FRUITVALE AVE		OAKLAND	94601	OAKLAND HYRAIL III LLC	PAUL DRISCOLL	990 HIGHLAND DR	300	SOLANA BEACH CA	92075
474	025 073800100		REGATTA DR		OAKLAND	94601	REGENTS UNIVERSITY CALIFORNIA	ATTN DIRECTOR OF REA	111 FRANKLIN ST	6TH	OAKLAND CA	94607
475	025 073801200	2943	GLASCOCK ST		OAKLAND	94601	HARPER LEONA M & BYRON D		201 S GLENVILLE DR	111	RICHARDSON TX	75081

FOR CONTRACT NO.: 04-0A7104
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ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
476	025 073803300	2893	REGATTA DR		OAKLAND	94601	DILLER ABIGAIL, ABDELMALAK MENA M & PARKER J D TRS		2893 REGATTA DR		OAKLAND CA	94601
477	025 073901000	2913	GLASCOCK ST	126	OAKLAND	94601	GOOD MARCEL & YOSHIDA NAHO		2913 GLASCOCK ST		OAKLAND CA	94601
478	025 073902500	335	CHANNEL WAY	140	OAKLAND	94601	STIDHAM KATRINA R		141 MAIN ST	A	TUCKAHOE NY	10707
479	025 073800500	2957	GLASCOCK ST		OAKLAND	94601	TRAN THUYEN H		2957 GLASCOCK ST		OAKLAND CA	94601
480	025 073802000	2867	REGATTA DR		OAKLAND	94601	LOPEZ CYNTHIA L		3819 BRIGHTON AVE		OAKLAND CA	94602
481	025 073902700	331	CHANNEL WAY	142	OAKLAND	94601	NEEDHAM GUY R & MONTE KAREN L		331 CHANNEL WAY	142	OAKLAND CA	94601
482	025 073903700	317	BOWSMAN CT	151	OAKLAND	94601	CHANG SO M & PAN PETER S		317 BOWSMAN CT	151	OAKLAND CA	94601
483	025 073904300	2807	REGATTA DR		OAKLAND	94601	CADY DONALD C		915 L ST	C242	SACRAMENTO CA	95814
484	025 073904600	2813	REGATTA DR		OAKLAND	94601	PARK DOUGLAS H & GALOVICH ALEXANDRA		5855 HERON DR		OAKLAND CA	94618
485	025 073903300	309	BOWSMAN CT	147	OAKLAND	94601	ROSS JASON		309 BOWSMAN CT	147	OAKLAND CA	94601
486	025 073903100	305	BOWSMAN CT	145	OAKLAND	94601	MASON JAMES N		305 BOWSMAN CT	145	OAKLAND CA	94601
487	025 067001300	2976	E 7TH ST		OAKLAND	94601	YADEN CALVIN C		2976 E 7TH ST		OAKLAND CA	94601
488	019 005500802	1026	COTTON ST		OAKLAND	94606	COTTONMILL PROPERTIES LLC	KORDULA M. GARDNER	2228 LIVINGSTON ST		OAKLAND CA	94606
489	019 008301700	824	27TH AVE		OAKLAND	94601	MUNOZ ROBERT		824 27TH AVE		OAKLAND CA	94601
490	019 010000201	1080	23RD AVE		OAKLAND	94606	P&D 23RD AVENUE ASSOCIATES, LLC		409 THIRTEENTH ST	8TH	OAKLAND CA	94612
491	019 004900312	2160	LIVINGSTON ST		OAKLAND	94606	MADDEN NOLDEN & MARY L TRS		5565 MORAGA AVE		PIEDMONT CA	94611
492	019 005401000	2100	EMBARCADERO		OAKLAND	94606	CONLEY BARBARA J & JOSEPH F		PO BOX 24333		OAKLAND CA	94623
493	019 005401300		DENNISON ST		OAKLAND	94606	S P CO 872-1-106A-1	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
494	019 005601803	1024	CALCOT PL		OAKLAND	94606	GONZALES DAVID G & JEANETTE A		1036 CALCOT PL		OAKLAND CA	94606
495	019 005601902	1036	CALCOT PL		OAKLAND	94606	GONZALES DAVID G & JEANETTE A		1036 CALCOT PL		OAKLAND CA	94606
496	019 005602500	1074	CALCOT PL		OAKLAND	94606	ZHOU QIA X & OU XIN Y		2715 PARK BLVD		OAKLAND CA	94606
497	019 006601800	901	KING ST		OAKLAND	94606	ZERULL BRENT K TR		233 BAYVIEW DR		SAN RAFAEL CA	94901
498	019 006600720	2135	FREDERICK ST		OAKLAND	94606	PRESLEY PROPERTIES LLC & CRAIG JOHN N & PETER ETAL		1721 BROADWAY	202	OAKLAND CA	94612
499	019 007100400	401	KENNEDY ST		OAKLAND	94606	RIGHT AWAY REDY MIX INCORPORATED	ATTN GEOFFREY V HENR	725 JULIE ANN WAY		OAKLAND CA	94621
500	019 007201500	333	23RD AVE		OAKLAND	94606	LONESTAR CALIFORNIA INC	CEMEX INC - PROPERTY	1501 BELVEDERE RD		WEST PALM BEACH FL	33406
501	019 007300804		KENNEDY ST		OAKLAND	94606	LANE CLAUDIO M & NANA	THE CARPET MARKET	45 SABLE PT		ALAMEDA CA	94502
502	019 007901500	2825	CHAPMAN ST		OAKLAND	94601	HARDING SCOTT I		1431 EAST SHORE DR		ALAMEDA CA	94501
503	019 008001000	500	23RD AVE		OAKLAND	94606	TIMLIN ROBERT S		500 23RD AVE		OAKLAND CA	94606
504	019 008001100	512	23RD AVE		OAKLAND	94606	MYERHOFF NICOLAS & GREENBERG DANIEL		2233 SAN ANTONIO AVE		ALAMEDA CA	94501
505	019 008002401	2813	E 7TH ST		OAKLAND	94601	HERNANDEZ MARIA L		13501 ROSE DR		SAN LEANDRO CA	94578
506	019 008002402	2815	E 7TH ST		OAKLAND	94601	TELLES WALTER		2040 E 15TH ST		OAKLAND CA	94606
507	019 008301603	816	27TH AVE		OAKLAND	94601	BELLELLI ROBERT TR		P O BOX 102		KENTFIELD CA	94914
508	019 008302000	838	27TH AVE		OAKLAND	94601	RAMIREZ MARIA J & JOSE L		838 27TH AVE		OAKLAND CA	94601
509	019 008402500	818	LISBON AVE		OAKLAND	94601	PROSSER TRUST		818 LISBON AVE		OAKLAND CA	94601
510	019 008402700	2851	E 9TH ST		OAKLAND	94601	TOBAR ABNER & ALBERTINA		2039 NOME ST		SAN LEANDRO CA	94577
511	019 008400500	2819	E 9TH ST		OAKLAND	94601	CARRENO FRANCISCO & JOSE F		826 LISBON AVE		OAKLAND CA	94601
512	019 008501202	2811	E 10TH ST		OAKLAND	94601	SCHWARTZ PHILLIP & SUSAN TRS		4589 MOHR AVE		PLEASANTON CA	94566
513	019 008600600	2725	E 10TH ST		OAKLAND	94601	NUNO RAUL R & RODRIGUEZ CELIA		2725 E 10TH ST		OAKLAND CA	94601
514	019 008700600	929	27TH AVE		OAKLAND	94601	RODRIGUEZ RAQUEL & SALCIDO JULIO C ETAL		929 27TH AVE		OAKLAND CA	94601
515	019 008800601	2525	E 10TH ST		OAKLAND	94601	LOVETT GARY H & JACQUE E TRS		3410 DEER RIDGE DR		DANVILLE CA	94506
516	019 008900800	948	23RD AVE		OAKLAND	94606	JWDFLEISCHMANN LLC & KIDSPART LLC		P O BOX 7509		OAKLAND CA	94601
517	019 008502100		E 10TH ST		OAKLAND	94608	OAKLEY STATION LLC	ATTN GRAY DANIEL R	3527 MT. DIABLO BLVD	179	LAFAYETTE CA	94549

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
518	019 009001200	2534	E 10TH ST		OAKLAND	94601	REPOSA GUSSIE		2534 E 10TH ST		OAKLAND CA	94601
519	019 009001802	1010	25TH AVE		OAKLAND	94601	BOYENGA ERIC & JANELLE		PO BOX 1823		LOS GATOS CA	95031
520	019 009100401	2631	E 11TH ST		OAKLAND	94601	KIDSPART LLC	DREISBACH ENTERPRISE	PO BOX 7509		OAKLAND CA	94601
521	019 009201100	2736	E 10TH ST		OAKLAND	94601	NAVARRO IGNACIO & ALICIA		P O BOX 7372		OAKLAND CA	94601
522	019 009200300	2717	E 11TH ST		OAKLAND	94601	NAVARRO LYDIA & JOSEPHINE VENDEES	LYDIA NAVARRO	2717 E 11TH ST		OAKLAND CA	94601
523	019 009200700	2739	E 11TH ST		OAKLAND	94601	QUINTERO MARTIN & JUVENTINA		2739 E 11TH ST		OAKLAND CA	94601
524	019 009301602	1101	29TH AVE		OAKLAND	94601	CITY OF OAKLAND	REAL ESTATE DIVISION	250 FRANK H OGAWA PLZ	4	OAKLAND CA	94612
525	019 009301800	1006	SAN FRANCISCO CT		OAKLAND	94601	DEMELLO JOHN L & NINA D		1006 SAN FRANCISCO CT		OAKLAND CA	94601
526	019 009302100	1036	SAN FRANCISCO CT		OAKLAND	94601	BRIZUELA ROBERTO		1036 SAN FRANCISCO CT		OAKLAND CA	94601
527	019 009302200	1046	SAN FRANCISCO CT		OAKLAND	94601	LI TONG		1046 SAN FRANCISCO ST		OAKLAND CA	94601
528	019 009302300	1056	SAN FRANCISCO CT		OAKLAND	94601	JEFFERY SYLVIA A		1056 SAN FRANCISCO CT		OAKLAND CA	94601
529	019 009302700	1087	SAN FRANCISCO CT		OAKLAND	94601	LUO NANCY Q		1087 SAN FRANCISCO CT		OAKLAND CA	94601
530	019 009303600	2836	E 10TH ST		OAKLAND	94601	DESANTIS JAMES H		2836 E 10TH ST		OAKLAND CA	94601
531	019 009000300	2517	E 11TH ST		OAKLAND	94601	SALTO JUAN M & MARIA G		2517 E 11TH ST		OAKLAND CA	94601
532	019 009100200	2615	E 11TH ST		OAKLAND	94601	KIDSPART LLC	DREISBACH ENTERPRISE	PO BOX 7509		OAKLAND CA	94601
533	019 009305400	1015	SANTA MARIA CT		OAKLAND	94601	LEE BING K & LI AMANDA H		1015 SANTA MARIA CT		OAKLAND CA	94601
534	019 009306000	1022	SANTA INES CT		OAKLAND	94601	LI KARY J & ZHEN LIHUA		1022 SANTA INES CT		OAKLAND CA	94601
535	019 009306100	1032	SANTA INES CT		OAKLAND	94601	GUTIERREZ EDGAR & MARIA		1032 SANTA INES CT		OAKLAND CA	94601
536	019 009307500		E 10TH ST		OAKLAND	94601	JINGLETOWN HOMEOWNERS ASSOCIATION	PREFERRED PROPERTY M	7033 VILLAGE PKWY	212	DUBLIN CA	94568
537	019 009900400	1008	E 23RD ST		OAKLAND	94606	CITY OF OAKLAND	REAL ESTATE DIVISION	250 FRANK H OGAWA PLZ	4	OAKLAND CA	94612
538	025 066000200	3109	ELMWOOD AVE		OAKLAND	94601	FLORES FEDERICO & FRANCISCA		3109 ELMWOOD AVE		OAKLAND CA	94601
539	025 066000500		FRUITVALE AVE		OAKLAND	94601	S P CO 872-1-74-3	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
540	025 066800300	3009	E 7TH ST		OAKLAND	94601	ZAMORA CHRISTOPHER		3009 E 7TH ST		OAKLAND CA	94601
541	025 066800400	3021	E 7TH ST		OAKLAND	94601	LAAKANIEMI JILL		3708 MARKET ST	C	OAKLAND CA	94608
542	025 066000301	3129	ELMWOOD AVE		OAKLAND	94601	KAUNE MARY R & ROSEFIELD CHRISTINA L ETAL		3129 ELMWOOD AVE		OAKLAND CA	94601
543	025 066900201	3009	ELMWOOD AVE		OAKLAND	94601	MCEACHERN DAN L		920 PEARL ST		ALAMEDA CA	94501
544	025 066902700	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
545	025 066900301		ELMWOOD AVE		OAKLAND	94608	MCEACHERN DAN L		920 PEARL ST		ALAMEDA CA	94501
546	025 066900800	3061	ELMWOOD AVE		OAKLAND	94601	MARTINEZ BEVERLY A		3061 ELMWOOD AVE		OAKLAND CA	94601
547	025 067001400	2982	E 7TH ST		OAKLAND	94601	CORNEJO FRANCISCO J		2039 101ST AVE		OAKLAND CA	94603
548	025 067000501	2938	E 7TH ST		OAKLAND	94601	ZAMORA ANTONIO C		2938 E 7TH ST		OAKLAND CA	94601
549	025 067101001	2947	E 7TH ST		OAKLAND	94601	SANCHEZ ALAN SR		2947 E 7TH ST		OAKLAND CA	94601
550	025 067100600	2925	E 7TH ST		OAKLAND	94601	VILLEGAS RUDY & SOFIA		2925 E 7TH ST		OAKLAND CA	94601
551	025 067100700	2933	E 7TH ST		OAKLAND	94601	SUN MARK I	MARK SUN	2939 E 7TH ST		OAKLAND CA	94601
552	025 067100900	2941	E 7TH ST		OAKLAND	94601	CHADSEY COLLEEN TR & WINTER BENJAMIN J TR		2941 E 7TH ST		OAKLAND CA	94601
553	025 067200200	2912	FORD ST		OAKLAND	94601	CORNERSTONE LOFTS LLC		2912 FORD ST		OAKLAND CA	94601
554	025 067300502	2937	FORD ST		OAKLAND	94601	SILVEIRA WILLIAM J		499 EMBARCADERO		OAKLAND CA	94606
555	025 067300503	2955	FORD ST		OAKLAND	94601	8855 SAN LEANDRO STREET LLC		401 ROLAND WAY	220	OAKLAND CA	94621
556	025 067502600	2875	GLASCOCK ST	210	OAKLAND	94601	OLIVIA NINA LLC		5923 MARIE WAY		OAKLAND CA	94618
557	025 067502700	2875	GLASCOCK ST	211	OAKLAND	94601	OLIVIA NINA LLC		5923 MARIE WAY		OAKLAND CA	94618
558	025 067500600	2875	GLASCOCK ST	103	OAKLAND	94601	EAMES PETER M & LAUREN T		2875 GLASCOCK ST	103	OAKLAND CA	94601
559	025 067000200	2914	E 7TH ST		OAKLAND	94601	ANDRADE MARVIN J & MOLLY A TRS		1730 ARROWHEAD DR		OAKLAND CA	94611
560	025 067501400	2875	GLASCOCK ST	111	OAKLAND	94601	GUERRERO NICOLE D		5385 PEACHTREE DUNWOODY RD	420	ATLANTA GA	30342
561	025 067601000	412	29TH AVE		OAKLAND	94601	DAVALOS JAVIER		2748 E 10TH ST		OAKLAND CA	94601
562	025 067600601	2884	GLASCOCK ST		OAKLAND	94601	SISCO CATHARINE M TR		6701 AUBURN ST	35	BAKERSFIELD CA	93306
563	025 067600700	2876	GLASCOCK ST		OAKLAND	94601	ALCALA SALVADOR & JOSE		2870 GLASCOCK ST		OAKLAND CA	94601
564	025 067600900	400	29TH AVE		OAKLAND	94601	DAVALOS JAVIER		2748 E 10TH ST		OAKLAND CA	94601

FOR CONTRACT NO.: 04-0A7104
LIST OF ADDRESSES FOR RESIDENCES AND BUSINESSES WITHIN 500 FEET OF PROJECT LIMITS

ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
565	025 067700700	2897	CHAPMAN ST		OAKLAND	94601	DICKSON P R & D TRS FAM TR & DICKSON PETER R ETAL		1290 LARCH AVE		MORAGA CA	94556
566	025 068000505	824	29TH AVE		OAKLAND	94601	OAKLAND UNIFIED SCHOOL DISTRICT	CAROLYN M GETRIDGE	1025 2ND AVE		OAKLAND CA	94606
567	025 067800600	2892	CHAPMAN ST		OAKLAND	94601	CHAPMAN GROUP	CHRIS COLLARD G.P.	1813 HIBBARD ST		ALAMEDA CA	94501
568	025 073800400	2959	GLASCOCK ST		OAKLAND	94601	DIEDEN EDWARD P & KATHLEEN A TRS		2959 GLASCOCK ST		OAKLAND CA	94601
569	025 073900800	2917	GLASCOCK ST	124	OAKLAND	94601	LU TONY & PHUONG CINDY		2917 GLASCOCK		OAKLAND CA	94601
570	025 073900700	2919	GLASCOCK ST	123	OAKLAND	94601	PHAN JAMIE H		P O BOX 60093		PALO ALTO CA	94306
571	025 073901300	2907	GLASCOCK ST	129	OAKLAND	94601	NGO NHIEN & SIMPSON STEVE		2907 GLASCOCK ST		OAKLAND CA	94601
572	025 073700900		REGATTA DR		OAKLAND	94601	ESTUARY OWNERS ASSOCIATION		4670 WILLOW WAY	200	PLEASANTON CA	94588
573	025 073802800	2883	REGATTA DR		OAKLAND	94601	DEVENS BRUCE & MONICA TRS		2883 REGATTA DR		OAKLAND CA	94601
574	025 073900900	2915	GLASCOCK ST	125	OAKLAND	94601	MICHAIL DALIA		2915 GLASCOCK ST		OAKLAND CA	94601
575	025 073905200	2825	REGATTA DR		OAKLAND	94601	VANCE ROBERT C & LIZETTE K TRS		3130 GRAYSTONE RD		PLACERVILLE CA	95667
576	025 073906900	2857	REGATTA DR		OAKLAND	94601	CHANG SO M & PAN DOUGLAS S ETAL		317 BOWSMAN CT		OAKLAND CA	94601
577	025 073903500	313	BOWSMAN CT	149	OAKLAND	94601	QUINONEZ JOSE A & BROOKS JENNIFER C		313 BOWSMAN CT	149	OAKLAND CA	94601
578	025 073906800	2855	REGATTA DR		OAKLAND	94601	NAVARRA CARLO J & EDDY PAULA L TRS		2855 REGATTA DR		OAKLAND CA	94601
579	025 073901400	2905	GLASCOCK ST	130	OAKLAND	94601	READ ANDREW	CALDECOTT PROPERTIES	5251 BROADWAY		OAKLAND CA	94618
580	025 073904200	2805	REGATTA DR		OAKLAND	94601	CALLAWAY MYRA A		33037 REGENTS BLVD		UNION CITY CA	94587
581	019 009305000	1055	SANTA MARIA CT		OAKLAND	94601	LI BENJAMIN		1055 SANTA MARIA CT		OAKLAND CA	94601
582	025 067000900	2956	E 7TH ST		OAKLAND	94601	REO HOMES 3 LLC		2100 LAKESHORE AVE	D	OAKLAND CA	94606
583	019 005400902	1920	DENNISON ST		OAKLAND	94606	CONLEY FAMILY LP		PO BOX 24333		OAKLAND CA	94623
584	019 005601703		CALCOT PL		OAKLAND	94608	EANDI FAMILY PROPERTIES LP		4201 BEMIS ST		OAKLAND CA	94605
585	019 005600402	1075	CALCOT PL		OAKLAND	94606	EANDI ROGER E & LORETTA L		976 23RD AVE		OAKLAND CA	94606
586	019 006600100	845	KENNEDY ST		OAKLAND	94606	LAZARUS WAYNE TR		101 DRAKE MEWS		SONOMA CA	95476
587	019 006600300	825	KENNEDY ST		OAKLAND	94606	SHELDON CECILIA C TR		825 KENNEDY ST		OAKLAND CA	94606
588	019 006600604	819	KENNEDY ST		OAKLAND	94606	RATTO LAND CO ETAL & LINDQUIST ELSIE H TR ETAL	LEN RATTO	P O BOX 764		SALIDA CA	95368
589	019 006600703		FREDERICK ST		OAKLAND	94608	CITY OF OAKLAND		505 14TH ST	609	OAKLAND CA	94612
590	019 007800400	29TH	AV		OAKLAND	94606	S P CO 872-1-75A-9	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
591	019 007901000	430	23RD AVE		OAKLAND	94606	MARZOLF WAYNE H & NANCY T REED TRS & MARZOLF ETAL		1044 CENTRAL AVE		ALAMEDA CA	94501
592	019 007901101	436	23RD AVE		OAKLAND	94606	MARZOLF WAYNE H & NANCY T REED TRS & MARZOLF ETAL		1044 CENTRAL AVE		ALAMEDA CA	94501
593	019 005600806	1015	E 23RD ST		OAKLAND	94606	EANDI FAMILY PROPERTIES LP		4201 BEMIS ST		OAKLAND CA	94605
594	019 006600200	837	KENNEDY ST		OAKLAND	94606	KENNEDY STREET LLC		1350 BAYSHORE HWY	900	BURLINGAME CA	94010
595	019 007000101	2100	E 7TH ST		OAKLAND	94606	COUNTY OF ALAMEDA	COUNTY ADMINISTRATOR	1221 OAK ST	536	OAKLAND CA	94612
596	019 007800106	340	23RD AVE		OAKLAND	94606	CONSOS THEO PROPS 1 LLC & PARANOMOS N & NIKOL ETAL		P O BOX 111		PLEASANTON CA	94566
597	019 008000900	2808	CHAPMAN ST		OAKLAND	94601	LO MICHAEL & LISA J TRS		461 2ND AVE		SAN FRANCISCO CA	94118
598	019 008100501	2802	E 7TH ST		OAKLAND	94601	SIO OSCAR F	SIO KAM K	600 E 15TH ST		OAKLAND CA	94606
599	019 008200601	823	27TH AVE		OAKLAND	94601	EBPM HOLDING CO	PROVIDENT FINANCIAL	2850 OCEAN PARK BLVD	300	SANTA MONICA CA	90405
600	019 008301000	2751	E 9TH ST		OAKLAND	94601	WHITMIRE AVA TR		1044 57TH ST		OAKLAND CA	94608
601	019 008301900	834	27TH AVE		OAKLAND	94601	GARCIA ANDRES M & MARIA L TRS		2502 E 15TH ST		OAKLAND CA	94601
602	019 008300103	2707	E 9TH ST		OAKLAND	94601	RAMIREZ MARIA E TRUST		2707 E 9TH ST		OAKLAND CA	94601
603	019 008301100	835	LISBON AVE		OAKLAND	94601	DO SON & TA DANG		835 LISBON AVE		OAKLAND CA	94601
604	019 008403501	820	PORTWOOD AVE		OAKLAND	94601	BANSAL INC		1784 150TH AVE		SAN LEANDRO CA	94578

FOR CONTRACT NO.: 04-0A7104
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ID	APN	SITUS_ HOUSE_ NUMBER	SITUS_STREET_ NAME	SITUS _ UNIT	SITUS_ CITY	SITUS_ ZIP_ CODE	OWNER_NAME	MAILING_ADDRESS_ CARE_OF_NAME	MAILING_ADDRESS	UNIT	MAILING_ ADDRESS_ CITY_STATE	ZIP
605	019 008700200	2615	E 10TH ST		OAKLAND	94601	TSANG KWOK F		PO BOX 3637		FREMONT CA	94539
606	019 008800301	2523	E 10TH ST		OAKLAND	94601	LOVETT GARY	GARY & JACQUE LOVETT	PO BOX 3203		DANVILLE CA	94526
607	019 008500400	2836	E 9TH ST		OAKLAND	94601	SALCEDO RAMON Q		2836 E 9TH ST		OAKLAND CA	94601
608	019 008801203	907	26TH AVE		OAKLAND	94601	CHAN ANDY H ETAL	ANDY CHAN	810 23RD AVE		OAKLAND CA	94606
609	019 009000100	1034	25TH AVE		OAKLAND	94601	ZHOU XI H		16615 ROLANDO AVE		SAN LEANDRO CA	94578
610	019 009001100	1025	26TH ST		OAKLAND	94607	KIDSPART LLC		PO BOX 7509		OAKLAND CA	94601
611	019 009000500	2531	E 11TH ST		OAKLAND	94601	GONZALEZ ILDEFONSO		219 FOOTHILL BLVD		OAKLAND CA	94606
612	019 009301200	29TH	AV		OAKLAND	94601	S P CO 872-1-107G-POR 39	LEONARD SHIRLEY	PO BOX 2500		BROOMFIELD CO	80038
613	019 009000700	2545	E 11TH ST		OAKLAND	94601	KIDSPART LLC		PO BOX 7509		OAKLAND CA	94601
614	019 009304900	1065	SANTA MARIA CT		OAKLAND	94601	NG CONNIE C		1065 SANTA MARIA CT		OAKLAND CA	94601
615	019 009305700	2820	E 10TH ST		OAKLAND	94601	AGUILAR ARMANDO		2820 E 10TH ST		OAKLAND CA	94601
616	019 009307300		E 10TH ST		OAKLAND	94601	JINGLETOWN HOMEOWNERS ASSOCIATION	PREFERRED PROPERTY M	7033 VILLAGE PKWY	212	DUBLIN CA	94568
617	019 009800505	2424	E 11TH ST		OAKLAND	94601	MAYERON DENNIS		P.O. BOX 3999		BERKELEY CA	94703
618	025 066800900	3057	E 7TH ST		OAKLAND	94601	BUCHANAN RICHARD F & SUSAN H	INSURANCE DEPT	PO BOX 5954		SPRINGFIELD OH	45501
619	025 066901401	3014	E 7TH ST		OAKLAND	94601	J TOWN LLC		PO BOX 410987		SAN FRANCISCO CA	94141
620	025 066901700	710	DERBY AVE		OAKLAND	94601	MCEACHERN DAN		920 PEARL ST		ALAMEDA CA	94501
621	025 066902600	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
622	025 066902200	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
623	025 066902100	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
624	025 066902000	3033	ELMWOOD AVE		OAKLAND	94601	DC HOME DEVELOPMENT LLC		2787 MOORPARK		SAN JOSE CA	95128
625	025 066900900	3058	E 7TH ST		OAKLAND	94601	CHAN WAIMOND C & AMY P		3058 E 7TH ST		OAKLAND CA	94601
626	025 067000800	2952	E 7TH ST		OAKLAND	94601	MEJIA JAVIER & MARIA		2952 E 7TH ST		OAKLAND CA	94601
627	025 067102402	2920	CHAPMAN ST		OAKLAND	94601	GARLOCK SHAR J		2920 CHAPMAN ST		OAKLAND CA	94601
628	025 067300100	2904	GLASCOCK ST		OAKLAND	94601	SILVEIRA WILLIAM J		499 EMBARCADERO		OAKLAND CA	94606
629	025 067300300	2915	FORD ST		OAKLAND	94601	SILVEIRA WILLIAM J		499 EMBARCADERO		OAKLAND CA	94606
630	025 067502000	2875	GLASCOCK ST	204	OAKLAND	94601	SEDILLO RENEE TR		2875 GLASCOCK ST	204	OAKLAND CA	94601
631	025 067500800	2875	GLASCOCK ST	105	OAKLAND	94601	MORGENS ANNE		2875 GLASCOCK ST	105	OAKLAND CA	94601
632	025 067102201	2928	CHAPMAN ST		OAKLAND	94601	PETERS JEFFREY & GRIECOPETERS JENNIFER M		PO BOX 546		PHILO CA	95466
633	025 067500107	340	29TH AVE		OAKLAND	94601	ALAMEDAS ZIMMERMAN PROPERTIES LLC		801 ISLAND DR		ALAMEDA CA	94502
634	025 067600200	2857	FORD ST		OAKLAND	94601	SILVEIRA BILL		2921 FORD ST		OAKLAND CA	94601
635	025 067600800	2870	GLASCOCK ST		OAKLAND	94601	ALCALA SALVADOR & JOSE		2870 GLASCOCK ST		OAKLAND CA	94601
636	025 067801201	600	29TH AVE		OAKLAND	94601	COSTELLO MARTIN C & MARY J		809 LASUEN DR		SAN LEANDRO CA	94578
637	025 073801600	2935	GLASCOCK ST		OAKLAND	94601	CASCIANA JEANETTE & CASCIANA JOSEPH C TR		PO BOX 1344		ALAMEDA CA	94501
638	025 073802200	2871	REGATTA DR		OAKLAND	94601	REICH WILSON D & ARLEEN A TRS		2871 REGATTA DR		OAKLAND CA	94601
639	025 073802700	2881	REGATTA DR		OAKLAND	94601	KATO HARUMI		2881 REGATTA DR		OAKLAND CA	94601
640	025 073900500	2923	GLASCOCK ST	121	OAKLAND	94601	CALIHAN P J & MUTZ MICHAEL E		2923 GLASCOCK ST		OAKLAND CA	94601
641	025 073801500	2937	GLASCOCK ST		OAKLAND	94601	RADOS RICHARD		2937 GLASCOCK ST		OAKLAND CA	94601
642	025 073801100	2945	GLASCOCK ST		OAKLAND	94601	HARPER BYRON D TR & JAHEN CARLOS J TR		2945 GLASCOCK ST		OAKLAND CA	94601
643	025 073803400	2895	REGATTA DR		OAKLAND	94601	COOK ELIZABETH J		2895 REGATTA DR		OAKLAND CA	94601
644	025 073901900	347	CHANNEL WAY	134	OAKLAND	94601	WALKER RYAN & MICHELLE TRS		6400 MORAGA AVE		OAKLAND CA	94611
645	025 073903000	303	BOWSMAN CT	144	OAKLAND	94601	SINDHAR ANSHUMAN & PRIYANKASHARMA		303 BOWSMAN CT		OAKLAND CA	94601
646	025 073907100	2861	REGATTA DR		OAKLAND	94601	PARRAGUE INC		2861 REGATTA DR		OAKLAND CA	94601
647	025 073907000	2859	REGATTA DR		OAKLAND	94601	CANNON ROBERT L TR		843 MANDANA BLVD		OAKLAND CA	94610
648	019 009100702		E 11TH ST		OAKLAND	94608	CHAVEZ MARIA J TR & CERDA JOSE TR	JOSE CERDA	2708 ALIDA ST		OAKLAND CA	94602