FOR CONTRACT NO.: 07-1786A**4**

INFORMATION HANDOUT

MATERIALS INFORMATION

PORTION OF SITE INVESTIGATION PRIVATE PROPERTY – 1619 COSMIC WAY, APN 5627-008-013, PARCEL NO. 77407-, I-5 WESTERN AVENUE INTERCHANGE, TASK ORDER NO. 14, EA 1786A1, PREPARED BY NINYO & MOORE DATED FEBRUARY 25, 2009

PORTION OF SITE INVESTIGATION – 1620 FLOWER STREET, I-5 AT WESTERN AVENUE, TASK ORDER NO. 12, EA 1786A1, PREPARED BY NINYO & MOORE DATED APRIL 16, 2009

PORTION OF SITE INVESTIGATION – 1648-1650 FLOWER AND 640 WESTERN AVENUE, I-5 AT WESTERN AVENUE, TASK ORDER NO. 12, EA 1786A1, PREPARED BY NINYO & MOOR DATED APRIL 16, 2009

PORTION OF LEAD SITE INVESTIGATION REPORT, INTERSTATE 5 WESTERN AVENUE INTERCHANGE, LOS ANGELES, CALIFORNIA, TASK ORDER 07-1786A1, STATEWIDE CONTRACT 43A0078, PREPARED BY NINYO & MOORE, JANUARY 20, 2003

REVISED GETECHNICAL INVESTIGATION WESTERN AVENUE UNDERCROSSING (53-1079S) PART 1 OF 2 AND PART 2 OF 2

RESPONSE TO CALTRANS REVIEW COMMENTS

UPDATE TO THE WESTERN AVENUE UNDERCROSSING (53-1079S) GEOTECHNICAL INVESTIGATION

BATTERY BACKUP SYSTEM CONNECTION DIAGRAMS

ROUTE: 07-LA-5-27.4/28.1

FOR CONTRACT NO.: 07-1786A4

INFORMATION HANDOUT

MATERIALS INFORMATION

SITE INVESTIGATION REPORT

Site Investigation Private Property
1619 Cosmic Way, APN 5627-008-013, Parcel No. 77407,
I-5 Western Avenue Interchange, Task Order No. 14, EA 1786A1
prepared by Ninyo & Moore dated February 25, 2009

ROUTE: 07-LA-5, KP 44.2/45.2

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

SITE INVESTIGATION
PRIVATE PROPERTY – 1619 COSMIC WAY
APN 5627-008-013, PARCEL #77407
I-5 WESTERN AVENUE INTERCHANGE
07-LA-5; KP 44.3/45.3
GLENDALE, CALIFORNIA
TASK ORDER NO. 14
EA NO. 1786A1, CONTRACT NO. 07A2211

PREPARED FOR:
State of California
Department of Transportation
District 7, Division of Planning, 12th Floor, MS-16
Office of Environmental Engineering and Corridor Studies
100 South Main Street
Los Angeles, California 90012

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
475 Goddard, Suite 200
Irvine, California 92618

February 25, 2009
Project No. 207126014

February 25, 2009
Project No. 207126014

Dr. Ayubur Rahman
State of California
Department of Transportation
District 7, 12th Floor, MS-16
Office of Environmental Engineering and Corridor Studies
100 South Main Street
Los Angeles, California 90012

Subject: Site Investigation
Private Property – 1619 Cosmic Way
APN 5627-008-013, Parcel #77407
I-5 Western Avenue Interchange
07-LA-5; KP 44.3/45.3
Glendale, California
Task Order No. 14
EA No. 1786A1
Contract No. 07A2211

Dear Mr. Rahman:

Ninyo & Moore has prepared this report to document the procedures and results for soil sampling conducted at 1619 Cosmic Way, in Glendale, California. Fieldwork was conducted by Ninyo & Moore on January 9, 2009 in accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order No. 14. A description of field procedures and results, figures, tables, and appendices are attached.

Based on the results of this assessment the following conclusions have been made:

- Insignificant concentrations of volatile organic compounds (VOCs) and metals were detected in the soil samples collected at the site. Based on the analytical data, soil generated during construction activities at the site would not be classified as a hazardous waste. Excavated soil can be disposed of at a Class III disposal facility upon acceptance from the selected facility.

- Because no chlorinated solvents were detected in soil samples at the site, it is unlikely the site has contributed to groundwater contamination in the San Fernando Groundwater basin.

- Concentrations of organochlorine pesticides (OCPs), chlorinated herbicides, and polychlorinated biphenyls (PCBs) were not detected in the soil samples collected at the site.
- Based on the preceding conclusion, significant concentrations of the analytes tested are not present in soil at the site in areas proposed for construction, additional environmental assessment is not warranted.

Based on the results of this assessment, Ninyo & Moore recommends the following:

- Ninyo & Moore recommends that the results of this SI be used in the development of a health and safety plan (HSP) for the proposed construction. Although the chemical constituents detected in soil are present in insignificant concentrations, preparation of a HSP is still required by federal and state laws for sites where such chemical constituents are present in the subsurface.

We appreciate the opportunity to provide service on this project.

Sincerely,
NINYO & MOORE

For

Peter Sims
Staff Environmental Geologist

PROFESSIONAL GEOLOGIST
DAVID I. SHALER
NO. 6370
EXP. 07/10
STATE OF CALIFORNIA

David I. Shaler, P.G. 6370
Senior Geologist

PDS/NA/DIS/sc

Distribution: (7) Addressee (6 hard copies and 1 CD)

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1. INTRODUCTION

In accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order No. 14, Ninyo & Moore has performed a site assessment (SI) at 1619 Cosmic Way in Glendale, California (site; Figure 1). This report is based on conditions at the site at the time of the sampling activities and provides documentation of our findings and recommendations.

1.1. Project Location

The California Department of Transportation (Department) is currently preparing the Plans, Specifications, and Estimates (PS&E) to construct northbound off- and on-ramp at Western Avenue. As part of the planned construction, the Department will acquire the private property (or a portion thereof) at 1619 Cosmic Way. The site location is shown on Figure 1.

1.2. Proposed Project

A northbound off- and on-ramp will be constructed. In order to do so, construction activities will occur on the private property which the department is planning to acquire. In support of the project, Ninyo & Moore has conducted a site investigation (SI) at the aforementioned private property (site).

1.3. Site Description

The site is currently developed as a detached structure and associated parking area at 1619 Cosmic Way, Glendale, California (Figure 2).

2. ENVIRONMENTAL SETTING

2.1. Geology/Hydrogeology

The site is generally flat. Based on the review of the United States Geological Survey (USGS) USGS 7.5-Minute Series Burbank, California, Topographic Quadrangle Map, dated

1966 and photorevised 1972, the site has an approximate elevation of approximately 485 feet above mean sea level (MSL).

The site is located on the eastern side of the San Fernando Valley, an east-west trending structural trough north of the Santa Monica Mountains and south of the Verango Mountains. The valley contains several thousand feet of sediments, which entered the valley as it subsided during uplift of surrounding mountains. The site vicinity is underlain by Quaternary alluvial fan deposits consisting primarily of loose to moderately dense sand and silty sand with minor clay.

No natural surface water bodies, including ponds, streams, or other bodies of water, are present on the site. The Los Angeles River is located approximately 0.5-mile south of the site. Based on information available on the EPA web site, groundwater is expected to flow in a southeasterly direction toward the Los Angeles River. However, groundwater flow conditions are variable due to groundwater pumping associated with groundwater cleanup activities.

According to the Los Angeles Department of Public Works (LADPW), Hydrologic Records Division, the nearest well in the vicinity of the site is designated Well No. 3903A located approximately 500 feet north of the site along Western Avenue. On October 25, 2001, groundwater was measured at approximately 60 feet below ground surface (bgs). According to the Gregg Drilling website at "greggdrilling.com," groundwater was encountered at the intersection of Flower Street and Western Avenue in March 1998 at approximately 48 feet bgs.

3. BACKGROUND

Based on a Workplan prepared by Ninyo & Moore on November 27, 2002, and according to TO 14 provided by the Department, the site is occupied by one structure. The site has been used for agricultural, residential, commercial, and light industrial purposes. According to the Workplan, propane is the only hazardous material used on the site. The Workplan states that the site is within the San Fernando Groundwater basin. The San Fernando Groundwater basin contains regional groundwater contamination plumes contaminated with trichloroethylene (TCE), tetrachloroethylene (PCE), and/or carbon tetrachloride (CTC). The SI was performed to evaluate potential hazardous waste conditions at the site.

4. OBJECTIVES

The objective of the SI scope of services is to evaluate the gross and significant concentrations of chemicals possibly present in soil beneath the site resulting from past uses of the site. Due to the historical uses of the site and the lack of specific information regarding chemical and waste storage areas at the site, locations were screened for hazardous waste contaminants of concern in soil including: organochlorine pesticides (OCPs), title 22 metals, volatile organic compounds (VOCs), chlorinated herbicides, and polychlorinated biphenyls (PCBs).

5. SCOPE OF WORK

The following scope of work was performed in accordance with the TO.

5.1. Site-Specific HSP

Ninyo & Moore prepared and provided a site-specific Health and Safety Plan (HSP), under separate cover, based on the scope of work and potential hazards observed during site reconnaissance. The HSP covered the field activities conducted by Ninyo & Moore personnel and was approved by a California Certified Industrial Hygienist (CIH).

The HSP was prepared in accordance with applicable local, state, and federal regulations. The HSP included health and safety requirements related to the proposed scope of the project and planned fieldwork activities.

5.2. Site Investigation

5.2.1. Site Reconnaissance

Ninyo & Moore and the Department visited the site on January 6, 2009. Three sample locations were marked with white spray paint at the approximate locations shown on Figure 2.

5.2.2. Underground Service Alert (USA)

Ninyo & Moore obtained an inquiry identification number from USA at least 48 hours prior to start of work at the site. This number was obtained for the proposed SI borings.

5.2.3. Geophysical Survey

Each of the proposed boring locations on the site was evaluated by a geophysical subcontractor in order to locate utilities or other structures which might interfere with sampling.

5.2.4. Soil Sampling

Three direct push borings were advanced and sampled on the site at the approximate locations shown on Figure 2. Four samples were collected from each boring at surface, 2 feet, 5 feet, and 10 feet below ground surface (bgs).

5.2.5. Sampling Procedures - Soil

Soil borings were situated based on the site reconnaissance, surface markings, and geophysical survey and were collected using a hydraulic push rig. Excess soil not collected as a sample was placed in a Department of Transportation (DOT) approved container and stored on the Department right of way (R/W) pending removal. Please refer to Appendix A for specific procedures.

Sample containers were labeled with boring number, unique Department ID number, and sample depth. Sampling information, time, date of sample collection, sample matrix type, turn-around-time, container type, requested analysis, and other information was recorded on the chain-of-custody. Soil samples were stored in an ice chest for transport to an Environmental Laboratory Accreditation Program (ELAP) certified laboratory within 24 hours of collection.

5.2.6. Decontamination

Clean and decontaminated sampling equipment was used for each borehole location. Sampling equipment was decontaminated between boreholes to prevent introduction of foreign materials and cross contamination. Specific decontamination procedures are described in Appendix A.

Decontamination water generated from the soil survey on the private properties was placed in a DOT approved drum and stored at Department maintenance yard. Disposal of decontamination water is pending and a disposal manifest will be provided in the final report.

5.2.7. Investigative Derived Wastes (IDW)

Discarded equipment/items, such as gloves and pails, were disposed of accordingly. IDW is not considered hazardous and can be disposed of at a permitted disposal facility. Discarded equipment that is to be disposed of, which can still be re-used, was rendered inoperable prior to its disposal in the refuse facility at the direction of the Department.

5.3. GPS Data Collection

Borings were located and marked in the field using the Departments GPS NAD83 datum. Investigative data for each boring, sample, and test performed were entered into an electronic Microsoft Access 2000 database file. Borings were identified by a unique identification number system. Analytic data for each boring is included in the database file (Appendix D).

5.4. Laboratory Analysis

Soil samples were analyzed for VOCs by EPA Method 8260B/5035, PCBs by EPA Method 8082, OCPs by EPA Method 3550B/8081A, chlorinated herbicides by EPA Method 8151A, and Title 22 metals by EPA Method 6010B.

The laboratory limit on the analysis is reported as Method Detection Limit (MDL) and Practical Quantitation Limit (PQL). Soil samples were analyzed by Advanced Technology Laboratories (ATL), a state-certified laboratory in Signal Hill, California.

5.5. Quality Control and Quality Assurance (QA/QC)

5.5.1. Field QA/QC

Field procedures, including decontamination of field sampling equipment, described in Appendix A, were utilized to ensure quality of samples during field sampling. Duplicate samples were collected. The number of duplicate samples to be collected was approximately 10 percent of the total number of samples collected from the site. Duplicate samples were collected, numbered, and packaged in the same manner as other samples. Rinsate blank (equipment blank) samples were collected at a rate of one per day and consisted of distilled water poured through decontaminated sampling equipment. One trip blank was included.

5.5.2. Laboratory QA/QC

ATL analyzed samples in accordance with the requirements of their in-house QA/QC program (a copy of which will be provided to the Department upon request) and the requirements of contract 07A2211.

6. ANALYTICAL RESULTS

6.1. Chemical Results for Soil Samples

Results of the chemical analyses of soil samples are summarized in Table 1, Table 2, and Table 3. Analytical results are also presented in the attached Access database file

(Appendix D). A copy of the laboratory reports is included in Appendix C. Boring logs are included in Appendix B. Chemical results for the soil samples collected during the current assessment are summarized as follows:

- Toluene was detected in soil sample 1027-204-0 at 12 micrograms per kilogram (µg/kg). Other VOCs were not detected in any other soil samples. The concentration of toluene detected is below the United States Environmental Protection Agency (USEPA) preliminary remediation goals for industrial properties (PRGi) (toluene – 520,000 µg/kg).
- No samples exceeded 10 times the State of California Soluble Threshold Limit Concentration (STLC) for metals or the State of California Total Threshold Limit Concentration (TTLC).
- OCP concentrations were not detected in the soil samples collected at the site.
- PCB concentrations were not detected in the soil samples collected at the site.
- Chlorinated herbicide concentrations were not detected in the soil samples collected at the site.

7. CONCLUSIONS

Based on the results of the assessments conducted to date, the following conclusions have been made:

- Insignificant concentrations of VOCs and metals were detected in the soil samples collected at the site. Based on the analytical data, soil generated during construction activities at the site would not be classified as a hazardous waste. Excavated soil can be disposed of at a Class III disposal facility upon acceptance from the selected facility.
- Because no chlorinated solvents were detected in soil samples at the site, it is unlikely the site has contributed to groundwater contamination in the San Fernando Groundwater basin.
- Concentrations of OCPs, chlorinated herbicides, and PCBs were not detected in the soil samples collected at the site.
- Based on the preceding conclusion, significant concentrations of the analytes tested are not present in soil at the site in areas proposed for construction, additional environmental assessment is not warranted.

8. RECOMMENDATIONS

The following recommendations are based on the findings of this assessment.

- Ninyo & Moore recommends that the results of this SI be used in the development of a health and safety plan (HSP) for the proposed construction. Although the chemical constituents detected in soil are present in insignificant concentrations, preparation of a HSP is still required by federal and state laws for sites where such chemical constituents are present in the subsurface.

9. LIMITATIONS

The services outlined in this report have been conducted in a manner generally consistent with current regulatory guidelines. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Ninyo & Moore's opinions are based on an analysis of observed conditions and on information obtained from third parties. It is likely that variations in soil conditions may exist which were beyond the scope of work.

The samples collected and chemically analyzed and the observations made are believed to be representative of the general area evaluated; however, conditions can vary significantly between sampling locations. The interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and measure the concentration of certain chemical or physical constituents in samples collected from the site. The analyses have been conducted by an independent laboratory, which is accredited by the United States EPA and/or certified by the State of California to conduct such analyses. Ninyo & Moore has no involvement in, or control over, such analyses and has no means of confirming the accuracy of laboratory results. Ninyo & Moore, therefore, disclaims any responsibility for inaccuracy in such laboratory results.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document. Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

10. REFERENCES

Ninyo & Moore, Detailed Work Plan for a Parcel Acquisition Site Investigation, Intestate 5 at Western Avenue Interchange, Glendale, California, November 27, 2002.

United States Geological Survey (USGS) 7.5-Minute Series Burbank, California, Topographic Quadrangle Map, dated 1966 and photorevised 1972

TABLE 1 – CHEMICAL RESULTS FOR SOIL SAMPLES - VOCs

Sample No.	Depth (feet)	Date	US EPA Method 8260B		
			PCE (µg/kg)	TCE (µg/kg)	Other VOCs (µg/kg)
1027-203-0	0	1/9/2009	ND	ND	ND
1027-203-2	2	1/9/2009	ND	ND	ND
1027-203-5	5	1/9/2009	ND	ND	ND
1027-203-10	10	1/9/2009	ND	ND	ND
1027-204-0	0	1/9/2009	ND	ND	Toluene 12
1027-204-2	2	1/9/2009	ND	ND	ND
1027-204-5	5	1/9/2009	ND	ND	ND
1027-204-10	10	1/9/2009	ND	ND	ND
1027-205-0	0	1/9/2009	ND	ND	ND
1027-205-2	2	1/9/2009	ND	ND	ND
1027-205-2D	2	1/9/2009	ND	ND	ND
1027-205-5	5	1/9/2009	ND	ND	ND
1027-205-10	10	1/9/2009	ND	ND	ND
1027-205-10D	10	1/9/2009	ND	ND	ND
US EPA Method 8260B µg/l					
1027-TB	--	1/9/2009	ND	ND	ND
1027-EB	--	1/9/2009	ND	ND	ND
PRG-Industrial			1,300	110	Toluene 520,000

Notes:
US EPA – United States Environmental Protection Agency
µg/kg – microgram per kilogram
PCE – tetrachloroethene
TCE – trichloroethene
VOCs - Volatile Organic Compounds
ND – not detected - see laboratory report additional details
Individual detection limits presented in the laboratory report in Appendix C.
TB - trip blank
EB - equipment blank
NA - not applicable
PRG-Industrial - Preliminary Remediation Goals for Industrial Properties

TABLE 2 – CHEMICAL RESULTS FOR SOIL SAMPLES – Polychlorinated Biphenyls, Organochlorine Pesticides, and Chlorinated Herbicides

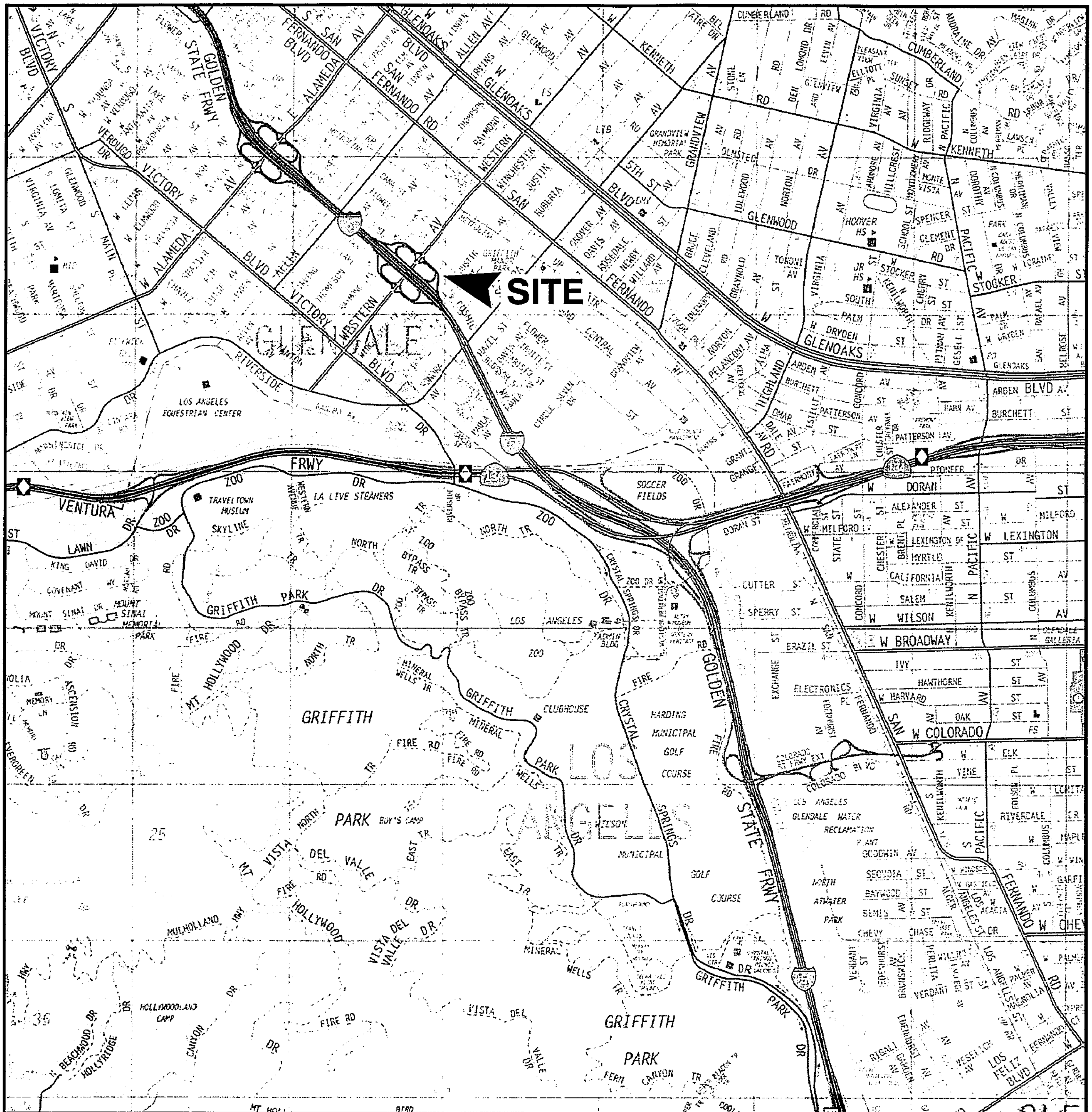
Sample	Sample Date	Depth (feet bgs)	US EPA 3550B/8082 (µg/kg)	US EPA 3550B/8081A (µg/kg)	US EPA 8151A (µg/kg)
			PCBs	OCPs	Chlorinated Herbicides
1027-203-0	1/9/2009	0	ND	ND	ND
1027-203-2	1/9/2009	2	ND	ND	ND
1027-203-5	1/9/2009	5	ND	ND	ND
1027-203-10	1/9/2009	10	ND	ND	ND
1027-204-0	1/9/2009	0	ND	ND	ND
1027-204-2	1/9/2009	2	ND	ND	ND
1027-204-5	1/9/2009	5	ND	ND	ND
1027-204-10	1/9/2009	10	ND	ND	ND
1027-205-0	1/9/2009	0	ND	ND	ND
1027-205-2	1/9/2009	2	ND	ND	ND
1027-205-2D	1/9/2009	2	ND	ND	ND
1027-205-5	1/9/2009	5	ND	ND	ND
1027-205-10	1/9/2009	10	ND	ND	ND
1027-205-10D	1/9/2009	10	ND	ND	ND
PRG - Industrial			PRGs vary by analyte	PRGs vary by analyte	PRGs vary by analyte

Notes:
US EPA - United States Environmenal Protection Agency
mg/kg – milligrams per kilogram
µg/kg - micrograms per kilogram
PCBs - polychlorinated biphenyls
SVOCs - semi- volatile organic compounds
ND - not detected above the Practical Quantitation Limit - see laboratory report for additional details
PRG-Industrial - Preliminary Remediation Goals for Industrial Properties
NL - Not Listed

TABLE 3 – SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Sample Date	Metals (mg/kg)																
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
1027-203-0	1/9/2009	ND<2.0	2.0	180	ND<1.0	ND<1.0	20	11	30	12	ND<0.10	ND<1.0	16	ND<1.0	ND<1.0	ND<1.0	49	83
1027-203-2	1/9/2009	ND<2.0	2.0	150	ND<1.0	ND<1.0	15	9.2	23	3.5	ND<0.10	ND<1.0	13	ND<1.0	ND<1.0	ND<1.0	40	57
1027-203-5	1/9/2009	ND<2.0	1.8	160	ND<1.0	ND<1.0	15	8.8	21	2.7	ND<0.10	ND<1.0	12	ND<1.0	ND<1.0	ND<1.0	45	56
1027-203-10	1/9/2009	ND<2.0	1.1	130	ND<1.0	ND<1.0	15	8.0	15	2.3	ND<0.10	ND<1.0	11	ND<1.0	ND<1.0	ND<1.0	41	52
1027-204-0	1/9/2009	ND<2.0	9.3	130	ND<1.0	ND<1.0	8.1	5	18	26	ND<0.10	ND<1.0	9.0	ND<1.0	ND<1.0	ND<1.0	29	72
1027-204-2	1/9/2009	ND<2.0	1.5	150	ND<1.0	ND<1.0	16	9.6	21	2.7	ND<0.10	ND<1.0	13	ND<1.0	ND<1.0	ND<1.0	43	61
1027-204-5	1/9/2009	ND<2.0	2.1	180	ND<1.0	ND<1.0	16	9.5	24	3.4	ND<0.10	ND<1.0	13	ND<1.0	ND<1.0	ND<1.0	45	60
1027-204-10	1/9/2009	ND<2.0	ND<1.0	97	ND<1.0	ND<1.0	11	6.3	12	1.9	ND<0.10	ND<1.0	8.4	ND<1.0	ND<1.0	ND<1.0	30	42
1027-205-0	1/9/2009	ND<2.0	1.3	170	ND<1.0	ND<1.0	18	10	21	20	ND<0.10	ND<1.0	14	ND<1.0	ND<1.0	ND<1.0	43	100
1027-205-2	1/9/2009	ND<2.0	2.3	200	ND<1.0	ND<1.0	20	11	29	4.1	ND<0.10	ND<1.0	15	ND<1.0	ND<1.0	ND<1.0	53	73
1027-205-2D	1/9/2009	ND<2.0	2.4	170	ND<1.0	ND<1.0	18	11	26	6.1	ND<0.10	ND<1.0	15	ND<1.0	ND<1.0	ND<1.0	47	67
1027-205-5	1/9/2009	ND<2.0	2.1	170	ND<1.0	ND<1.0	16	10	24	3.3	ND<0.10	ND<1.0	13	ND<1.0	ND<1.0	ND<1.0	50	61
1027-205-10	1/9/2009	ND<2.0	ND<1.0	99	ND<1.0	ND<1.0	9.4	6.0	11	1.6	ND<0.10	ND<1.0	7.2	ND<1.0	ND<1.0	ND<1.0	30	39
1027-205-10D	1/9/2009	ND<2.0	ND<1.0	100	ND<1.0	ND<1.0	10	6.4	11	1.7	ND<0.10	ND<1.0	7.7	ND<1.0	ND<1.0	ND<1.0	31	40
TTLC (mg/kg)		500	500	10,000	75	100	2,500	8,000	2,500	1,000	20	3,500	2,000	100	500	700	2,400	5,000
10 x STLC (mg/l)		150	50	1,000	7.5	10	50	800	250	50	2.0	3,500	200	10	50	70	240	2,500

Notes:
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
*Mercury was analyzed using United States Environmental Protection Agency test method 7471A.
ND – not detected above the Practical Quantitation Limit
Samples were analyzed using United States Environmental Protection Agency (US EPA) Test Method 6010B.
TTLC - State of California Total Threshold Limit Concentration
STLC - State of California Soluble Threshold Limit Concentration



REFERENCE: 2007 THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY

APPROXIMATE SCALE IN FEET

0 2400 4800

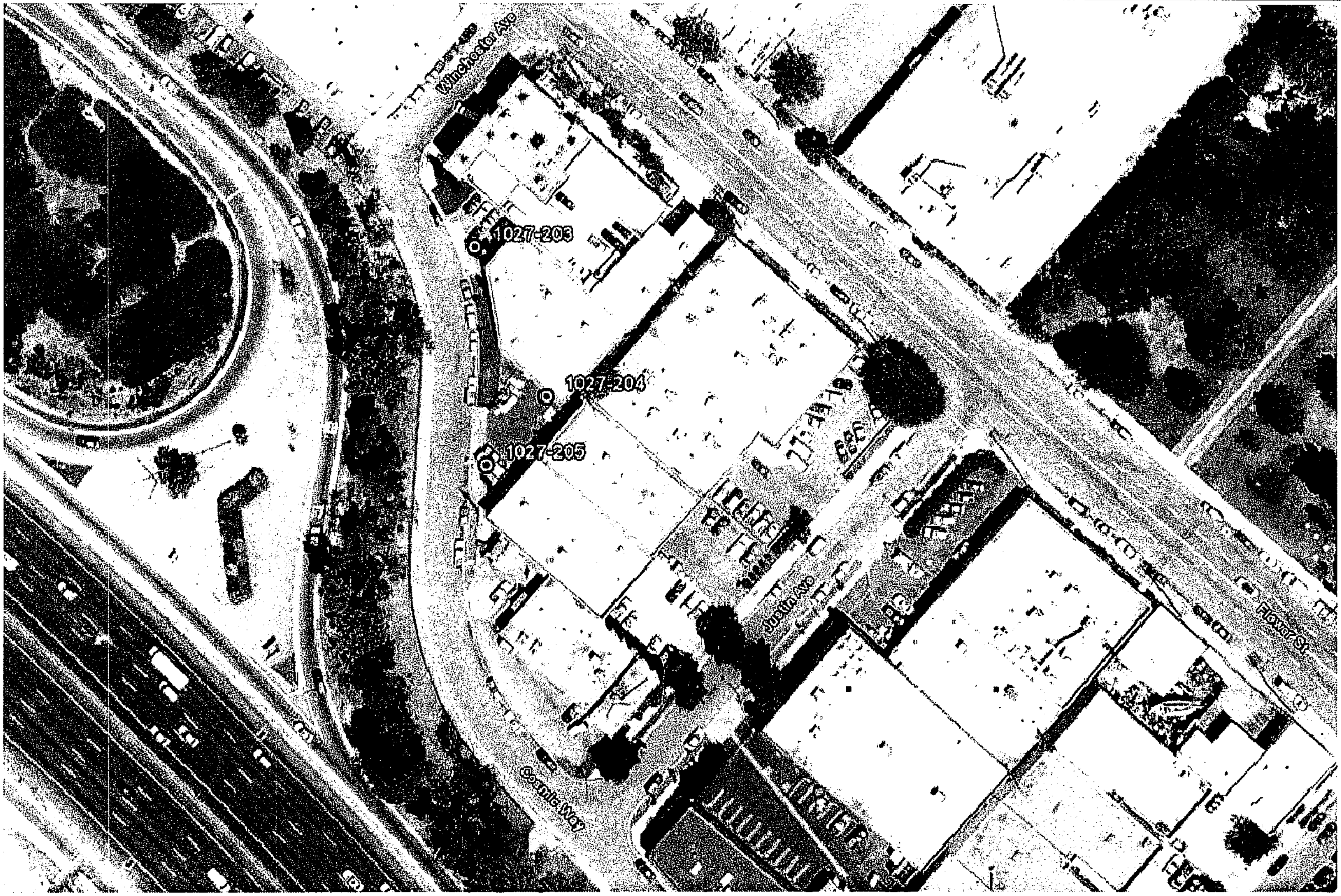
N

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Map © Rand McNally, R.L.07-S-129

207126-A4.DWG

Ninyo & Moore	SITE LOCATION MAP	FIGURE
PROJECT NO. 207126014	DATE 2/09	1619 COSMIC WAY GLENDALE, CALIFORNIA	1



APPROXIMATE SCALE IN FEET

0 100 200

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH, 2009.

LEGEND

1027-204 ⊙ APPROXIMATE LOCATION OF SOIL BORING

Ninyo & Moore		BORING LOCATION MAP	FIGURE
PROJECT NO.	DATE	1619 COSMIC WAY GLENDALE, CALIFORNIA	2
207126014	2/09		

207126-A5.DWG

FOR CONTRACT NO.: 07-1786A4

INFORMATION HANDOUT

MATERIALS INFORMATION

SITE INVESTIGATION REPORT

Site Investigation – 1620 Flower Street, I-5 at Western Avenue
Task Order No. 12, EA 1786A1
prepared by Ninyo & Moore dated April 16, 2009

ROUTE: 07-LA-5, KP 44.2/45.2

SITE INVESTIGATION
1620 FLOWER STREET
INTERSTATE 5 AT WESTERN AVENUE
INTERCHANGE (KP 44.3/45.3)
GLENDALE, CALIFORNIA
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Subject: Site Investigation
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Interstate 5 Western Avenue Interchange (KP 44.3/45.3)
Glendale, California
Task Order No. 12 EA No. 1786A1
Statewide Contract No. 07A2211

Dear Mr. Rahman:

Ninyo & Moore has prepared this report to document the procedures and results for soil and soil vapor sampling conducted at 1620 Flower Street as part of preparation work for the reconfiguration of the north bound Interstate 5 (I-5) Western Avenue Interchange and the improvement of the intersection of Western Avenue and Flower Street in the city of Glendale, California. Fieldwork was conducted by Ninyo & Moore on February 9, 10, and 11, 2009 in accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order (TO) No. 12, TO 12 Amendment No. 1, and Ninyo & Moore's work plan dated February 6, 2009. A description of field procedures and results, figures, tables, and appendices are attached.

Fourteen borings, ten inside and four outside the building, have been drilled at the site. Fifty-eight soil samples (including duplicates) and 14 soil vapor samples (including duplicates) were collected and analyzed.

Based on the results of this assessment the following conclusions have been made:

Soil Samples

- Concentrations of volatile organic compounds (VOCs) were not detected in soil samples. These results would not cause the soil to be classified as a hazardous waste.

- Total petroleum hydrocarbons (TPH) were detected in 56 of 58 soil samples. The concentrations of TPH did not exceed soil screening limits (SSLs) for the protection of groundwater established by the Los Angeles Regional Water Quality Control Board (RWQCB). The detected concentrations were found in the C_{13} - C_{22} range up to 45 milligrams per kilogram (mg/kg); in the C_{23} - C_{32} range up to 480 mg/kg; and in the > C_{32} range up to 230 mg/kg. The concentrations of TPH in the samples would not cause the soil to be classified as a hazardous waste because there is no regulatory determined concentration at which point TPH is defined by California or federal regulations as hazardous waste.

- Polychlorinated biphenyls (PCBs) were detected in 2 of 58 samples. The two detected samples were collected near the surface. The concentrations of PCBs did not exceed the United States Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Guidelines for industrial properties (PRGis). None of the PCB detections exceeded California hazardous waste criteria.

- Semivolatile organic compounds (SVOCs) were detected in 26 of 58 samples. The concentrations of SVOCs did not exceed PRGis. The concentrations of SVOCs detected would not cause the soil to be classified as a hazardous waste.

- pH in soil samples ranged from 7.4 to 12. These pH levels would not cause the soil to be classified as hazardous waste.

- As is typical, one or more metals were detected in each of the 58 soil samples collected. None of the metals concentrations exceeded the California criteria for hazardous waste based on Total Threshold Limit Concentrations (TTLCs) or ten times the Soluble Threshold Limit Concentrations (STLCs).

- Organochlorine pesticides (OCPs) were detected in 56 of the 58 samples. The concentrations of OCPs detected would not cause the soil to be classified as a hazardous waste.

- Chlorinated herbicides were not detected in soil samples. These results would not cause the soil to be classified as a hazardous waste.

Soil Vapor Samples

- Concentrations of VOCs detected in soil vapor samples did not exceed their respective California Human Health Screening Levels (CHHSLs).

Based on the results of this assessment, Ninyo & Moore recommends the following:

- The results of this site investigation (SI) be used in the development of a health and safety plan (HSP) for the proposed construction.

- Soil to be disposed by the Department should be classified for acceptance by a disposal facility selected by the Department before excavating and transporting the soil. Note that some soil may be classified as petroleum containing waste.

We appreciate the opportunity to provide service on this project.

Sincerely,
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1. INTRODUCTION

In accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order (TO) No. 12, TO 12 Amendment No. 1, and Ninyo & Moore's work plan dated February 6, 2009 (work plan), Ninyo & Moore has performed a site investigation (SI) at 1620 Flower Street near I-5 from kilometer post (KP) 44.3 to 45.3 in the city of Glendale, California (site; Figure 1). This report is based on conditions at the site at the time of the sampling activities and provides documentation of our findings and recommendations.

1.1. Project Location and Description

Work under this TO will consist of an SI to evaluate the potential existence of soil and soil vapor contamination at 1620 Flower Street in the city of Glendale, California (Figure 1). The project involves realigning the I-5 (KP 44.3-45.3) northbound off and on ramps at Western Avenue to just south of Winchester Avenue. The site includes parcel 77406 (1620 Flower Street) north of the I-5 at the Western Avenue Interchange, which will be acquired by the Department as part of the reconfiguration project (Figure 1).

1.2. Site Description

The site is currently developed with detached structures (Figure 2). This parcel is currently used for commercial/light industrial purposes. The Department plans to reconfigure the I-5 Western Avenue Interchange near the site.

2. GEOLOGY/HYDROGEOLOGY

The site is generally flat. Based on the review of the United States Geological Survey (USGS) USGS 7.5-Minute Series Burbank, California, Topographic Quadrangle Map, dated 1966 and photorevised 1972, the site has an elevation of approximately 485 feet above mean sea level (msl).

The site is on the eastern side of the San Fernando Valley, an east-west trending structural trough north of the Santa Monica Mountains and south of the Verango Mountains. The valley contains several thousand feet of sediments, which entered the valley as it subsided during uplift of surrounding mountains. The site vicinity is underlain by Quaternary alluvial fan deposits consisting primarily of loose to moderately dense sand and silty sand with minor clay.

No natural surface water bodies, including ponds, streams, or other bodies of water, are present on the site. The Los Angeles River is approximately 0.5-mile south of the site. Based on information available on the United States Environmental Protection Agency (EPA) web site, groundwater is expected to flow in a southeasterly direction toward the Los Angeles River. However, groundwater flow conditions are variable due to groundwater pumping associated with groundwater cleanup activities.

Based on the results of a subsurface evaluation completed for the Department at a property approximately 200 feet from the site, the depth to groundwater in the immediate site vicinity is approximately 50 feet below ground surface (bgs).

3. BACKGROUND

Ninyo & Moore conducted background research in 2002 and details may be found in the Detailed Work Plan for a Parcel Acquisition Site Investigation, Interstate 5 at Western Avenue Interchange (KP 44.3/45.3), Glendale, California, Task Order No. 07-178601-QV, Statewide Contract No. 43A0078, dated November 27, 2002. According to the work plan, the site was previously occupied by residences and then Vari-Lite, Inc. (a user of hazardous materials), and a video supply company. The scope of work was based on the results of this background research and information provided by the Department.

This site is located in the National Priority List (NPL) groundwater contamination plume known as the San Fernando Valley Area 2 – Crystal Spring Wellfield Area (Los Angeles/Glendale), where groundwater is regionally impacted by volatile organic compounds (VOCs).

4. OBJECTIVES

The objective of the SI was to evaluate the potential existence of soil and soil vapor contamination at the site. The Department will be obtaining the parcel as part of the reconfiguration project. It was necessary to evaluate the existence of subsurface contamination at the site.

The SI evaluated the presence of possible contaminants that may exceed the acceptable regulatory limits or compromise the safety of the construction workers on site. The SI identified the concentration of contaminants in the subsurface so that worker safety can be addressed during construction and handling and/or disposal of excess soil can be evaluated. The information obtained will be used to help the Project Engineer estimate the volume of soil impacted, and the cost for remedial activities and/or for the appraisal for the acquisition.

5. SCOPE OF WORK

The following scope of work was performed in accordance with the work plan.

5.1. Site-Specific Health and Safety Plan (HSP)

Ninyo & Moore prepared and provided a site-specific HSP, provided in Appendix A, based on the scope of work and potential hazards observed during site reconnaissance. The HSP covered the field activities conducted by Ninyo & Moore personnel and was approved by a California Certified Industrial Hygienist (CIH).

The HSP was prepared in accordance with applicable local, state, and federal regulations. The HSP included health and safety requirements related to the proposed scope of the project and planned fieldwork activities.

5.2. Site Investigation

5.2.1. Site Reconnaissance

Ninyo & Moore and the Department visited the site on February 2, 2009. Fourteen locations (ten inside and four outside) were selected by the Department and Ninyo & Moore and marked with white spray paint at the approximate locations shown on Figure 2.

5.2.2. Underground Service Alert (USA)

Ninyo & Moore obtained an inquiry identification number from USA at least 48 hours prior to start of work at the site. This number was obtained for the proposed SI borings.

5.2.3. Geophysical Survey

Each of the proposed boring locations on the site was evaluated by a geophysical subcontractor (Southwest Geophysics, Inc.) on February 2, 2009 in order to locate utilities or other underground structures which might interfere with sampling. A copy of the geophysical survey report is provided in Appendix B.

5.2.4. Soil Sampling

Fourteen direct-push borings were advanced and sampled on the site at the approximate locations shown on Figure 2 as described in Appendix C. Prior to drilling, a photograph was taken of each sampling location. Another photograph was taken of each location after the work was finished. The photographs are presented in Appendix D. The borings were sampled at depths of surface, 1, 3, and 5 feet bgs except for borings 1001-112 and 1001-114 which were sampled at 0 and 1 foot bgs due to refusal for a total of 58 samples.

Soil sample locations were selected based on the site reconnaissance, USA markings, and the geophysical survey and were collected using a direct-push rig. Excess soil not collected as a sample was placed in a Department of Transportation (DOT) approved drum and stored at a nearby Department right of way (ROW) pending removal. Field procedures are in Appendix C. A copy of the disposal manifest is in Appendix E.

Sample containers were labeled with boring number, unique Department ID number, and sample depth. Sampling information, time, date of sample collection, sample matrix type, turn-around-time, container type, requested analysis, and other information was recorded on the chain-of-custody (COC). Soil samples were stored in an ice chest for transport to an Environmental Laboratory Accreditation Program (ELAP) certified laboratory within 24 hours of collection.

5.2.5. Soil Vapor Sampling

Soil vapor probes were installed and samples were collected at a depth of 5 feet bgs from borings 1001-101, 1001-102, 1001-103, 1001-104, 1001-105, 1001-106, 1001-107, 1001-108, 1001-109, 1001-110, 1001-111, and 1001-113 as described in Appendix C.

Fourteen soil vapor samples (including duplicates) were collected to evaluate gross and significant concentrations of VOCs in the vapor phase. The soil vapor samples were collected in accordance with the Department of Toxic Substances Control (DTSC)/Regional Water Quality Control Board (RWQCB) guidance for Active Soil Gas Investigations and the procedures outlined in Appendix C. Soil vapor samples were analyzed on site by a state certified mobile laboratory (Jones Environmental).

5.2.6. Decontamination

Clean and decontaminated sampling equipment was used for each borehole location. Sampling equipment was decontaminated between boreholes to prevent introduction of foreign materials and cross contamination. Specific decontamination procedures are described in Appendix C.

Decontamination water and other waste generated from the SI were placed in a DOT approved drum and stored at a nearby Department ROW. Waste was removed from the site on March 6, 2009 by KM Industrial. The disposal manifest is provided in Appendix D.

5.2.7. Investigative Derived Wastes (IDW)

Discarded equipment/items, such as gloves and pails, were disposed of accordingly. IDW is not considered hazardous and can be disposed at a permitted disposal facility. Discarded equipment that is to be disposed, which can still be re-used, was rendered in-operable prior to its disposal in the refuse facility at the direction of the Department.

5.3. GPS Data Collection

When possible borings were located and marked in the field using a global positioning satellite (GPS) receiver and the NAD83 datum. Investigative data for each boring, sample, and test performed were entered into an electronic Microsoft Access 2000 database file. Borings were identified by a unique identification number system. Analytic data for each boring is included in the database file (Appendix F).

5.4. Laboratory Analysis

Soil samples were analyzed for total petroleum hydrocarbons (TPH) as C_4-C_{12}, C_{13}-C_{22}, C_{23}-C_{32}, and >C_{32} by modified EPA Method 8015/5035, VOCs by EPA Method 8260B/5035, semivolatile organic compounds (SVOCs) by EPA Method 8270C, polychlorinated biphenyls (PCBs) by EPA Method 8082, Title 22 Metals by EPA Method 6010B, pH by EPA Method 9045C, Organochlorinated Pesticides (OCPs) by EPA Method 8081A, and chlorinated herbicides by EPA Method 8151A.

Soil vapor samples were analyzed for VOCs by EPA Method 8260B, in accordance with the DTSC/RWQCB Guidance for Active Soil Gas Investigations.

The laboratory limit on the analysis is reported as Method Detection Limit (MDL) and Practical Quantitation Limit (PQL). Soil vapor samples were analyzed by an on-site state-certified mobile laboratory operated by Jones Environmental. Soil and groundwater samples were analyzed by Advanced Technology Laboratories (ATL), a state-certified laboratory in Signal Hill, California. Copies of the laboratory reports are presented in Appendix G.

5.5. Quality Assurance and Quality Control (QA/QC)

5.5.1. Field QA/QC

Field procedures, including decontamination of field sampling equipment, described in Appendix C, were utilized to ensure quality of samples during field sampling. Duplicate samples were collected. The number of duplicate samples to be collected was approximately 10 percent of the total number of samples collected from the site. Duplicate samples were collected, numbered, and packaged in the same manner as other samples. Rinsate blank (equipment blank) samples were collected at a rate of one per COC, per drill rig, and consisted of distilled water poured through decontaminated sampling equipment. Trip blanks were included in each cooler used to transport samples to the laboratory.

5.5.2. Laboratory QA/QC

ATL analyzed samples in accordance with the requirements of their in-house QA/QC program (a copy of which will be provided to the Department upon request) and the requirements of contract 07A2211.

Jones Environmental analyzed soil vapor samples in accordance with the DTSC/RWQCB Guidance for Soil Gas Investigations.

6. ANALYTICAL RESULTS

6.1. Chemical and Metal Results for Soil Samples

Results of the chemical and metal analyses of 58 soil samples are summarized in Tables 1, 2, and 3. Analytical results are also presented in the attached Access database file (Appendix F). A copy of the laboratory reports is included in Appendix G. Boring logs are included in Appendix H. Results for the soil samples collected during the current assessment are summarized as follows:

- VOCs were not detected in soil samples.

- Detected Title 22 Metals concentrations were below respective Total Threshold Limit Concentrations (TTLCs) and 10 times the Soluble Threshold Limit Concentrations (STLCs).

- TPH C_4-C_{12} was not detected in any samples. TPH C_{13}-C_{22} was detected in 26 samples with detections ranging from 10 to 45 mg/kg. TPH C_{23}-C_{32} was detected in 52 samples with detections ranging from 10 to 480 mg/kg. TPH $>C_{32}$ was detected in 52 samples with detections ranging from 10 to 230 mg/kg. No samples exceeded the RWQCB soil screening level (SSL) for soil between 20 to 150 feet above groundwater. The SSLs are not a criteria for classifying soil as a hazardous waste.

- PCB concentrations were detected in two samples. A concentration of 46 micrograms per kilogram (µg/kg) Aroclor 1260 was detected in soil sample 1001-109-1-S. A concentration of 150 µg/kg Aroclor 1254 was detected in soil sample 1001-112-1-S. The concentrations are below the Preliminary Remediation Guidelines for industrial properties (PRGi) for these aroclors (740 µg/kg). PCB concentrations do not exceed the TTLC hazardous waste criteria (50,000 ug/kg).

- SVOC concentrations were detected in 26 soil samples. Concentrations of bis(2-ethylhexyl)phthalate, phenol, and di-n-octylphthalate were detected in soil samples. Concentrations of bis(2-ethylhexyl)phthalate, phenol, and di-n-octylphthalate were not detected above their respective PRGis. There are no hazardous waste criteria for these compounds.

- pH levels within soil samples ranged from 7.4 to 12.

- OCP concentrations were detected in 56 soil samples. Concentrations of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, chlordane, dieldrin, gamma-chlordane, and heptachlor epoxide were detected in soil samples. No OCPs were detected at concentrations above their respective PRGis. There are no hazardous waste criteria for these compounds.

- Chlorinated herbicides were not detected in soil samples.

6.2. Chemical Results for Soil Vapor Samples

Results of the chemical analyses of the 16 soil vapor samples are summarized in Table 4. A copy of the laboratory report is included in Appendix D. Results for the soil vapor samples are summarized as follows:

- The soil vapor samples had detectable concentrations of one or more of the following: tetrachloroethylene (PCE), trichloroethene (TCE), chloroform, toluene, xylenes, ethylbenzene, tert-amylmethylether, isopropylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and freon 113.

- The greatest concentration of PCE was 0.02 micrograms per liter (µg/l) in 1001-102-5-V and 1001-102-5-VD. The California Human Health Screening Levels (CHHSL) for PCE of 0.603 µg/l was not exceeded.

- The greatest concentration of TCE was 0.324 µg/l in 1001-102-5-VD. The CHHSL for TCE of 1.77 µg/l was not exceeded.

- The greatest concentration of chloroform was 0.575 µg/l in 1001-111-5-V 1P. There is no listed CHHSL for chloroform.

- The greatest concentration of toluene was 71.6 µg/l in 1001-113-5-V. The CHHSL for toluene of 378 µg/l was not exceeded.

- The greatest concentration of xylenes was 71.7 µg/l in 1001-113-5-V. The CHHSL for xylenes of 887 µg/l was not exceeded.

- The greatest concentration of ethylbenzene was 13.6 µg/l in 1001-113-5-V. There is no listed CHHSL for ethylbenzene.

- The greatest concentration of tert-amylmethylether was 2.18 µg/l in 1001-113-5-V. There is no listed CHHSL for tert-amylmethylether.

- The greatest concentration of isopropylbenzene was 0.548 µg/l in 1001-113-5-V. There is no listed CHHSL for isopropylbenzene.

- The greatest concentration of 1,2,4-trimethylbenzene was 3.22 µg/l in 1001-113-5-V. There is no listed CHHSL for 1,2,4-trimethylbenzene.

- The greatest concentration of 1,3,5-trimethylbenzene was 1.76 µg/l in 1001-113-5-V. There is no listed CHHSL for 1,3,5-trimethylbenzene.

- The greatest concentration of freon 113 was 0.775 µg/l in 1001-113-5-V. There is no listed CHHSL for freon 113.

7. CONCLUSIONS

Based on the results of the assessments conducted to date, the following conclusions have been made:

Soil Samples

- Concentrations of VOCs were not detected in soil samples. These results would not cause the soil to be classified as a hazardous waste.

- TPH was detected in 56 of 58 soil samples. The concentrations of TPH did not exceed SSLs for the protection of groundwater established by the RWQCB. The detected concentrations were found in the C_{13} - C_{22} range up to 45 milligrams per kilogram (mg/kg); in the C_{23} - C_{32} range up to 480 mg/kg; and in the > C_{32} range up to 230 mg/kg. The concentrations of TPH in the samples would not cause the soil to be classified as a hazardous waste because there is no regulatory determined concentration at which point TPH is defined by California or federal regulations as hazardous waste.

- PCBs were detected in 2 of 58 samples. The two detected samples were collected near the surface. The concentrations of PCBs did not exceed PRGis. None of the PCB detections exceeded California Hazardous waste criteria.

- SVOCs were detected in 26 of 58 samples. The concentrations of SVOCs did not exceed PRGis. The concentrations of SVOCs detected would not cause the soil to be classified as hazardous waste.

- pH in soil samples ranged from 7.4 to 12. These pH levels would not cause the soil to be classified as hazardous waste.

- As is typical, one or more metals were detected in each of the 58 soil samples collected. None of the metals concentrations exceeded the California criteria for hazardous waste based on TTLC or ten times the STLC.

- OCPs were detected in 56 of the 58 samples. The concentrations of OCPs detected would not cause the soil to be classified as a hazardous waste.

- Chlorinated herbicides were not detected in soil samples. These results would not cause the soil to be classified as a hazardous waste.

Soil Vapor Samples

- Concentrations of VOCs detected in soil vapor samples did not exceed their respective CHHSLs.

8. RECOMMENDATIONS

The following recommendations are based on the findings of this assessment.

- The results of this SI be used in the development of a HSP for the proposed construction.

- Soil to be disposed by the Department should be classified for acceptance by a disposal facility selected by the Department before excavating and transporting the soil. Note that some soil may be classified as petroleum containing waste.

9. LIMITATIONS

The services outlined in this report have been conducted in a manner generally consistent with current regulatory guidelines. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Ninyo & Moore's opinions are based on an analysis of observed conditions and on information obtained from third parties. It is likely that variations in soil conditions may exist which were beyond the scope of work.

The samples collected and chemically analyzed and the observations made are believed to be representative of the general area evaluated; however, conditions can vary significantly between sampling locations. The interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and measure the concentration of certain chemical or physical constituents in samples collected from the site. The analyses have been conducted by an independent laboratory, which is accredited by the United States EPA and/or certified by the State of California to conduct such analyses. Ninyo & Moore has no involvement in, or control over, such analyses and has no means of confirming the accuracy of laboratory results. Ninyo & Moore, therefore, disclaims any responsibility for inaccuracy in such laboratory results.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document. Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

10. REFERENCES

Ninyo & Moore, Detailed Work Plan for a Parcel Acquisition Site Investigation, 1620 Flower Street, Interstate 5 at Western Avenue Interchange, Glendale, California, Los Angeles, California, dated February 6, 2009.

United States Geological Survey (USGS), 7.5-Minute Series, Burbank, California, Topographic Quadrangle Map, dated 1966 and photorevised 1972.

TABLE 1 – CHEMICAL RESULTS FOR SOIL SAMPLES - VOCs

Sample No.	Depth (feet)	Date	EPA Method 8260B		
			PCE (µg/kg)	TCE (µg/kg)	Other VOCs (µg/kg)
1001-101-0-S	0	2/9/2009	ND	ND	ND
1001-101-1-S	1	2/9/2009	ND	ND	ND
1001-101-3-S	3	2/9/2009	ND	ND	ND
1001-101-5-S	5	2/9/2009	ND	ND	ND
1001-102-0-S	0	2/10/2009	ND	ND	ND
1001-102-1-S	1	2/10/2009	ND	ND	ND
1001-102-3-S	3	2/10/2009	ND	ND	ND
1001-102-5-S	5	2/10/2009	ND	ND	ND
1001-102-5-SD	5	2/10/2009	ND	ND	ND
1001-103-0-S	0	2/10/2009	ND	ND	ND
1001-103-1-S	1	2/10/2009	ND	ND	ND
1001-103-3-S	3	2/10/2009	ND	ND	ND
1001-103-3-SD	3	2/10/2009	ND	ND	ND
1001-103-5-S	5	2/10/2009	ND	ND	ND
1001-104-0-S	0	2/10/2009	ND	ND	ND
1001-104-1-S	1	2/10/2009	ND	ND	ND
1001-104-3-S	3	2/10/2009	ND	ND	ND
1001-104-5-S	5	2/10/2009	ND	ND	ND
1001-105-0-S	0	2/10/2009	ND	ND	ND
1001-105-1-S	1	2/10/2009	ND	ND	ND
1001-105-3-S	3	2/10/2009	ND	ND	ND
1001-105-5-S	5	2/10/2009	ND	ND	ND
1001-106-0-S	0	2/10/2009	ND	ND	ND
1001-106-1-S	1	2/10/2009	ND	ND	ND
1001-106-3-S	3	2/10/2009	ND	ND	ND
1001-106-5-S	5	2/10/2009	ND	ND	ND
1001-106-5-SD	5	2/10/2009	ND	ND	ND
1001-107-0-S	0	2/10/2009	ND	ND	ND
1001-107-0-SD	0	2/10/2009	ND	ND	ND
1001-107-1-S	1	2/10/2009	ND	ND	ND
1001-107-3-S	3	2/10/2009	ND	ND	ND
1001-107-5-S	5	2/10/2009	ND	ND	ND
1001-108-0-S	0	2/10/2009	ND	ND	ND
1001-108-1-S	1	2/10/2009	ND	ND	ND
1001-108-3-S	3	2/10/2009	ND	ND	ND
1001-108-5-S	5	2/10/2009	ND	ND	ND
1001-109-0-S	0	2/10/2009	ND	ND	ND

TABLE 1 – CHEMICAL RESULTS FOR SOIL SAMPLES - VOCs

Sample No.	Depth (feet)	Date	EPA Method 8260B		
			PCE (µg/kg)	TCE (µg/kg)	Other VOCs (µg/kg)
1001-109-1-S	1	2/10/2009	ND	ND	ND
1001-109-1-SD	1	2/10/2009	ND	ND	ND
1001-109-3-S	3	2/10/2009	ND	ND	ND
1001-109-5-S	5	2/10/2009	ND	ND	ND
1001-110-0-S	0	2/10/2009	ND	ND	ND
1001-110-1-S	1	2/10/2009	ND	ND	ND
1001-110-3-S	3	2/10/2009	ND	ND	ND
1001-110-5-S	5	2/10/2009	ND	ND	ND
1001-111-0-S	0	2/10/2009	ND	ND	ND
1001-111-1-S	1	2/10/2009	ND	ND	ND
1001-111-3-S	3	2/10/2009	ND	ND	ND
1001-111-5-S	5	2/10/2009	ND	ND	ND
1001-112-0-S	0	2/9/2009	ND	ND	ND
1001-112-1-S	1	2/9/2009	ND	ND	ND
1001-113-0-S	0	2/9/2009	ND	ND	ND
1001-113-1-S	1	2/9/2009	ND	ND	ND
1001-113-3-S	3	2/9/2009	ND	ND	ND
1001-113-3-SD	3	2/9/2009	ND	ND	ND
1001-113-5-S	5	2/9/2009	ND	ND	ND
1001-114-0-S	0	2/9/2009	ND	ND	ND
1001-114-1-S	1	2/9/2009	ND	ND	ND
PRG-Industrial			1,300	110	Individual PRGs May Vary

Notes:
EPA – United States Environmental Protection Agency.
µg/kg – microgram per kilogram.
PCE – tetrachloroethene.
TCE – trichloroethene.
VOCs – volatile organic compounds.
ND – not detected - see laboratory report additional details.
Individual detection limits presented in the laboratory report in Appendix G.
EB – equipment blank.
NA – not applicable.
PRG-Industrial – EPA Region 9 Preliminary Remediation Goals for Industrial Properties.

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-101-0-S	0	2/9/2009	ND	ND	ND	11	ND	bis(2-ethylhexyl)phthalate 960	11	ND	ND
1001-101-1-S	1	2/9/2009	ND	17	36	ND	ND	phenol 730	7.4	4,4'-DDD 5.8 4,4'-DDE 20 4,4'-DDT 9.0 alpha-chlordane 110 chlordane 720 dieldrin 25 gamma-chlordane 110 heptachlor epoxide 12	ND
1001-101-3-S	3	2/9/2009	ND	ND	25	ND	ND	bis(2-ethylhexyl)phthalate 1,700	12	4,4'-DDE 2.3 4,4'-DDT 2.6 alpha-chlordane 12 chlordane 84 dieldrin 2.2 gamma-chlordane 13 heptachlor epoxide 1.2	ND
1001-101-5-S	5	2/9/2009	ND	ND	15	ND	ND	bis(2-ethylhexyl)phthalate 8,100	8.5	4,4'-DDT 3.1 alpha-chlordane 3.0 chlordane 23 dieldrin 3.8 gamma-chlordane 3.6	ND
1001-102-0-S	0	2/10/2009	ND	12	20	19	ND	phenol 410	7.9	4,4'-DDE 2.9 4,4'-DDT 2.5 alpha-chlordane 9.0 chlordane 63 dieldrin 2.3 gamma-chlordane 9.7 heptachlor epoxide 1.4	ND
1001-102-1-S	1	2/10/2009	ND	13	23	28	ND	nd	7.9	4,4'-DDD 2.1 4,4'-DDE 4.7 alpha-chlordane 22 chlordane 190 dieldrin 4.4 gamma-chlordane 30	ND
1001-102-3-S	3	2/10/2009	ND	23	190	230	ND	phenol 470	7.8	4,4'-DDE 3.1 4,4'-DDT 3.5 alpha-chlordane 7.2 chlordane 52 gamma-chlordane 8.8	ND
1001-102-5-S	5	2/10/2009	ND	ND	ND	ND	ND	ND	7.8	chlordane 10 heptachlor epoxide 1.7	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-102-5-SD	5	2/10/2009	ND	29	80	41	ND	ND	7.8	4,4'-DDE 6.7 4,4'-DDT 2.8 alpha-chlordane 7.9 chlordane 60 dieldrin 5.1 gamma-chlordane 9.3 heptachlor epoxide 6.5	ND
1001-103-0-S	0	2/10/2009	ND	11	31	37	ND	ND	8.3	4,4'-DDE 4.5 4,4'-DDT 4.6 alpha-chlordane 19 chlordane 120 dieldrin 4.3 gamma-chlordane 21 heptachlor epoxide 3.4	ND
1001-103-1-S	1	2/10/2009	ND	19	35	27	ND	phenol 760	8.3	4,4'-DDD 2.1 4,4'-DDE 4.7 alpha-chlordane 22 chlordane 190 dieldrin 4.4 gamma-chlordane 30	ND
1001-103-3-S	3	2/10/2009	ND	ND	21	31	ND	ND	8.1	4,4'-DDE 2.2 alpha-chlordane 7.2 chlordane 52 gamma-chlordane 8.1	ND
1001-103-3-SD	3	2/10/2009	ND	ND	26	31	ND	ND	7.9	4,4'-DDT 2.7 alpha-chlordane 5.3 chlordane 47 gamma-chlordane 7.2	ND
1001-103-5-S	5	2/10/2009	ND	ND	ND	11	ND	ND	7.8	alpha-chlordane 2.6 chlordane 14 gamma-chlordane 2.0	ND
1001-104-0-S	0	2/10/2009	ND	ND	19	29	ND	bis(2-ethylhexyl)phthalate 3,500	8.3	alpha-chlordane 3.8 chlordane 27 gamma-chlordane 5.0	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-104-1-S	1	2/10/2009	ND	20	100	170	ND	ND	8.2	4,4'-DDD 7.1 4,4'-DDE 17 4,4'-DDT 3.8 alpha-chlordane 120 chlordane 420 dieldrin 18 gamma-chlordane 73 heptachlor epoxide 4.7	ND
1001-104-3-S	3	2/10/2009	ND	15	51	59	ND	ND	8.1	4,4'-DDD 19 4,4'-DDE 40 4,4'-DDT 9.1 alpha-chlordane 160 chlordane 1,000 dieldrin 34 gamma-chlordane 160 heptachlor epoxide 11	ND
1001-104-5-S	5	2/10/2009	ND	13	72	71	ND	ND	8.2	alpha-chlordane 1.5 chlordane 15 gamma-chlordane 1.6	ND
1001-105-0-S	0	2/10/2009	ND	ND	14	17	ND	ND	7.8	4,4'-DDE 5.7 4,4'-DDT 3.7 alpha-chlordane 33 chlordane 150 dieldrin 6.0 gamma-chlordane 28 heptachlor epoxide 3.9	ND
1001-105-1-S	1	2/10/2009	ND	45	480	92	ND	ND	7.7	4,4'-DDE 6.0 4,4'-DDT 5.1 alpha-chlordane 48 chlordane 250 dieldrin 6.0 gamma-chlordane 49 heptachlor epoxide 5.3	ND
1001-105-3-S	3	2/10/2009	ND	ND	20	23	ND	ND	7.4	4,4'-DDE 6.0 4,4'-DDT 5.5 alpha-chlordane 15 chlordane 110 dieldrin 2.9 gamma-chlordane 21 heptachlor epoxide 1.7	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-105-5-S	5	2/10/2009	ND	ND	16	23	ND	ND	7.8	4,4'-DDT 8.2 alpha-chlordane 7.9 chlordane 47 gamma-chlordane 7.8	ND
1001-106-0-S	0	2/10/2009	ND	ND	14	17	ND	ND	7.8	4,4'-DDE 4.4 4,4'-DDT 5.1 alpha-chlordane 17 chlordane 120 dieldrin 3.5 gamma-chlordane 22 heptachlor epoxide 2.8	ND
1001-106-1-S	1	2/10/2009	ND	ND	21	28	ND	ND	7.8	4,4'-DDE 3.5 4,4'-DDT 4.8 alpha-chlordane 13 chlordane 84 dieldrin 2.3 gamma-chlordane 15 heptachlor epoxide 1.9	ND
1001-106-3-S	3	2/10/2009	ND	12	18	25	ND	ND	7.7	4,4'-DDE 2.9 4,4'-DDT 2.7 alpha-chlordane 11 chlordane 86 gamma-chlordane 14 heptachlor epoxide 1.4	ND
1001-106-5-S	5	2/10/2009	ND	ND	ND	ND	ND	ND	7.8	4,4'-DDT 2.4	ND
1001-106-5-SD	5	2/10/2009	ND	14	27	32	ND	bis(2-ethylhexyl)phthalate 4,000	7.8	4,4'-DDT 3.5 alpha-chlordane 8.6 chlordane 59 gamma-chlordane 11 heptachlor epoxide 1.3	ND
1001-107-0-S	0	2/10/2009	ND	14	22	24	ND	ND	8.1	4,4'-DDD 3.3 4,4'-DDE 6.5 4,4'-DDT 3.6 alpha-chlordane 27 chlordane 260 dieldrin 6.5 gamma-chlordane 33 heptachlor epoxide 3.0	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-107-0-SD	0	2/10/2009	ND	ND	17	30	ND	ND	8.1	4,4'-DDE 2.2 4,4'-DDT 2.0 alpha-chlordane 11 chlordane 66 dieldrin 2.0 gamma-chlordane 13 heptachlor epoxide 1.4	ND
1001-107-1-S	1	2/10/2009	ND	ND	18	26	ND	ND	8.0	4,4'-DDE 6.2 4,4'-DDT 3.2 alpha-chlordane 31 chlordane 220 dieldrin 7.0 gamma-chlordane 33 heptachlor epoxide 4.3	ND
1001-107-3-S	3	2/10/2009	ND	ND	16	29	ND	ND	8.2	4,4'-DDE 7.7 4,4'-DDT 6.3 alpha-chlordane 46 chlordane 250 dieldrin 7.2 gamma-chlordane 48 heptachlor epoxide 7.0	ND
1001-107-5-S	5	2/10/2009	ND	ND	12	20	ND	phenol 670	8.3	4,4'-DDE 2.7 alpha-chlordane 21 chlordane 100 dieldrin 2.4 gamma-chlordane 21 heptachlor epoxide 1.8	ND
1001-108-0-S	0	2/10/2009	ND	ND	ND	ND	ND	bis(2-ethylhexyl)phthalate 1,200	8.3	alpha-chlordane 2.8 chlordane 24 gamma-chlordane 2.8 heptachlor epoxide 1.1	ND
1001-108-1-S	1	2/10/2009	ND	ND	15	24	ND	bis(2-ethylhexyl)phthalate 950	8.0	4,4'-DDE 2.5 4,4'-DDT 2.9 alpha-chlordane 19 chlordane 66 gamma-chlordane 12 heptachlor epoxide 1.1	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-108-3-S	3	2/10/2009	ND	ND	16	10	ND	bis(2-ethylhexyl)phthalate 3,200	7.8	4,4'-DDE 5.8 4,4'-DDT 6.4 alpha-chlordane 29 chlordane 180 gamma-chlordane 32 heptachlor epoxide 3.9	ND
1001-108-5-S	5	2/10/2009	ND	ND	26	43	ND	ND	8.0	4,4'-DDE 5.5 4,4'-DDT 3.3 alpha-chlordane 25 chlordane 160 dieldrin 5.8 gamma-chlordane 30 heptachlor epoxide 5.2	ND
1001-109-0-S	0	2/10/2009	ND	15	75	84	ND	ND	7.8	4,4'-DDE 5.8 4,4'-DDT 4.7 alpha-chlordane 27 chlordane 160 dieldrin 6.6 gamma-chlordane 30 heptachlor epoxide 4.5	ND
1001-109-1-S	1	2/10/2009	ND	ND	25	37	aroclor 1260 46	phenol 1,400	7.8	4,4'-DDE 6.0 4,4'-DDT 9.3 alpha-chlordane 28 chlordane 160 dieldrin 7.6 gamma-chlordane 32 heptachlor epoxide 3.5	ND
1001-109-1-SD	1	2/10/2009	ND	15	32	39	ND	ND	7.8	4,4'-DDE 7.8 4,4'-DDT 6.4 alpha-chlordane 38 chlordane 200 dieldrin 8.4 gamma-chlordane 38 heptachlor epoxide 5.0	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-109-3-S	3	2/10/2009	ND	12	24	29	ND	ND	7.7	4,4'-DDD 4.6 4,4'-DDE 2.9 4,4'-DDT 3.4 alpha-chlordane 11 chlordane 76 dieldrin 2.7 gamma-chlordane 14 heptachlor epoxide 1.3	ND
1001-109-5-S	5	2/10/2009	ND	ND	20	27	ND	ND	7.4	4,4'-DDE 7.8 4,4'-DDT 9.3 alpha-chlordane 29 chlordane 170 dieldrin 5.9 gamma-chlordane 32 heptachlor epoxide 2.7	ND
1001-110-0-S	0	2/10/2009	ND	10	18	12	ND	bis(2-ethylhexyl)phthalate 980	7.6	4,4'-DDE 6.3 4,4'-DDT 6.9 alpha-chlordane 39 chlordane 190 dieldrin 17 gamma-chlordane 32 heptachlor epoxide 5.4	ND
1001-110-1-S	1	2/10/2009	ND	12	41	46	ND	bis(2-ethylhexyl)phthalate 620 phenol 620	7.5	4,4'-DDE 9.0 4,4'-DDT 4.6 alpha-chlordane 46 chlordane 240 dieldrin 12 gamma-chlordane 41 heptachlor epoxide 6.8	ND
1001-110-3-S	3	2/10/2009	ND	11	28	38	ND	phenol 1,400	7.8	4,4'-DDE 16 4,4'-DDT 17 alpha-chlordane 68 chlordane 360 dieldrin 12 gamma-chlordane 64 heptachlor epoxide 7.1	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-110-5-S	5	2/10/2009	ND	11	26	34	ND	bis(2-ethylhexyl)phthalate 1,800 phenol 350	7.8	4,4'-DDE 7.8 4,4'-DDT 9.3 alpha-chlordane 32 chlordane 180 dieldrin 6.6 gamma-chlordane 33 heptachlor epoxide 3.9	ND
1001-111-0-S	0	2/10/2009	ND	18	25	20	ND	bis(2-ethylhexyl)phthalate 6,600	8.7	alpha-chlordane 2.5 chlordane 18 gamma-chlordane 3.1	ND
1001-111-1-S	1	2/10/2009	ND	25	110	190	ND	phenol 360	8.5	alpha-chlordane 5.5 chlordane 40 gamma-chlordane 6.4	ND
1001-111-3-S	3	2/10/2009	ND	ND	16	25	ND	bis(2-ethylhexyl)phthalate 580	8.4	4,4'-DDT 2.3 alpha-chlordane 2.7 chlordane 26 gamma-chlordane 3.5	ND
1001-111-5-S	5	2/10/2009	ND	15	10	12	ND	bis(2-ethylhexyl)phthalate 1,000	8.4	ND	ND
1001-112-0-S	0	2/9/2009	ND	ND	34	21	ND	bis(2-ethylhexyl)phthalate 3,600 Di-n-octylphthalate 390	8.4	alpha-chlordane 1.0 chlordane 13	ND
1001-112-1-S	1	2/9/2009	ND	ND	19	54	aroclor 1254 150	ND	8.7	alpha-chlordane 3.3 chlordane 39 gamma-chlordane 3.1	ND
1001-113-0-S	0	2/9/2009	ND	ND	14	30	ND	bis(2-ethylhexyl)phthalate 3,400	8.6	alpha-chlordane 3.2 chlordane 22 gamma-chlordane 4.2	ND
1001-113-1-S	1	2/9/2009	ND	ND	14	35	ND	bis(2-ethylhexyl)phthalate 920	8.9	4,4'-DDE 3.3 alpha-chlordane 17 chlordane 140 gamma-chlordane 23	ND
1001-113-3-S	3	2/9/2009	ND	ND	ND	22	ND	ND	8.3	4,4'-DDE 2.2 4,4'-DDT 2.3 alpha-chlordane 9.3 chlordane 62 dieldrin 2.0 gamma-chlordane 11	ND

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-113-3-SD	3	2/9/2009	ND	ND	17	28	ND	ND	8.3	4,4'-DDE 2.2 4,4'-DDT 3.4 alpha-chlordane 15 chlordane 100 dieldrin 2.2 gamma-chlordane 19 heptachlor epoxide 2.0	ND
1001-113-5-S	5	2/9/2009	ND	ND	15	31	ND	bis(2-ethylhexyl)phthalate 660	8.4	4,4'-DDE 2.0 4,4'-DDT 2.1 alpha-chlordane 2.6 chlordane 21 gamma-chlordane 3.2	ND
1001-114-0-S	0	2/9/2009	ND	14	35	73	ND	bis(2-ethylhexyl)phthalate 1,900	8.7	4,4'-DDT 2.4 alpha-chlordane 2.1 chlordane 19 gamma-chlordane 2.1	ND
1001-114-1-S	1	2/9/2009	ND	12	29	135	ND	bis(2-ethylhexyl)phthalate 13,000	8.1	alpha-chlordane 3.1 chlordane 21 gamma-chlordane 2.8	ND
SSLs			500	1,000	10,000	10,000	NL	NL	NL	NL	NL
PRG - Industrial			NL	NL	NL	NL	aroclor 1254 740 aroclor 1260 740	bis(2-ethylhexyl)phthalate 120,000 phenol 100,000,000 Di-n-octylphthalate 25,000,000	NL	4,4'-DDD 10,000 4,4'-DDE 7,000 4,4'-DDT 7,000 alpha-chlordane NL chlordane 6,500 dieldrin 110 gamma-chlordane NL heptachlor epoxide 190	Individual PRGs May Vary

Notes:
EPA – United States Environmental Protection Agency.
mg/kg – milligrams per kilogram.
µg/kg – micrograms per kilogram.
PCBs – polychlorinated biphenyls.
SVOCs – semivolatile organic compounds.
OCPs – organochlorine pesticides.
ND – not detected above the Practical Quantitation Limit - see laboratory report for additional details.
PRG-Industrial – EPA Region 9 Preliminary Remediation Goals for Industrial Properties.
NL – Not Listed.
SSLs – Soil Screening Levels published by the Los Angeles Regional Water Quality Control Board for soil 20 to 150 feet above groundwater.

TABLE 3 – SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Depth (feet bgs)	Sample Date	Metals (mg/kg)																
			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
1001-101-0-S	0	2/9/2009	<2.0	1.7	94	<1.0	<1.0	8.8	5.0	14	3.3	<0.10	<1.0	6.8	<1.0	<1.0	<1.0	26	37
1001-101-1-S	1	2/9/2009	<2.0	1.6	160	<1.0	<1.0	16	8.7	23	17	<0.10	<1.0	12	<1.0	<1.0	<1.0	43	78
1001-101-3-S	3	2/9/2009	<2.0	3.5	130	<1.0	<1.0	24	6.7	21	11	<0.10	1.4	12	<1.0	<1.0	<1.0	35	59
1001-101-5-S	5	2/9/2009	<2.0	<1.0	150	<1.0	<1.0	14	8.3	21	12	<0.10	<1.0	11	<1.0	<1.0	<1.0	40	67
1001-102-0-S	0	2/10/2009	<2.0	1.9	150	<1.0	<1.0	18	9.7	24	14	<0.10	<1.0	13	<1.0	<1.0	<1.0	45	76
1001-102-1-S	1	2/10/2009	<2.0	1.4	160	<1.0	<1.0	17	9.2	26	16	<0.10	<1.0	13	<1.0	<1.0	<1.0	47	82
1001-102-3-S	3	2/10/2009	<2.0	<1.0	140	<1.0	<1.0	15	8.3	21	13	<0.10	<1.0	12	<1.0	<1.0	<1.0	42	66
1001-102-5-S	5	2/10/2009	<2.0	<1.0	130	<1.0	<1.0	14	7.8	19	4.7	<0.10	<1.0	11	<1.0	<1.0	<1.0	42	55
1001-102-5-SD	5	2/10/2009	<2.0	<1.0	150	<1.0	<1.0	16	8.6	22	15	<0.10	<1.0	12	<1.0	<1.0	<1.0	44	75
1001-103-0-S	0	2/10/2009	<2.0	2.0	150	<1.0	<1.0	17	9.4	23	16	<0.10	<1.0	13	<1.0	<1.0	<1.0	45	76
1001-103-1-S	1	2/10/2009	<2.0	<1.0	150	<1.0	<1.0	16	9.3	23	11	<0.10	<1.0	12	<1.0	<1.0	<1.0	44	68
1001-103-3-S	3	2/10/2009	<2.0	<1.0	130	<1.0	<1.0	31	24	21	7.9	<0.10	1.3	19	<1.0	<1.0	<1.0	38	56
1001-103-3-SD	3	2/10/2009	<2.0	<1.0	160	<1.0	<1.0	17	9.3	25	10	<0.10	<1.0	13	<1.0	<1.0	<1.0	46	77
1001-103-5-S	5	2/10/2009	<2.0	<1.0	150	<1.0	<1.0	15	8.7	21	3.4	<0.10	<1.0	11	<1.0	<1.0	<1.0	45	57
1001-104-0-S	0	2/10/2009	<2.0	2.5	150	<1.0	<1.0	17	8.8	24	16	<0.10	<1.0	13	<1.0	<1.0	<1.0	46	80
1001-104-1-S	1	2/10/2009	<2.0	2.4	130	<1.0	<1.0	16	11	19	8.8	<0.10	<1.0	10	<1.0	<1.0	<1.0	39	56
1001-104-3-S	3	2/10/2009	<2.0	2.4	150	<1.0	<1.0	19	19	22	11	<0.10	<1.0	13	<1.0	<1.0	<1.0	42	64
1001-104-5-S	5	2/10/2009	<2.0	<1.0	150	<1.0	<1.0	18	10	23	8.8	<0.10	<1.0	14	<1.0	<1.0	<1.0	45	66
1001-105-0-S	0	2/10/2009	<2.0	2.3	150	<1.0	<1.0	17	8.8	23	14	0.12	<1.0	13	<1.0	<1.0	<1.0	44	78
1001-105-1-S	1	2/10/2009	<2.0	1.7	140	<1.0	<1.0	18	9.3	23	15	<0.10	<1.0	13	<1.0	<1.0	<1.0	44	75
1001-105-3-S	3	2/10/2009	<2.0	1.8	150	<1.0	1.2	17	8.7	23	22	<0.10	<1.0	13	<1.0	<1.0	<1.0	43	110
1001-105-5-S	5	2/10/2009	<2.0	1.7	150	<1.0	<1.0	16	8.7	22	13	<0.10	<1.0	12	<1.0	<1.0	<1.0	44	75
1001-106-0-S	0	2/10/2009	<2.0	<1.0	130	<1.0	<1.0	14	12	19	11	<0.10	<1.0	10	<1.0	<1.0	<1.0	40	60
1001-106-1-S	1	2/10/2009	<2.0	1.3	140	<1.0	<1.0	17	8.8	22	14	<0.10	<1.0	12	<1.0	<1.0	<1.0	43	73
1001-106-3-S	3	2/10/2009	<2.0	1.2	130	<1.0	<1.0	16	7.9	20	8.2	<0.10	<1.0	12	<1.0	<1.0	<1.0	39	63
1001-106-5-S	5	2/10/2009	<2.0	<1.0	140	<1.0	<1.0	15	8.3	21	5.8	<0.10	<1.0	11	<1.0	<1.0	<1.0	43	61
1001-106-5-SD	5	2/10/2009	<2.0	1.4	150	<1.0	<1.0	17	9.1	24	15	<0.10	<1.0	13	<1.0	<1.0	<1.0	45	80
1001-107-0-S	0	2/10/2009	<2.0	3.2	160	<1.0	<1.0	15	9.2	23	14	<0.10	<1.0	12	<1.0	<1.0	<1.0	41	75
1001-107-0-SD	0	2/10/2009	<2.0	2.2	140	<1.0	<1.0	14	8.4	21	21	<0.10	<1.0	11	<1.0	<1.0	<1.0	37	72

TABLE 3 – SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Depth (feet bgs)	Sample Date	Metals (mg/kg)																
			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
1001-107-1-S	1	2/10/2009	<2.0	2.4	160	<1.0	<1.0	16	9.5	24	14	<0.10	<1.0	13	<1.0	<1.0	<1.0	43	79
1001-107-3-S	3	2/10/2009	<2.0	3.0	140	<1.0	<1.0	15	8.7	22	14	<0.10	<1.0	12	<1.0	<1.0	<1.0	39	74
1001-107-5-S	5	2/10/2009	<2.0	1.6	140	<1.0	<1.0	13	8.2	20	7.2	<0.10	<1.0	11	<1.0	<1.0	<1.0	37	62
1001-108-0-S	0	2/10/2009	<2.0	1.7	120	<1.0	<1.0	13	10	17	4.9	<0.10	<1.0	9.7	<1.0	<1.0	<1.0	37	49
1001-108-1-S	1	2/10/2009	<2.0	1.4	130	<1.0	<1.0	16	8.7	21	10	<0.10	<1.0	12	<1.0	<1.0	<1.0	40	64
1001-108-3-S	3	2/10/2009	<2.0	3.0	140	<1.0	<1.0	16	8.6	22	14	<0.10	<1.0	12	<1.0	<1.0	<1.0	44	71
1001-108-5-S	5	2/10/2009	<2.0	4.4	160	<1.0	<1.0	16	9.5	23	16	<0.10	<1.0	13	<1.0	<1.0	<1.0	40	84
1001-109-0-S	0	2/10/2009	<2.0	1.9	150	<1.0	<1.0	13	22	22	20	<0.10	<1.0	11	<1.0	<1.0	<1.0	35	75
1001-109-1-S	1	2/10/2009	<2.0	1.7	170	<1.0	<1.0	17	10	26	25	<0.10	<1.0	13	<1.0	<1.0	<1.0	42	97
1001-109-1-SD	1	2/10/2009	<2.0	2.3	150	<1.0	<1.0	16	10	24	18	<0.10	<1.0	14	<1.0	<1.0	<1.0	40	80
1001-109-3-S	3	2/10/2009	<2.0	1.1	170	<1.0	<1.0	17	11	27	21	<0.10	<1.0	14	<1.0	<1.0	<1.0	44	87
1001-109-5-S	5	2/10/2009	<2.0	1.3	160	<1.0	<1.0	16	9.6	25	16	<0.10	<1.0	13	<1.0	<1.0	<1.0	41	84
1001-110-0-S	0	2/10/2009	<2.0	<1.0	120	<1.0	<1.0	13	14	17	13	<0.10	<1.0	10	<1.0	<1.0	<1.0	31	58
1001-110-1-S	1	2/10/2009	<2.0	1.6	170	<1.0	<1.0	16	9.5	24	21	<0.10	<1.0	12	<1.0	<1.0	<1.0	39	96
1001-110-3-S	3	2/10/2009	<2.0	1.5	150	<1.0	<1.0	15	9.0	22	15	<0.10	<1.0	13	<1.0	<1.0	<1.0	39	77
1001-110-5-S	5	2/10/2009	<2.0	1.8	150	<1.0	<1.0	37	10	25	20	<0.10	<1.0	23	<1.0	<1.0	<1.0	40	82
1001-111-0-S	0	2/10/2009	<2.0	2.9	110	<1.0	<1.0	15	6.3	17	14	<0.10	<1.0	8.8	<1.0	<1.0	<1.0	34	51
1001-111-1-S	1	2/10/2009	<2.0	1.8	160	<1.0	<1.0	17	9.3	25	16	<0.10	<1.0	13	<1.0	<1.0	<1.0	47	75
1001-111-3-S	3	2/10/2009	<2.0	<1.0	140	<1.0	<1.0	16	8.4	24	17	<0.10	<1.0	12	<1.0	<1.0	<1.0	43	86
1001-111-5-S	5	2/10/2009	<2.0	<1.0	140	<1.0	<1.0	14	8.2	20	1.2	<0.10	<1.0	11	<1.0	<1.0	<1.0	44	50
1001-112-0-S	0	2/9/2009	<2.0	1.6	110	<1.0	<1.0	13	6.6	18	10	<0.10	<1.0	10	<1.0	<1.0	<1.0	32	56
1001-112-1-S	1	2/9/2009	<2.0	2.4	96	<1.0	<1.0	14	5.2	16	18	0.14	<1.0	7.8	<1.0	<1.0	<1.0	27	55
1001-113-0-S	0	2/9/2009	<2.0	2.2	110	<1.0	<1.0	13	6.8	18	17	<0.10	<1.0	10	<1.0	<1.0	<1.0	33	62
1001-113-1-S	1	2/9/2009	<2.0	<1.0	110	<1.0	<1.0	12	6.0	15	9.3	<0.10	<1.0	8.7	<1.0	<1.0	<1.0	30	57
1001-113-3-S	3	2/9/2009	<2.0	2.5	150	<1.0	<1.0	15	8.9	22	6.9	<0.10	<1.0	12	<1.0	<1.0	<1.0	41	66
1001-113-3-SD	3	2/9/2009	<2.0	2.2	150	<1.0	<1.0	17	9.3	24	14	<0.10	<1.0	14	<1.0	<1.0	<1.0	43	78
1001-113-5-S	5	2/9/2009	<2.0	<1.0	140	<1.0	<1.0	14	8.4	22	22	<0.10	<1.0	12	<1.0	<1.0	<1.0	41	68
1001-114-0-S	0	2/9/2009	<2.0	4.3	110	<1.0	<1.0	13	6.6	19	11	<0.10	<1.0	9.0	<1.0	<1.0	<1.0	31	60
1001-114-1-S	1	2/9/2009	<2.0	3.8	10	<1.0	<1.0	13	8.0	20	3.6	<0.10	<1.0	10	<1.0	<1.0	<1.0	40	56

TABLE 3 – SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Depth (feet bgs)	Sample Date	Metals (mg/kg)																
			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
TTLC (mg/kg)			500	500	10,000	75	100	2,500	8,000	2,500	1,000	20	3,500	2,000	100	500	700	2,400	5,000
10 x STLC (mg/l)			150	50	1,000	7.5	10	50	800	250	50	2.0	3,500	200	10	50	70	240	2,500

Notes:
mg/kg – milligrams per kilogram.
mg/l – milligrams per liter.
ND – not detected above the Practical Quantitation Limit.
Samples were analyzed using United States Environmental Protection Agency (EPA) Test Method 6010B.
*Mercury was analyzed using EPA Test Method 7471A.

TABLE 4 – SUMMARY OF SOIL VAPOR SAMPLE ANALYTICAL RESULTS

Sample	Date Sampled	Depth (feet)	PCE	TCE	Chloroform	cis-1,2-dichloroethene	trans-1,2-dichloroethene	Toluene	Xylenes	Ethylbenzene	Benzene	tert-amylmethylether	Vinyl Chloride	n-Propylbenzene	Isopropylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Freon 113
			(µg/l)															
1001-101-5-V	2/11/2009	5	ND	ND	ND	ND	ND	0.138	0.311	ND	ND	ND	ND	ND	ND	ND	ND	0.2
1001-102-5-V	2/11/2009	5	0.02	0.208	ND	ND	ND	ND	0.28	ND	ND	ND	ND	ND	ND	ND	ND	0.664
1001-102-5-VD	2/11/2009	5	0.02	0.324	ND	ND	ND	ND	0.268	ND	ND	ND	ND	ND	ND	ND	ND	0.775
1001-103-5-V	2/11/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.354
1001-104-5-V	2/11/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4
1001-105-5-V	2/11/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.535
1001-106-5-V	2/11/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.264
1001-107-5-V	2/11/2009	5	ND	ND	ND	ND	ND	0.282	0.328	ND	ND	ND	ND	ND	ND	ND	ND	ND
1001-108-5-V	2/11/2009	5	ND	ND	ND	ND	ND	0.203	0.297	ND	ND	ND	ND	ND	ND	ND	ND	0.199
1001-109-5-V	2/11/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.112
1001-110-5-V	2/11/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.378
1001-111-5-V 3P	2/11/2009	5	ND	ND	0.0685	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1001-113-5-V	2/11/2009	5	ND	ND	ND	ND	ND	71.6	71.7	13.6	ND	2.18	ND	ND	0.548	3.22	1.76	ND
1001-113-5-VD	2/11/2009	5	ND	ND	ND	ND	ND	60.5	58.7	10.3	ND	1.53	ND	ND	0.314	2.49	1.39	ND
Screening Levels																		
CHHSLs (Industrial Land Use in µg/l)			**0.603**	**1.77**	**NL**	**44.4**	**88.7**	**378**	**887**	**NL**	**0.122**	**NL**	**0.0448**	**NL**	**NL**	**NL**	**NL**	**NL**

Notes:
PCE – tetrachloroethene.
TCE – trichloroethene.
µg/l – micrograms per liter.
ND – Not detected above reported detection limit.
Individual detection limits presented in the laboratory report in Appendix G.
NL – None Listed.
Cal-EPA – California Environmental Protection Agency.
CHHSLs – California Human Health Screening Levels established by the Cal-EPA in January 2005.

REFERENCE: 2007 THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY

APPROXIMATE SCALE IN FEET

0 2400 4800

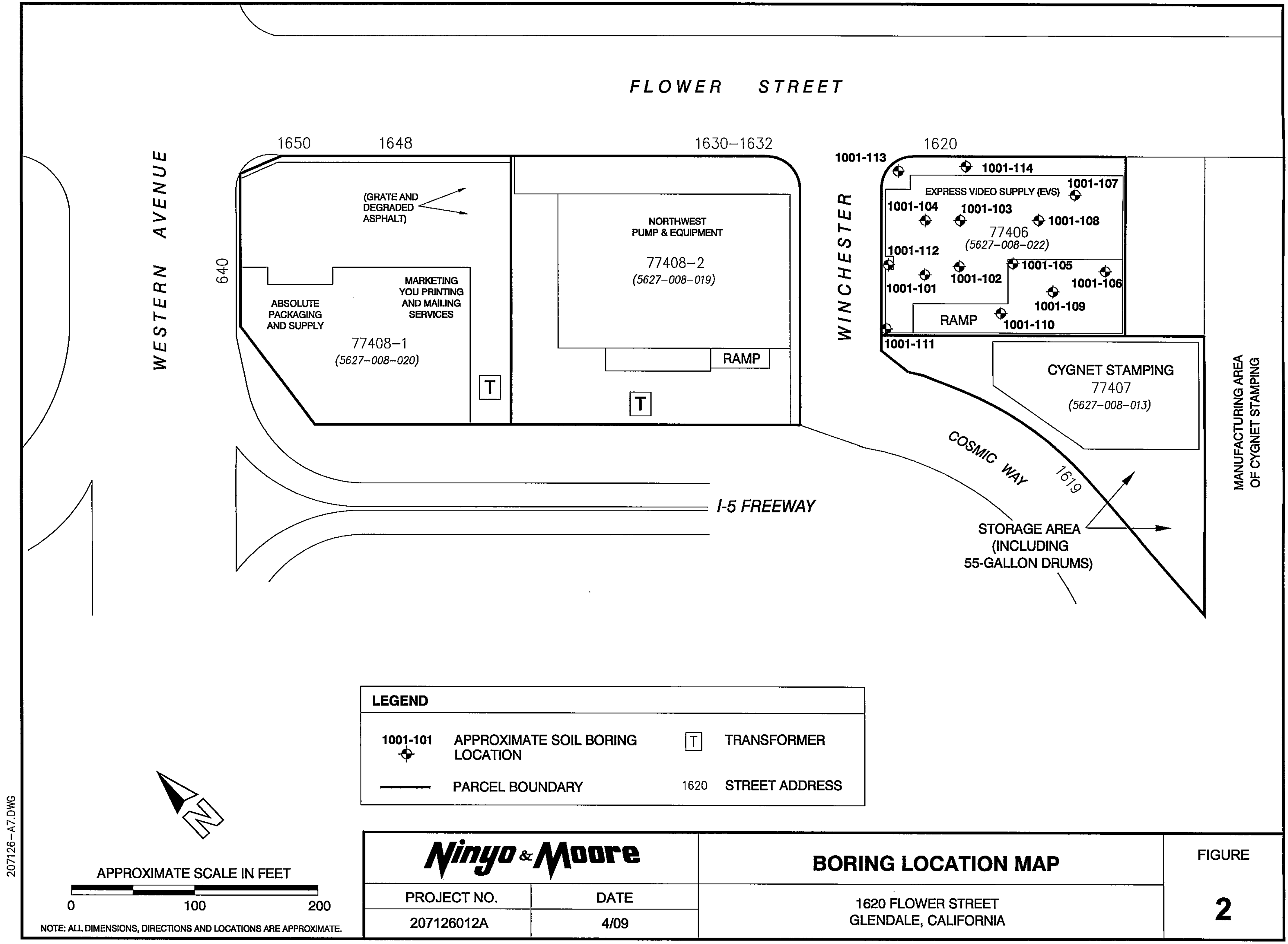
N

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Map © Rand McNally, R.L.07-S-129

Ninyo & Moore		SITE LOCATION MAP	FIGURE
PROJECT NO.	DATE	1620 FLOWER STREET GLENDALE, CALIFORNIA	1
207126012A	4/09		

207126-A5.DWG



Ninyo & Moore

BORING LOCATION MAP

FIGURE **2**

PROJECT NO.	DATE
207126012A	4/09

1620 FLOWER STREET
GLENDALE, CALIFORNIA

FOR CONTRACT NO.: 07-1786A4

INFORMATION HANDOUT

MATERIALS INFORMATION

SITE INVESTIGATION REPORT

Site Investigation – 1648-1650 Flower and 640 Western Avenue
I-5 at Western Avenue, Task Order No. 12, EA 1786A1
prepared by Ninyo & Moor dated April 16, 2009

ROUTE: 07-LA-5, KP 44.2/45.2

SITE INVESTIGATION
1648-1650 FLOWER STREET
AND 640 WESTERN AVENUE
INTERSTATE 5 WESTERN
AVENUE INTERCHANGE (KP 44.3/45.3)
GLENDALE, CALIFORNIA
TASK ORDER NO. 12 EA NO. 1786A1
STATEWIDE CONTRACT NO. 07A2211

PREPARED FOR:
State of California
Department of Transportation
District 7, Division of Planning, 12th Floor, MS-16
Office of Environmental Engineering and Corridor Studies
100 South Main Street
Los Angeles, California 90012

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
475 Goddard, Suite 200
Irvine, California 92618

April 16, 2009
Project No. 207126012B

April 16, 2009
Project No. 207126012B

Dr. Ayubur Rahman
State of California
Department of Transportation
District 7, 12th Floor, MS-16
Office of Environmental Engineering and Corridor Studies
100 South Main Street
Los Angeles, California 90012

Subject: Site Investigation
1648-1650 Flower Street and 640 Western Avenue
Interstate 5 Western Avenue Interchange (KP 44.3/45.3)
Glendale, California
Task Order No. 12 EA No. 1786A1
Statewide Contract No. 07A2211

Dear Mr. Rahman:

Ninyo & Moore has prepared this report to document the procedures and results for groundwater, soil, and soil vapor sampling conducted at 1648-1650 Flower Street and 640 Western Avenue as part of preparation work for the reconfiguration of the north bound of Interstate 5 (I-5) Western Avenue Interchange and the improvement of the intersection of Western Avenue and Flower Street in the city of Glendale, California. Fieldwork was conducted by Ninyo & Moore on February 13, 2009 in accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order (TO) No. 12, TO 12 Amendment No. 1, and Ninyo & Moore's work plan dated February 6, 2009. A description of field procedures and results, figures, tables, and appendices are attached.

Six borings, one inside the building and five outside the building, have been drilled at the site. Twenty-seven soil samples (including duplicates), six soil vapor samples (including one duplicate), and three ground water samples, including one duplicate, were collected and analyzed.

Based on the results of this assessment the following conclusions have been made:

Soil Samples

- Insignificant concentrations of volatile organic compounds (VOCs) were detected in three of 27 soil samples. The detections were far below the United States Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goals for industrial properties (PRGis) which are health risk based criteria. The detected concentrations would not cause the soil to be classified as a hazardous waste.

- Total petroleum hydrocarbons (TPH) were detected in 20 of 27 soil samples. The concentrations of TPH did not exceed Los Angeles Regional Water Quality Control Board (RWQCB) Soil Screening Levels (SSLs) for the protection of groundwater. Elevated concentrations of TPH C_{23}-C_{32} and TPH >C_{32} were detected in soil sample 1001-119-0-S. If the two elevated concentrations from 1001-119-0-S are summed, the SSL (10,000 milligrams per kilogram [mg/kg]) is exceeded. The elevated TPH concentrations are limited to the surface only.

- Polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), and chlorinated herbicides were not detected in the 27 soil samples.

- Semivolatile organic compounds (SVOCs) were detected in four of 27 samples. Detections in these 4 samples did not exceed PRGis. The concentrations of SVOCs detected would not cause the soil to be classified as a hazardous waste.

- pH in soil samples ranged from 5.1 to 11. These pH levels would not cause the soil to be classified as a hazardous waste.

- As is typical, one or more metals were detected in each of the 27 soil samples collected. None of the metals concentrations exceeded the California criteria for hazardous waste based on total concentrations. The concentration of lead in soil sample 1001-120-0-S did exceed 10 times the California soluble threshold for hazardous waste. The sample was analyzed for soluble lead concentration and the result was less than 5 milligrams per liter (mg/l) so the soil would not be classified as a hazardous waste.

Soil Vapor Samples

- VOCs were detected in each vapor sample collected. Tetrachloroethene (PCE) concentrations in 1001-118-5-V and 1001-119-5-V exceeded the industrial California Human Health Screening Level (CHHSL). The boring locations of 1001-118 and 1001-119 are along the northwestern edge of the property, away from the site building. However, none of the VOCs detected in the vapor samples were detected in soil samples. These detections would not cause the soil to be classified as a hazardous waste.

Groundwater Samples

- Groundwater was encountered beneath the site at a depth of approximately 50 feet below ground surface (bgs). Groundwater samples collected at the site contained no detectable concentrations of PCBs, SVOCs, OCPs, or chlorinated herbicides. One of the two groundwater samples collected (and its duplicate sample) contained detectable concentrations of

TPH. There is no listed California Department of Health Services Maximum Contaminant Level (MCL) for TPH. The two groundwater samples collected (and the duplicate) contained concentrations of VOCs in excess of the MCLs for PCE (5 micrograms per liter [μg/l]), trichloroethene (TCE; 5 μg/l), and 1,1-dichloroethene (1,1 DCE; 6 μg/l). These detections (PCE from 27 to 37 μg/l; TCE from 480 to 550 μg/l; and 1,1 DCE from 15 to 39 μg/l) were expected because of the site's location relative to regional solvent plumes in the San Fernando Valley. As mentioned above no VOCs were detected in soil samples collected at the site. Groundwater samples collected at the site contained concentrations of arsenic, barium, chromium, copper, mercury, nickel, and selenium in excess of the MCL. MCLs are a drinking water standard and do not indicate a hazardous waste classification.

Based on the results of this assessment, Ninyo & Moore recommends the following:

- The results of this SI be used in the development of a health and safety plan (HSP) for the proposed construction.
- We estimate the cost to excavate and dispose the 10 cubic yards of TPH containing soil in the vicinity of boring 119, including preparation of a worker health and safety plan and reporting, will be approximately $17,400.
- Soil to be disposed by the Department should be classified for acceptance by a disposal facility selected by the Department before excavating and transporting the soil.

We appreciate the opportunity to provide service on this project.

Sincerely,
NINYO & MOORE

Peter Sims
Staff Environmental Geologist

Nancy J. Anglin, R.E.A.
Senior Engineer

David I. Shaler, P.G. 6370
Senior Geologist

PROFESSIONAL GEOLOGIST
DAVID I. SHALER
NO. 6370
EXP. 07/10
STATE OF CALIFORNIA

PDS/NA/DIS/sc

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1. INTRODUCTION

In accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order No. (TO) 12, TO 12 Amendment No. 1, and Ninyo & Moore's work plan dated February 6, 2009 (work plan), Ninyo & Moore has performed a site investigation (SI) along Interstate 5 (I-5) from kilometer post (KP) 44.3 to 45.3 in the city of Glendale, California (site; Figure 1). This report is based on conditions at the site at the time of the sampling activities and provides documentation of our findings and recommendations.

1.1. Project Location and Description

Work under this TO consisted of an SI to evaluate the potential existence of soil, soil vapor, and groundwater contamination at 1648 – 1650 Flower Street and 640 Western Avenue in the city of Glendale, California (Figure 1). The project involves realigning the I-5 (KP 44.3-45.3) northbound off and on ramps at Western Avenue to just south of Winchester Avenue. The site includes parcel 77408 (1648 – 1650 Flower Street and 640 Western Avenue) north of the I-5 at the Western Avenue Interchange, which will be partially acquired by the Department as part of the reconfiguration project (Figure 1).

1.2. Site Description

The site is currently developed with detached structures and associated parking areas (Figure 2). This parcel is currently used for commercial/light industrial purposes. The Department plans to reconfigure the I-5 Western Avenue Interchange near the site.

2. GEOLOGY/HYDROGEOLOGY

The site is generally flat. Based on the review of the United States Geological Survey (USGS) USGS 7.5-Minute Series Burbank, California, Topographic Quadrangle Map, dated 1966 and photorevised 1972, the site has an approximate elevation of approximately 485 feet above mean sea level (msl).

The site is on the eastern side of the San Fernando Valley, an east-west trending structural trough north of the Santa Monica Mountains and south of the Verango Mountains. The valley contains several thousand feet of sediments, which entered the valley as it subsided during uplift of surrounding mountains. The site vicinity is underlain by Quaternary alluvial fan deposits consisting primarily of loose to moderately dense sand and silty sand with minor clay.

No natural surface water bodies, including ponds, streams, or other bodies of water, are present on the site. The Los Angeles River is approximately 0.5-mile south of the site. Based on information available on the United States Environmental Protection Agency (EPA) web site, groundwater is expected to flow in a southeasterly direction toward the Los Angeles River. However, groundwater flow conditions are variable due to groundwater pumping associated with groundwater cleanup activities.

Based on the temporary wells placed at the site, groundwater was encountered at depths ranging from 50 to 52 feet below ground surface (bgs).

3. BACKGROUND

Ninyo & Moore conducted background research in 2002 and details may be found in the Detailed Work Plan for a Parcel Acquisition Site Investigation, Interstate 5 at Western Avenue Interchange (KP 44.3/45.3), Glendale, California, Task Order No. 07-178601-QV, Statewide Contract No. 43A0078, dated November 27, 2002. According to the work plan, the site was previously occupied by graphics and printing companies. The scope of work was based on the results of this background research and information provided by the Department.

This site is located in the National Priority List (NPL) groundwater contamination plume known as the San Fernando Valley Area 2 – Crystal Spring Wellfield Area (Los Angeles/Glendale), where groundwater is regionally impacted by volatile organic compounds (VOCs).

4. OBJECTIVES

The objective of the SI was to evaluate the potential existence of soil, soil vapor, and possible groundwater contamination at the site. Prior tenants discharged photographic chemical wastes and utilized solvents, alcohols, developers, stabilizers, activators and inks, and also operated a silver recovery unit. The Department will be obtaining a portion of the parcel as part of the re-configuration project. It was necessary to evaluate the existence of subsurface contamination at the site.

The SI evaluated the presence of possible contaminants that may exceed the acceptable regulatory limits or compromise the safety of the construction workers on site. The SI identified the concentration of contaminants in the subsurface so that worker safety can be addressed during construction and handling and/or disposal of excess soil can be evaluated. The information obtained will be used to help the Project Engineer estimate the volume of soil impacted, and the cost for remedial activities and/or for the appraisal for the acquisition.

5. SCOPE OF WORK

The following scope of work was performed in accordance with the work plan.

5.1. Site-Specific Health and Safety Plan (HSP)

Ninyo & Moore prepared and provided a site-specific HSP, provided in Appendix A, based on the scope of work and potential hazards observed during site reconnaissance. The HSP covered the field activities conducted by Ninyo & Moore personnel and was approved by a California Certified Industrial Hygienist (CIH).

The HSP was prepared in accordance with applicable local, state, and federal regulations. The HSP included health and safety requirements related to the proposed scope of the project and planned fieldwork activities.

5.2. Site Investigation

5.2.1. Site Reconnaissance

Ninyo & Moore and the Department visited the site on February 2, 2009. Six locations (five inside and one outside) were selected by the Department and Ninyo & Moore and marked with white spray paint at the approximate locations shown on Figure 2.

5.2.2. Underground Service Alert (USA)

Ninyo & Moore obtained an inquiry identification number from USA at least 48 hours prior to start of work at the site. This number was obtained for the proposed SI borings.

5.2.3. Geophysical Survey

Each of the proposed boring locations on the site was evaluated by a geophysical subcontractor (Southwest Geophysics, Inc.) on February 11, 2009 in order to locate utilities or other interferences which might interfere with sampling. A copy of the geophysical survey report is provided in Appendix B.

5.2.4. Soil Sampling

Six direct-push borings were advanced and sampled on the site at the approximate locations shown on Figure 2 as described in Appendix C. Prior to drilling, a photograph was taken of each sampling location. Another photograph was taken of each location after the work was finished. The photographs are presented in Appendix D. Six of the borings were sampled at depths of surface, 1, 3, and 5 feet bgs. Twenty-seven soil samples were collected and analyzed (including duplicates).

Soil sample locations were selected based on the site reconnaissance, USA markings, and geophysical survey and were collected using a direct-push rig. Excess soil not collected as a sample was placed in a Department of Transportation (DOT) approved drum and stored at a nearby Department right of way. Field procedures are in Appendix C. A copy of the disposal manifest is in Appendix E.

Sample containers were labeled with boring number, unique Department ID number, and sample depth. Sampling information, time, date of sample collection, sample matrix type, turn-around-time, container type, requested analysis, and other information was recorded on the chain-of-custody. Soil samples were stored in an ice chest for transport to an Environmental Laboratory Accreditation Program (ELAP) certified laboratory within 24 hours of collection.

5.2.5. Soil Vapor Sampling

Soil vapor probes were installed and samples were collected at a depth of 5 feet bgs from borings 1001-115, 1001-117, 1001-118, 1001-119, and 1001-120 as described in Appendix B. Note that a vapor probe was not installed in 1001-116. This boring was not cleared by the geophysical contractor and therefore, only hand tools could be utilized.

Six soil vapor samples (including one duplicate) were collected to evaluate gross and significant concentrations of VOCs in the vapor phase. The soil vapor samples were collected in accordance with the Department of Toxic Substances Control (DTSC)/Regional Water Quality Control Board (RWQCB) guidance for Active Soil Gas Investigations and the procedures outlined in Appendix C. Soil vapor samples were analyzed on site by a state certified mobile laboratory (Jones Environmental).

5.2.6. Groundwater Sampling

Borings 1001-118 and 1001-120 were advanced to depths of 52 and 50 feet bgs, respectively, by hollow-stem auger drill rig. The borings were then converted to temporary groundwater sampling points and groundwater samples were collected from each boring as described in Appendix C.

Sample containers were labeled with boring number, unique Department ID number, and sample depth. Sampling information, time, date of sample collection, sample matrix type, turn-around-time, container type, requested analysis, and other information was recorded on the chain-of-custody. Groundwater samples were stored in an ice chest for transport to an ELAP certified laboratory within 24 hours of collection.

5.2.7. Decontamination

Clean and decontaminated sampling equipment was used for each borehole location. Sampling equipment was decontaminated between boreholes to prevent introduction of foreign materials and cross contamination. Specific decontamination procedures are described in Appendix C.

Decontamination water and other waste generated from the SI were placed in a DOT approved drum and stored at a nearby Department right of way. Waste was removed from the site on March 6, 2009 by KM Industrial. The disposal manifest is provided in Appendix E.

5.2.8. Investigative Derived Wastes (IDW)

Discarded equipment/items, such as gloves and pails, were disposed of accordingly. IDW is not considered hazardous and can be disposed at a permitted disposal facility. Discarded equipment that is to be disposed, which can still be re-used, was rendered inoperable prior to its disposal in the refuse facility at the direction of the Department.

5.3. GPS Data Collection

When possible borings were located and marked in the field using a global positioning satellite (GPS) receiver and the NAD83 datum. Investigative data for each boring, sample, and test performed were entered into an electronic Microsoft Access 2000 database file. Borings were identified by a unique identification number system. Analytic data for each boring is included in the database file (Appendix F).

5.4. Laboratory Analysis

Soil samples were analyzed for total petroleum hydrocarbons (TPH) as C_4-C_{12}, C_{13}-C_{22}, C_{23}-C_{32}, and $>C_{32}$ by modified EPA Method 8015/5035, VOCs by EPA Method 8260B/5035, semivolatile organic compounds (SVOCs) by EPA Method 8270C, polychlorinated biphenyls (PCBs) by EPA Method 8082, Title 22 Metals by EPA Method 6010B, pH by EPA

Method 9045C, organochlorinated pesticides (OCPs) by EPA Method 8081A, and chlorinated herbicides by EPA Method 8151A.

Soil vapor samples were analyzed for VOCs by EPA Method 8260B, in accordance with the DTSC/RWQCB Guidance for Active Soil Gas Investigations.

Groundwater samples were analyzed for TPH as C_4-C_{12}, C_{13}-C_{22}, C_{23}-C_{32}, and $>C_{32}$ by modified EPA Method 8015, VOCs by EPA Method 8260B, SVOCs by EPA Method 8270C, PCBs by EPA Method 8082, Title 22 Metals by EPA Method 6010B, pH by EPA Method 9045C, OCPs by EPA Method 8081A, and chlorinated herbicides by EPA Method 8151A.

The laboratory limit on the analysis is reported as Method Detection Limit (MDL) and Practical Quantitation Limit (PQL). Soil vapor samples were analyzed by an on-site state-certified mobile laboratory operated by Jones Environmental. Soil and groundwater samples were analyzed by Advanced Technology Laboratories (ATL), a state-certified laboratory in Signal Hill, California. Copies of the laboratory reports are presented in Appendix G.

5.5. Quality Assurance and Quality Control (QA/QC)

5.5.1. Field QA/QC

Field procedures, including decontamination of field sampling equipment, described in Appendix C, were utilized to ensure quality of samples during field sampling. Duplicate samples were collected. The number of duplicate samples to be collected was approximately 10 percent of the total number of samples collected from the site. Duplicate samples were collected, numbered, and packaged in the same manner as other samples. Rinsate blank (equipment blank) samples were collected at a rate of one per chain-of-custody (COC), per drill rig, and consisted of distilled water poured through decontaminated sampling equipment. Trip blanks were included in each cooler used to transport samples to the laboratory.

5.5.2. Laboratory QA/QC

ATL analyzed samples in accordance with the requirements of their in-house QA/QC program (a copy of which will be provided to the Department upon request) and the requirements of contract 07A2211.

Jones Environmental analyzed soil vapor samples in accordance with the DTSC/RWQCB Guidance for Soil Gas Investigations.

6. ANALYTICAL RESULTS

6.1. Chemical and Metal Results for Soil Samples

Results of the chemical and metal analyses of 27 soil samples are summarized in Tables 1, 2, and 3. Analytical results are also presented in the attached Access database file (Appendix F). A copy of the laboratory reports is included in Appendix G. Boring logs are included in Appendix H. Results for the soil samples collected during the current assessment are summarized as follows:

- Toluene was detected in soil samples 1001-115-0-S, 1001-115-3-S, and 1001-117-3-S at concentrations of 14, 6.4, and 34 micrograms per kilograms (µg/kg) respectively. Other VOCs were not detected in any other soil samples. The concentrations of toluene detected are below the EPA Region 9 Preliminary Remediation Goals for industrial properties (PRGi; toluene – 520,000 µg/kg).

- Detected Title 22 Metals concentrations were below respective State of California Total Threshold Limit Concentrations (TTLCs). One soil sample exceeded 10 times the State of California Soluble Threshold Limit Concentration (STLC) for lead (50 milligrams per liter [mg/l]): 1001-120-0-S at 120 milligrams per kilogram (mg/kg). This sample was analyzed for its soluble lead concentration and the result was less than 5 mg/l.

- TPH C_4-C_{12} was not detected in site samples. TPH C_{13}-C_{22} was detected in 15 samples with detections ranging from 11 to 880 mg/kg. TPH C_{23}-C_{32} was detected in 17 samples with detections ranging from 10 to 5,100 mg/kg. TPH >C_{32} was detected in 19 samples with detections ranging from 11 to 7,600 mg/kg. Elevated concentrations of TPH C_{23}-C_{32} and >C_{32} were detected in 1001-119-0-S (5,100 and 7,600 mg/kg, respectively). The RWQCB Soil Screening Level (SSL) for C_{23}-C_{32} is 10,000 mg/kg. If the two elevated concentrations from 1001-119-0-S are summed, this SSL is exceeded. The concentrations of TPH in 119-1 are insignificant. No samples exceeded the SSLs of 500 mg/kg for the TPH C_4-C_{12} range, 1,000 mg/kg for the C_{13}-C_{22} range, and 10,000 mg/kg for the TPH C_{23}-C_{32} and TPH >C_{32} ranges.

- Concentrations of PCBs, OCPs, and chlorinated herbicides were not detected in soil samples.
- SVOC concentrations were detected in four samples. Concentrations of fluoranthene, phenanthrene, and pyrene were detected in soil samples 1001-117-3-S and 1001-117-3-SD. Concentrations of bis(2-ethylhexyl)phthalate were detected in soil samples 1001-117-3-SD, 1001-120-0-S, and 1001-120-1-S. Detected SVOC concentrations were below their respective PRGis. There is no hazardous waste criteria for these compounds.
- pH levels within soil samples ranged from 5.1 to 11.

6.2. Chemical Results for Soil Vapor Samples

Results of the chemical analyses of the 6 soil vapor samples are summarized in Table 4. A copy of the laboratory report is included in Appendix G. Results for the soil vapor samples are summarized as follows:

- Four soil vapor borings had detectable concentrations of one or more of the following: tetrachloroethene (PCE), trichloroethene (TCE), trichlorofluoromethane, and freon 113.
- PCE was detected in four soil vapor samples. Concentrations of PCE exceeding California Human Health Screening Level (CHHSL) of 0.603 micrograms per liter (µg/l) were detected in soil vapor samples 1001-118-5-V and 1001-119-5-V at 1.76 and 0.811 µg/l, respectively.
- The greatest concentration of TCE was 0.334 µg/l in 1001-120-5-VD. The CHHSL for TCE of 1.77 µg/l was not exceeded.
- The greatest concentration of trichlorofluoromethane was 0.144 µg/l in 1001-120-5-V. There is no listed CHHSL for trichlorofluoromethane.
- The greatest concentration of freon 113 was 1.54 µg/l in 1001-120-5-VD. There is no listed CHHSL for freon 113.

6.3. Chemical and Metal Results for Groundwater Samples

Results of the chemical and metal analyses of two groundwater samples are summarized in Tables 5, 6, and 7. A copy of the laboratory report is included in Appendix G. Results for the groundwater samples are summarized as follows:

- VOCs were detected in the two groundwater sample and the duplicate. PCE was detected in1001-118-52-G. 1001-118-52-GD, and 1001-120-50G at 28, 27, and 37 µg/l, respectively. Detected concentrations of PCE exceeded the Maximum Contaminant Level (MCL) of 5.0 µg/l. TCE was detected in 1001-118-52-G. 1001-118-52-GD, and 1001-120-50G at 550, 540, and 480 µg/l, respectively. Detected concentrations of TCE exceeded the MCL of 5.0 µg/l. 1,1-dichloroethene was detected in 1001-118-52-G. 1001-118-52-GD, and 1001-120-50G at 39, 35, and 15 µg/l, respectively. Detected concentrations of 1,1-dichloroethene exceeded the MCL of 6.0 µg/l.

- TPH C_4-C_{12} was detected in one groundwater sample (1001-118-52-G) and its duplicate at 0.25 and 0.24 mg/l, respectively. TPH C_{13}-C_{22} was detected in the one groundwater sample and its duplicate at 0.37 and 0.29 mg/l, respectively. TPH C_{23}-C_{32}, and TPH >C_{32} were not detected in groundwater samples. There is no listed MCL for TPH.

- PCBs, SVOCs, OCPs and chlorinated herbicides were not detected in groundwater samples.

- The pH of groundwater samples ranged from 6.6 to 7.4.

- Detected Title 22 Metals concentrations in groundwater sample 1001-118-52-G and its duplicate 1001-118-52-GD exceeded the respective MCLs for barium, chromium, and nickel. Detected Title 22 Metals concentrations in groundwater sample 1001-120-50-G exceeded the respective MCLs for arsenic, barium, chromium, copper, mercury, nickel, and selenium. Other detected Title 22 Metals concentrations were below their applicable MCLs.

7. CONCLUSIONS

Based on the results of the assessments conducted to date, the following conclusions have been made:

Soil Samples

- Insignificant concentrations of VOCs were detected in three of 27 soil samples. The detections were far below PRGis which are health risk based criteria. The detected concentrations would not cause the soil to be classified as a hazardous waste.

- TPH was detected in 20 of 27 soil samples. The concentrations of TPH did not exceed SSLs for the protection of groundwater established by the Los Angeles Regional Water Quality Control Board (LARWQCB). Elevated concentrations of TPH C_{23}-C_{32} and TPH >C_{32} were detected in soil sample 1001-119-0-S. If the two elevated concentrations from 1001-119-0-S are summed, the SSL (10,000 mg/kg) is exceeded. The elevated TPH concentrations are limited to the surface only. This data suggests a limited surface spill.

- PCBs, OCPs, and chlorinated herbicides were not detected in the 27 soil samples.

- SVOCs were detected in four of 27 samples. Detections in these 4 samples did not exceed PRGis. The concentrations of SVOCs detected would not cause the soil to be classified as a hazardous waste.

- As is typical, one or more metals were detected in each of the 27 soil samples collected. None of the metals concentration exceeded the California criteria for hazardous waste based on total concentrations. The concentration of lead in soil sample 1001-120-0-S did exceed 10 times the California soluble threshold for hazardous waste. The sample was analyzed for soluble lead concentration and the result was less than 5 mg/l so the soil would not be classified as a hazardous waste.

Soil Vapor Samples

- VOCs were detected in five of six soil vapor samples collected. PCE concentrations in 1001-118-5-V and 1001-119-5-V exceeded the industrial CHHSL. The boring locations of 1001-118 and 1001-119 are along the northwestern edge of the property, away from the site building. However, none of the VOCs detected in the vapor samples were detected in soil samples. The concentrations of VOCs detected in soil vapor would not cause the soil to be classified as a hazardous waste.

Groundwater Samples

- Groundwater was encountered beneath the site at a depth of approximately 50 feet bgs. Groundwater samples collected at the site contained no detectable concentrations of PCBs, SVOCs, OCPs, or chlorinated herbicides. One of the two groundwater samples collected (and its duplicate sample) contained detectable concentrations of TPH. There is no listed MCL for TPH. The two groundwater samples collected (and the duplicate) contained concentrations of VOCs in excess of the MCLs for PCE (5 μg/l), TCE (5 μg/l), and 1,1-dichloroethene (1,1-DCE) (6 μg/l). These detections (PCE from 27 to 37 μg/l ; TCE from 180 to 550 μg/l ; and 1,1-DCE from 15 to 39 μg/l) were expected because of the site's location relative to regional solvent plumes in the San Fernando Valley. As mentioned above no VOCs were detected in soil samples collected at the site. Groundwater samples collected at the site contained concentrations of arsenic, barium, chromium, copper, mercury, nickel, and selenium in excess of the MCL. MCLs are a drinking water standard and do not indicate a hazardous waste classification.

8. RECOMMENDATIONS

The following recommendations are based on the findings of this assessment.

- The results of this SI be used in the development of a HSP for the proposed construction.

- We estimate the cost to excavate and dispose of the 10 cubic yards (volume of soil 50' long, 10' wide, six inches deep) of TPH containing soil in the vicinity of boring 119, including preparation of a worker health and safety plan, and reporting, will be approximately $17,400 (Appendix I).

- Soil to be disposed by the Department should be classified for acceptance by a disposal facility selected by the Department before excavating and transporting the soil.

9. LIMITATIONS

The services outlined in this report have been conducted in a manner generally consistent with current regulatory guidelines. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Ninyo & Moore's opinions are based on an analysis of observed conditions and on information obtained from third parties. It is likely that variations in soil conditions may exist which were beyond the scope of work.

The samples collected and chemically analyzed and the observations made are believed to be representative of the general area evaluated; however, conditions can vary significantly between sampling locations. The interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and measure the concentration of certain chemical or physical constituents in samples collected from the site. The analyses have been conducted by an independent laboratory, which is accredited by the United States EPA and/or certified by the State of California to conduct such analyses. Ninyo & Moore has no involvement in, or control over, such analyses and has no means of confirming the accuracy of laboratory results. Ninyo & Moore, therefore, disclaims any responsibility for inaccuracy in such laboratory results.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document. Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

10. REFERENCES

Ninyo & Moore, Detailed Work Plan for a Parcel Acquisition Site Investigation, 1648-1650 Flower Street and 640 Western Avenue, Interstate 5 at Western Avenue Interchange, Glendale, California, Los Angeles, California, dated February 6, 2009.

United States Geological Survey (USGS), 7.5-Minute Series, Burbank, California, Topographic Quadrangle Map, dated 1966 and photorevised 1972.

TABLE 1 – CHEMICAL RESULTS FOR SOIL SAMPLES - VOCs

Sample	Depth (feet)	Date	US EPA Method 8260B		
			PCE (µg/kg)	TCE (µg/kg)	Other VOCs (µg/kg)
1001-115-0-S	0	2/13/2009	ND	ND	toluene 14
1001-115-1-S	1	2/13/2009	ND	ND	ND
1001-115-3-S	3	2/13/2009	ND	ND	toluene 6.4
1001-115-5-S	5	2/13/2009	ND	ND	ND
1001-116-0-S	0	2/13/2009	ND	ND	ND
1001-116-1-S	1	2/13/2009	ND	ND	ND
1001-116-3-S	3	2/13/2009	ND	ND	ND
1001-116-5-S	5	2/13/2009	ND	ND	ND
1001-116-5-SD	5	2/13/2009	ND	ND	ND
1001-117-0-S	0	2/13/2009	ND	ND	ND
1001-117-1-S	1	2/13/2009	ND	ND	ND
1001-117-3-S	3	2/13/2009	ND	ND	toluene 34
1001-117-3-SD	3	2/13/2009	ND	ND	ND
1001-117-5-S	5	2/13/2009	ND	ND	ND
1001-118-0-S	0	2/13/2009	ND	ND	ND
1001-118-1-S	1	2/13/2009	ND	ND	ND
1001-118-3-S	3	2/13/2009	ND	ND	ND
1001-118-5-S	5	2/13/2009	ND	ND	ND
1001-119-0-S	0	2/13/2009	ND	ND	ND
1001-119-1-S	1	2/13/2009	ND	ND	ND
1001-119-3-S	3	2/13/2009	ND	ND	ND
1001-119-5-S	5	2/13/2009	ND	ND	ND
1001-120-0-S	0	2/13/2009	ND	ND	ND
1001-120-1-S	1	2/13/2009	ND	ND	ND
1001-120-1-SD	1	2/13/2009	ND	ND	ND
1001-120-3-S	3	2/13/2009	ND	ND	ND
1001-120-5-S	5	2/13/2009	ND	ND	ND
PRG-Industrial			1,300	110	toluene 520,000

Notes:
EPA – United States Environmental Protection Agency.
µg/kg – microgram per kilogram.
PCE – tetrachloroethene.
TCE – trichloroethene.
VOCs – volatile organic compounds.
ND – not detected - see laboratory report additional details.
Individual detection limits presented in the laboratory report in Appendix G.
PRG-Industrial – EPA Region 9 Preliminary Remediation Goals for Industrial Properties.

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
1001-115-0-S	0	2/13/2009	ND	24	100	190	ND	ND	7.7	ND	ND
1001-115-1-S	1	2/13/2009	ND	21	ND	ND	ND	ND	8.0	ND	ND
1001-115-3-S	3	2/13/2009	ND	40	210	340	ND	ND	7.3	ND	ND
1001-115-5-S	5	2/13/2009	ND	ND	ND	11	ND	ND	7.0	ND	ND
1001-116-0-S	0	2/13/2009	ND	ND	13	22	ND	ND	10	ND	ND
1001-116-1-S	1	2/13/2009	ND	ND	10	18	ND	ND	10	ND	ND
1001-116-3-S	3	2/13/2009	ND	ND	ND	ND	ND	ND	11	ND	ND
1001-116-5-S	5	2/13/2009	ND	ND	ND	ND	ND	ND	9.0	ND	ND
1001-116-5-SD	5	2/13/2009	ND	ND	ND	ND	ND	ND	8.5	ND	ND
1001-117-0-S	0	2/13/2009	ND	17	62	87	ND	ND	5.1	ND	ND
1001-117-1-S	1	2/13/2009	ND	34	170	300	ND	ND	7.2	ND	ND
1001-117-3-S	3	2/13/2009	ND	79	390	580	ND	fluoranthene 1,900 phenanthrene 2,100 pyrene 1,800	7.3	ND	ND
1001-117-3-SD	3	2/13/2009	ND	28	130	230	ND	bis(2-ethylhexyl)phthalate 1,400 fluoranthene 400 phenanthrene 430 pyrene 370	7.4	ND	ND
1001-117-5-S	5	2/13/2009	ND	95	480	750	ND	ND	7.4	ND	ND
1001-118-0-S	0	2/13/2009	ND	55	330	620	ND	ND	7.2	ND	ND
1001-118-1-S	1	2/13/2009	ND	17	58	92	ND	ND	7.0	ND	ND
1001-118-3-S	3	2/13/2009	ND	13	28	46	ND	ND	7.0	ND	ND
1001-118-5-S	5	2/13/2009	ND	22	100	170	ND	ND	7.5	ND	ND
1001-119-0-S	0	2/13/2009	ND	880	5,100	7,600	ND	ND	7.3	ND	ND
1001-119-1-S	1	2/13/2009	ND	ND	11	16	ND	ND	7.2	ND	ND
1001-119-3-S	3	2/13/2009	ND	ND	ND	ND	ND	ND	7.1	ND	ND
1001-119-5-S	5	2/13/2009	ND	ND	ND	12	ND	ND	7.2	ND	ND
1001-120-0-S	0	2/13/2009	ND	30	190	380	ND	bis(2-ethylhexyl)phthalate 2,100	7.3	ND	ND
1001-120-1-S	1	2/13/2009	ND	11	20	19	ND	bis(2-ethylhexyl)phthalate 2,300	7.1	ND	ND
1001-120-1-SD	1	2/13/2009	ND	ND	ND	ND	ND	ND	7.1	ND	ND
1001-120-3-S	3	2/13/2009	ND	ND	ND	ND	ND	ND	7.1	ND	ND
1001-120-5-S	5	2/13/2009	ND	ND	ND	ND	ND	ND	7.2	ND	ND
SSLs			500	1,000	10,000	10,000	NL	NL	NL	NL	NL

TABLE 2 – SOIL SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs and Chlorinated Herbicides

Sample	Depth (feet)	Sample Date	EPA 8015B(M) (mg/kg)				EPA 3550B/8082 (µg/kg)	EPA 3550B/8270C (µg/kg)	EPA 9045C	EPA 3550B/8081A (µg/kg)	EPA 8151A (µg/kg)
			C4-C12	C13-C22	C23-C32	>C32	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
PRG - Industrial			NL	NL	NL	NL	Individual PRGs May Vary	bis(2-ethylhexyl)phthalate 120,000 fluoranthene 22,000,000 phenanthrene NL pyrene 29,000,000	NL	Individual PRGs May Vary	Individual PRGs May Vary

Notes:
EPA – United States Environmental Protection Agency.
mg/kg – milligrams per kilogram.
µg/kg – micrograms per kilogram.
PCBs – polychlorinated biphenyls.
SVOCs – semivolatile organic compounds.
OCPs – organochlorinated pesticides.
ND – not detected above the Practical Quantitation Limit - see laboratory report for additional details.
PRG-Industrial – EPA Region 9 Preliminary Remediation Goals for Industrial Properties.
NL – Not Listed.
SSLs – Soil Screening Levels published by the Los Angeles Regional Water Quality Control Board for soil 20 to 150 feet above groundwater.

TABLE 3 – SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Depth (feet)	Sample Date	Metals (mg/kg)																
			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
1001-115-0-S	0	2/13/2009	<2.0	<1.0	130	<1.0	<1.0	15	8.1	18	2.1	<0.10	<1.0	12	<1.0	<1.0	<1.0	40	75
1001-115-1-S	1	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	17	9.8	23	2.1	<0.10	<1.0	13	<1.0	<1.0	<1.0	47	62
1001-115-3-S	3	2/13/2009	<2.0	<1.0	180	<1.0	<1.0	16	10	27	2.1	<0.10	<1.0	13	<1.0	<1.0	<1.0	48	66
1001-115-5-S	5	2/13/2009	<2.0	<1.0	190	<1.0	<1.0	18	11	30	1.9	<0.10	<1.0	14	<1.0	<1.0	<1.0	53	68
1001-116-0-S	0	2/13/2009	<2.0	<1.0	180	<1.0	<1.0	36	11	31	10	<0.10	<1.0	25	<1.0	<1.0	<1.0	53	82
1001-116-1-S	1	2/13/2009	<2.0	<1.0	170	<1.0	<1.0	19	9.9	26	3.3	<0.10	<1.0	15	<1.0	<1.0	<1.0	46	64
1001-116-3-S	3	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	20	9.5	24	4.5	<0.10	<1.0	15	<1.0	<1.0	<1.0	44	67
1001-116-5-S	5	2/13/2009	<2.0	<1.0	200	<1.0	<1.0	17	11	29	1.7	<0.10	<1.0	13	<1.0	<1.0	<1.0	54	68
1001-116-5-SD	5	2/13/2009	<2.0	<1.0	180	<1.0	<1.0	15	9.7	26	1.8	<0.10	<1.0	12	<1.0	<1.0	<1.0	49	66
1001-117-0-S	0	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	16	9.2	22	8.2	<0.10	<1.0	13	<1.0	<1.0	<1.0	46	65
1001-117-1-S	1	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	16	9.5	22	1.8	<0.10	<1.0	13	<1.0	<1.0	<1.0	43	60
1001-117-3-S	3	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	13	8.3	21	1.7	<0.10	<1.0	10	<1.0	<1.0	<1.0	42	55
1001-117-3-SD	3	2/13/2009	<2.0	<1.0	180	<1.0	<1.0	14	9.6	24	1.9	<0.10	<1.0	12	<1.0	<1.0	<1.0	48	60
1001-117-5-S	5	2/13/2009	<2.0	<1.0	180	<1.0	<1.0	15	9.8	24	2.2	<0.10	<1.0	12	<1.0	<1.0	<1.0	48	58
1001-118-0-S	0	2/13/2009	<2.0	<1.0	170	<1.0	<1.0	12	8.4	17	5.1	<0.10	<1.0	9.8	<1.0	<1.0	<1.0	46	53
1001-118-1-S	1	2/13/2009	<2.0	<1.0	150	<1.0	<1.0	16	9.3	24	2.6	<0.10	<1.0	13	<1.0	<1.0	<1.0	41	56
1001-118-3-S	3	2/13/2009	<2.0	<1.0	180	<1.0	<1.0	14	9.4	24	2.1	<0.10	<1.0	11	<1.0	<1.0	<1.0	47	59
1001-118-5-S	5	2/13/2009	<2.0	<1.0	150	<1.0	<1.0	12	8.0	20	2.7	<0.10	<1.0	9.8	<1.0	<1.0	<1.0	41	48
1001-119-0-S	0	2/13/2009	<2.0	<1.0	110	<1.0	<1.0	7.8	5.1	12	6.8	<0.10	<1.0	8.4	<1.0	<1.0	<1.0	30	42
1001-119-1-S	1	2/13/2009	<2.0	<1.0	150	<1.0	<1.0	17	9.9	24	3.0	<0.10	<1.0	14	<1.0	<1.0	<1.0	42	59
1001-119-3-S	3	2/13/2009	<2.0	<1.0	130	<1.0	<1.0	15	8.3	21	2.8	<0.10	<1.0	12	<1.0	<1.0	<1.0	39	54
1001-119-5-S	5	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	13	8.4	22	1.5	<0.10	<1.0	10	<1.0	<1.0	<1.0	44	54
1001-120-0-S	0	2/13/2009	<2.0	13	120	<1.0	1.1	12	7.0	26	**120**	<0.10	<1.0	15	<1.0	<1.0	<1.0	35	150
1001-120-1-S	1	2/13/2009	<2.0	<1.0	190	<1.0	<1.0	15	10	26	3.0	<0.10	<1.0	13	<1.0	<1.0	<1.0	51	67
1001-120-1-SD	1	2/13/2009	<2.0	<1.0	140	<1.0	<1.0	15	8.9	22	3.7	<0.10	<1.0	13	<1.0	<1.0	<1.0	39	54
1001-120-3-S	3	2/13/2009	<2.0	<1.0	190	<1.0	<1.0	13	10	25	3.6	<0.10	<1.0	11	<1.0	<1.0	<1.0	50	64
1001-120-5-S	5	2/13/2009	<2.0	<1.0	160	<1.0	<1.0	13	8.6	21	1.8	<0.10	<1.0	10	<1.0	<1.0	<1.0	42	53

TABLE 3 – SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Depth (feet)	Sample Date	Metals (mg/kg)																
			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
TTLC (mg/kg)			500	500	10,000	75	100	2,500	8,000	2,500	1,000	20	3,500	2,000	100	500	700	2,400	5,000
10 x STLC (mg/l)			150	50	1,000	7.5	10	50	800	250	50	2.0	3,500	200	10	50	70	240	2,500

Notes:
mg/kg – milligrams per kilogram.
mg/l – milligrams per liter.
Samples were analyzed using United States Environmental Protection Agency (EPA) Test Method 6010B.
*Mercury was analyzed using EPA Test Method 7471A.
Bold indicates that the detected concentration exceeds the applicable 10 x STLC.

TABLE 4 – SUMMARY OF SOIL VAPOR SAMPLE ANALYTICAL RESULTS

Sample	Date Sampled	Depth	PCE	TCE	Chloroform	cis-1,2-dichloroethene	trans-1,2-dichloroethene	Toluene	Xylenes	Ethylbenzene	Benzene	tert-amylmethylether	Vinyl Chloride	n-Propylbenzene	Isopropylbenzene	1,2,4-Trimethylbenzene	Trichlorofluoromethane	Freon 113
		(feet)	(µg/l)															
1001-115-5-V	2/13/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1001-117-5-V 7P	2/13/2009	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.101
1001-118-5-V	2/13/2009	5	**1.76**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.64
1001-119-5-V	2/13/2009	5	**0.811**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.929
1001-120-5-V	2/13/2009	5	0.21	0.302	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.144	1.33
1001-120-5-VD	2/13/2009	5	0.253	0.334	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.137	1.54
Screening Levels																		
CHHSLs (Industrial Land Use in µg/l)			**0.603**	**1.77**	**NL**	**44.4**	**88.7**	**378**	**887**	**NL**	**0.122**	**NL**	**0.0448**	**NL**	**NL**	**NL**	**NL**	**NL**

Notes:
7P – seven purge volumes.
PCE – tetrachloroethene.
TCE – trichloroethene
µg/l – micrograms per liter.
ND – Not detected above reported detection limit.
Individual detection limits presented in the laboratory report in Appendix G.
NL – None Listed.
Cal/EPA – California Environmental Protection Agency.
CHHSLs – California Human Health Screening Levels established by the Cal/EPA in January 2005.

TABLE 5 – CHEMICAL RESULTS FOR WATER SAMPLES - VOCs

Sample	Date	EPA Method 8260B		
		PCE (µg/l)	TCE (µg/l)	1,1-DCE (µg/l)
EB021309-A	2/13/2009	ND	ND	ND
Trip Blank D	2/13/2009	ND	ND	ND
Trip Blank E	2/13/2009	ND	ND	ND
1001-118-52-G	2/13/2009	**28**	**550**	39
1001-118-52-GD	2/13/2009	**27**	**540**	35
1001-120-50-G	2/13/2009	**37**	**480**	15
MCL		5.0	5.0	6.0

Notes:
EPA – United States Environmental Protection Agency.
µg/l – microgram per liter.
PCE – tetrachloroethene.
TCE – trichloroethene.
1,1-DCE – 1,1-dichloroethene.
VOCs – volatile organic compounds.
ND – not detected - see laboratory report additional details.
Individual detection limits presented in the laboratory report in Appendix G.
EB – equipment blank.
MCL – California Department of Health Services Maximum Contaminant Levels (Primary).

TABLE 6 – WATER SAMPLE ANALYTICAL TEST RESULTS – PCBs, SVOCs, Gasoline, Diesel, and Oil Range Organics, pH, OCPs, and Chlorinated Herbicides

Sample	Sample Date	EPA 8015B(M) (mg/l)				EPA 3550B/8082 (µg/l)	EPA 3550B/8270C (µg/l)	EPA 9045C	EPA 3550B/8081A (µg/l)	EPA 8151A (µg/l)
		C_4-C_{12}	C_{13}-C_{22}	C_{23}-C_{32}	>C_{32}	PCBs	SVOCs	pH	OCPs	Chlorinated Herbicides
EB021309-A	2/13/2009	ND	ND	ND	ND	ND	ND	6.6	ND	ND
1001-118-52-G	2/13/2009	0.25	0.37	ND	ND	ND	ND	7.3	ND	ND
1001-118-52-GD	2/13/2009	0.24	0.29	ND	ND	ND	ND	7.4	ND	ND
1001-120-50-G	2/13/2009	ND	ND	ND	ND	ND	ND	7.4	ND	ND
MCL		NL	NL	NL	NL	Individual MCLs Vary	Individual MCLs Vary	NL	Individual MCLs Vary	Individual MCLs Vary

Notes:
EPA – United States Environmental Protection Agency.
mg/l – milligrams per liter.
µg/l – micrograms per liter.
PCBs – polychlorinated biphenyls.
SVOCs – semivolatile organic compounds.
ND – not detected above the Practical Quantitation Limit - see laboratory report for additional details.
MCL – California Department of Health Services Maximum Contaminant Level.
NA – Not Analyzed.
NL – Not Listed.

TABLE 7 – WATER SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Sample	Sample Date	Metals (mg/l)																
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury*	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
EB021309-A	2/13/2009	<0.0050	<0.010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0050	0.0084	<0.20	<0.0050	<0.0050	<0.10	<0.0030	<0.015	<0.0030	<0.10
1001-118-52-G	2/13/2009	<0.0050	<0.010	**2.3**	<0.0030	<0.0030	**0.22**	0.23	0.37	<0.025	<0.20	<0.0050	**0.19**	<0.10	<0.0030	<0.015	0.66	0.57
1001-118-52-GD	2/13/2009	<0.0050	<0.010	**2.8**	<0.0030	<0.0030	**0.21**	0.19	0.33	<0.025	<0.20	<0.0050	**0.16**	<0.10	<0.0030	<0.015	0.63	0.67
1001-120-50-G	2/13/2009	<0.0050	**0.12**	**13**	<0.0030	0.053	**2.0**	0.85	**1.9**	0.10	**2.6**	0.040	**0.86**	**0.150**	<0.0030	<0.015	5.1	3.6
MCL (mg/l)		**0.006**	**0.05**	**1.0**	**0.004**	**0.005**	**0.05**	**NL**	**1.3**	**0.15**	**0.002**	**NL**	**0.1**	**0.05**	**0.1**	**0.002**	**NL**	**5**

Notes:

mg/l – milligrams per liter.

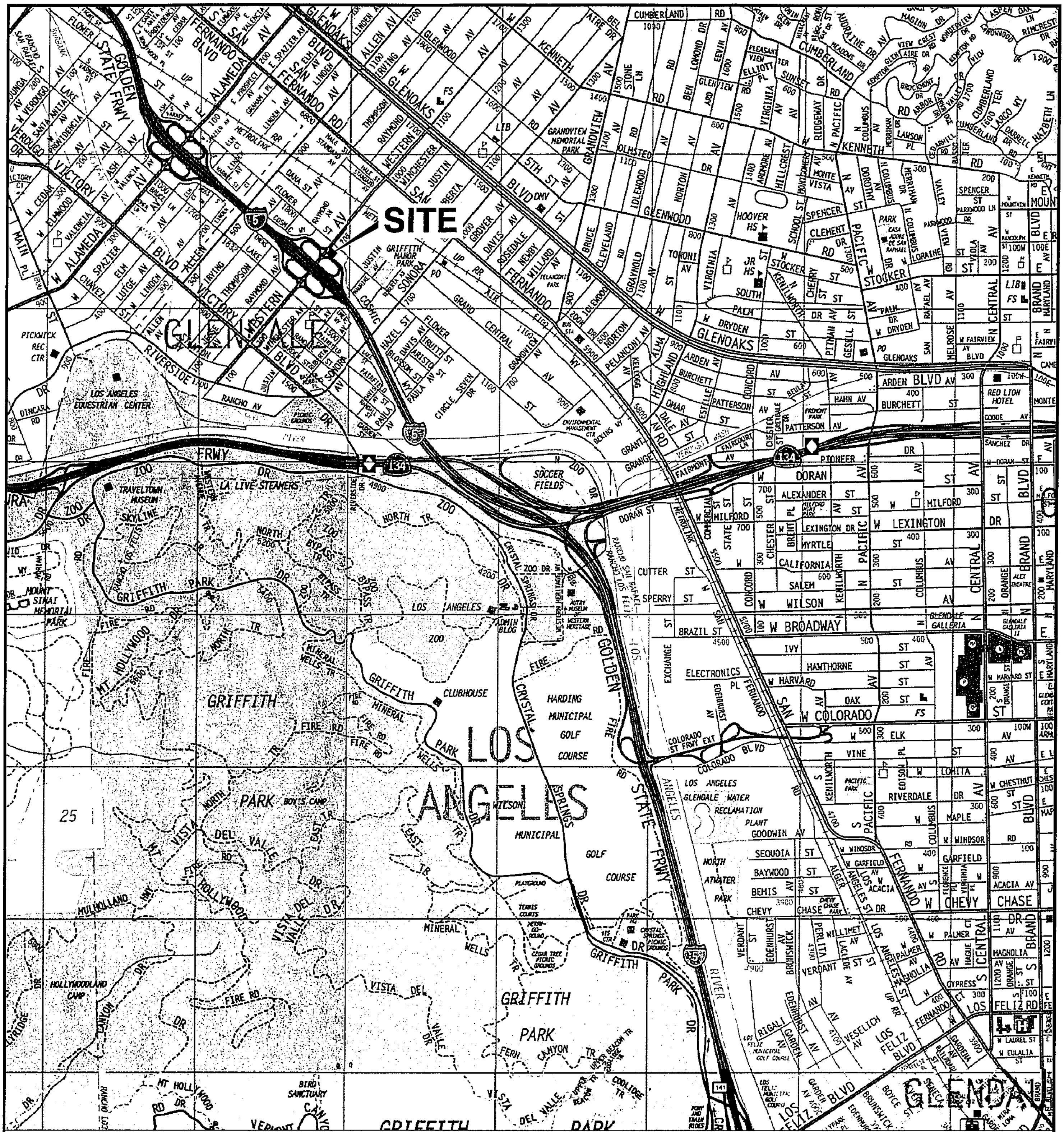
ND – not detected above the Practical Quantitation Limit.

Samples were analyzed using United States Environmental Protection Agency (EPA) Test Method 6010B.

*Mercury was analyzed using EPA Test Method 7471A.

MCL – California Department of Health Services Maximum Contaminant Level (Primary).

Bold indicates that the detected concentration exceeds the applicable MCL.



REFERENCE: 2007 THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY

APPROXIMATE SCALE IN FEET

0 2400 4800

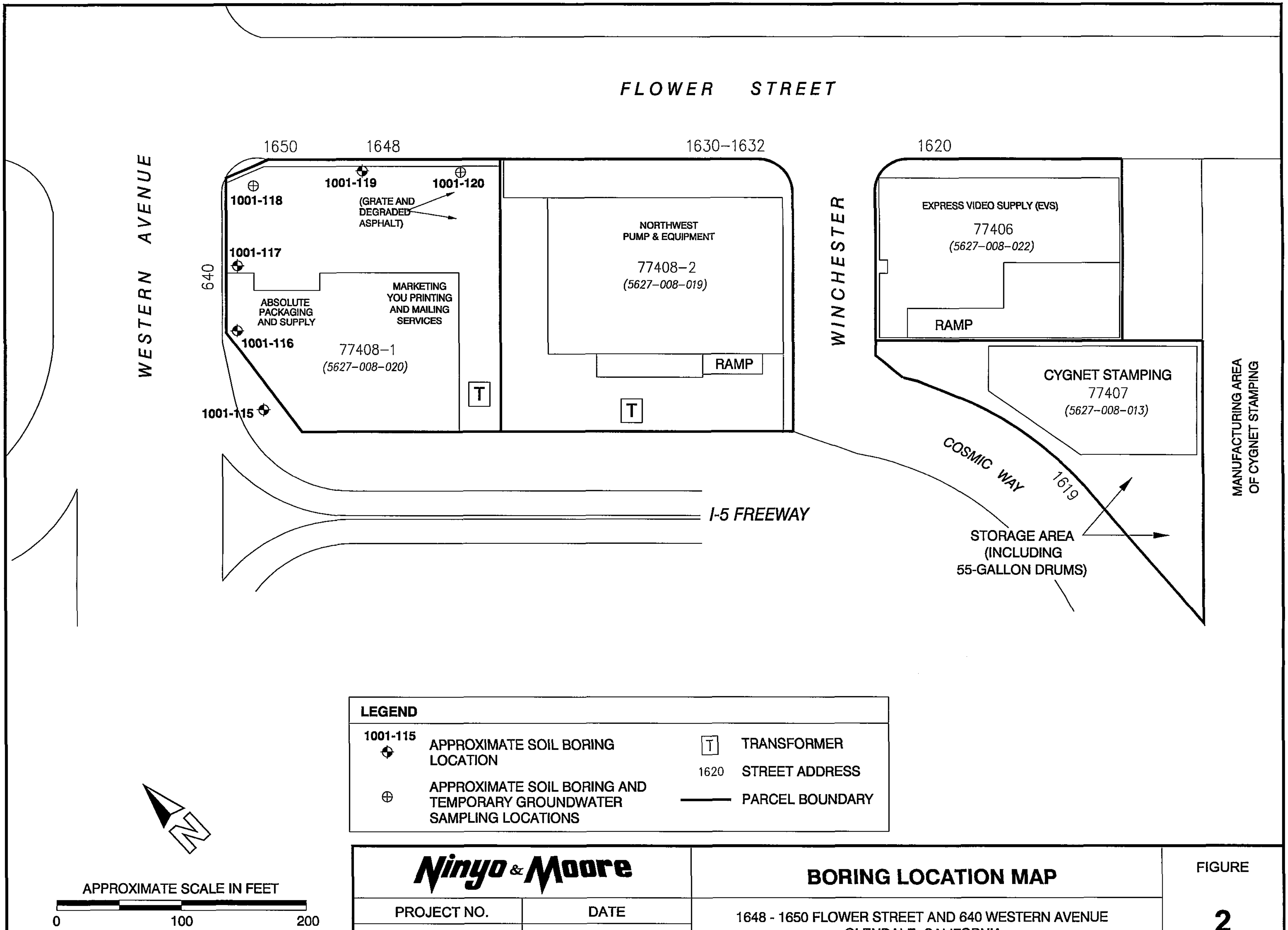
N

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Map © Rand McNally, R.L.07-S-129

207126-A6.DWG

Ninyo & Moore		SITE LOCATION MAP	FIGURE
PROJECT NO.	DATE	1648 - 1650 FLOWER STREET AND 640 WESTERN AVENUE GLENDALE, CALIFORNIA	1
207126012B	4/09		



NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

207126-A4.DWG

Ninyo & Moore		BORING LOCATION MAP	FIGURE
PROJECT NO.	DATE	1648 - 1650 FLOWER STREET AND 640 WESTERN AVENUE GLENDALE, CALIFORNIA	2
207126012B	4/09		

FOR CONTRACT NO.: 07-1786A4

INFORMATION HANDOUT

MATERIALS INFORMATION

LEAD SITE INVESTIGATION REPORT

Interstate 5 Western Avenue Interchange
Los Angeles County, California
Task Order No. 07-1786A1-QV
Statewide Contract No. 43A0078
Prepared by Ninyo & Moore, dated on January 20, 2003

ROUTE: 07-LA-5, KP 44.2/45.2

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

LEAD SITE INVESTIGATION REPORT
INTERSTATE 5 WESTERN AVENUE INTERCHANGE
LOS ANGELES COUNTY, CALIFORNIA
TASK ORDER NO. 07-1786A1-QV
STATEWIDE CONTRACT NO. 43A0078

PREPARED FOR:
State of California
Department of Transportation
District 7, Division of Planning
Office of Environmental Engineering
120 South Spring Street, Mail Stop 16
Los Angeles, California 90012

PREPARED BY:
Ninyo & Moore Geotechnical and Environmental Sciences Consultants
475 Goddard, Suite 200
Irvine, California 92618

January 20, 2003
Project No. 204268001

Ninyo & Moore

Geotechnical and Environmental Sciences Consultants

January 20, 2003
Project No. 204268001

Ms. Upa Patel
State of California
Department of Transportation
District 7, Division of Planning
Office of Environmental Engineering
120 South Spring Street, Mail Stop 16
Los Angeles, California 90012

Subject: Lead Site Investigation Report
Interstate 5 Western Avenue Interchange
Los Angeles County, California
Task Order No. 07-1786A1-QV
Statewide Contract No. 43A0078

Dear Ms. Patel:

In accordance with Caltrans Contract No. 43A0078, Task Order No. 07-1786A1-QV, Ninyo & Moore has conducted a Lead Site Investigation at the above-referenced site. The following report documents our methodologies, findings, and conclusions.

We appreciate the opportunity to be of service to you on this project. Should you have any questions, please contact the undersigned at your convenience.

Sincerely,
NINYO & MOORE

for

Dinesh Rao
Senior Staff Environmental Scientist

David I. Shaler, R.G., R.E.A.
Senior Project Environmental Geologist

REGISTERED GEOLOGIST DAVID IVAN SHALER No. 6370 Exp. 07/04 STATE OF CALIFORNIA

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Senior Project Environmental Engineer

DNR/NA/DIS/mll

Distribution: (6) Addressee (5 hardcopy, 1 CD)

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Text Tables

1. INTRODUCTION

The State of California Department of Transportation (Caltrans) has authorized Ninyo & Moore to conduct a Lead Site Investigation (LSI) at the Interstate 5/Western Avenue interchange area between the Sonora Avenue and Allen Avenue undercrossings in the city of Glendale, in the county of Los Angeles, California (site). Work was conducted in accordance with the Caltrans Contract No. 43A0078, Task Order (TO) No. 07-1786A1-QV, and the agreement between Ninyo & Moore and Caltrans.

The LSI is part of preparation work for reconfiguration of the northbound Interstate 5/Western Avenue interchange involving approximately one kilometer (Kilometer Post [KP] 44.3 to 45.3) of freeway. In addition to the LSI, a Parcel Acquisition Site Investigation (ASI) will be prepared by Ninyo & Moore (separately from the LSI) for four right-of-way (ROW) parcels associated with the I-5/Western Avenue interchange project. The ASI will be submitted as a separate report. The site location for the LSI is presented on Figure 1.

The purpose of the LSI was to evaluate surface and subsurface soil at the northbound Interstate 5/Western Avenue interchange and the location of proposed retaining wall near this interchange. These locations were evaluated for concentrations of aerially deposited lead (ADL) within the Caltrans ROW that may exceed acceptable regulatory limits. The soil adjacent to the freeway is suspected of being contaminated with ADL believed to be from automobile emissions from the use of leaded gasoline prior to 1986. The information obtained from the limited soil sampling and laboratory testing was used to determine the method of re-use or disposal of soil excavated during the proposed construction at the site. The data was also used to inform Caltrans of potential health and safety issues for workers at the site during construction activities. Ninyo & Moore prepared a Health and Safety Plan, dated November 13, 2002, that was delivered to the Caltrans Project Manager.

2. INVESTIGATIVE SUMMARY

Ninyo & Moore collected soil samples within the Caltrans ROW at the northbound Interstate 5/Western Avenue interchange and the location of a proposed retaining wall near this interchange between the Sonora Avenue and Allen Avenue undercrossings (KP 44.3 to 45.3 bgs). A total of 28 soil borings were advanced for this task. Soil borings were identified with a three digit prefix (579) provided by Caltrans and the boring number (101 to 128). Soil samples were labeled with the Caltrans prefix followed by the boring number and then the sample depth (below ground surface [bgs]) in meters. Therefore, a soil sample collected at a depth of 0.3 m bgs from boring 579-101 would be designated 579-101-0.3. Soil samples were collected at the surface (0), 0.15, 0.3, 0.6, 0.9, and 1.5 m bgs, unless refusal was encountered during drilling. A total of 130 soil samples were collected from 28 boring locations. The boring locations are presented on Layouts L-1 through L-3.

Eight (8) of the 130 soil samples collected contained concentrations of lead, which equaled or exceeded the California Total Threshold Limit Concentration (TTLC) for lead (1,000 milligrams per kilogram [mg/kg]). Three (3) samples exceeded the 1,411-mg/kg limit provided in the September 22, 2000 California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) variance to Caltrans District 7 (variance) as amended by Assembly Bill 414. Fifty (50) soil samples contained concentrations of lead less than the TTLC of 1,000 mg/kg but more than or equal to 50 mg/kg, which is 10 times the California Soluble Threshold Limit Concentration (STLC) for lead (5 milligrams per liter [mg/l]). These 50 soil samples were analyzed for soluble lead (STLC) by the Waste Extraction Test (WET). Forty-four (44) of these samples contained 5 mg/l or more of soluble lead (STLC). Each of these 44 samples was subsequently analyzed for soluble lead using the deionized water (DI-WET) extraction. Thirty-two (32) of the 44 samples contained 0.5 mg/l or more of lead using the DI-WET method.

In accordance with the TO, a total of 19 samples were analyzed by Toxicity Characteristic Leaching Procedure (TCLP). These 19 samples contained total lead (TTLC) greater than 350 mg/kg (material likely to be disposed of at a Class I landfill). Four (4) of the 19 samples contained 5 mg/l or more of lead by TCLP.

In accordance with the TO, samples were analyzed for pH to meet the requirement of analyzing a minimum of 10 percent of the total samples. Twelve (12) randomly selected samples were analyzed for pH. The pH values ranged from 5.8 to 9.0.

Each of the soil samples collected were recorded on a total of three chain-of-custody (COC) records. In accordance with the TO, one equipment rinsate sample was collected per COC record. Three equipment rinsate samples were collected and analyzed for total lead. The highest concentration of lead detected in any of the rinsate samples was 0.0061 mg/l.

3. PROJECT DESCRIPTION

The following sections describe the site description, purpose, and limitations.

3.1. Site Description

The site was along the northbound I-5/Western Avenue interchange in the City of Glendale (Figure 1). Specific boring locations were along the areas of the northbound Interstate 5/Western Avenue interchange and the proposed retaining wall area near this interchange between the Sonora Avenue and the Allen Avenue undercrossing (KP 44.3 to 45.3; Figure 1).

In accordance with the TO, this project was divided into two sites as shown in Table T1.

Table T1 – Boring Distribution

Site	Site Limits	Soil Borings	Total Borings
1	East of Western Avenue, from Station 443+61.571 to Western Avenue	579-101 to 579-119	19
2	West of Western Avenue, from Western Avenue to Station 451+13.018	579-120 to 579-128	9

Soil samples were collected from unpaved shoulders and freeway on and unpaved areas of off ramps at the locations specified in the TO. The boring locations are presented on Layouts L-1 through L-3 included in this report.

3.2. Purpose

The purpose of the TO was to evaluate concentrations of ADL in soil and assess if they exceed acceptable regulatory concentrations along the above-mentioned locations and to provide recommendations regarding the handling of the soil for re-use, or methods in disposal.

3.3. Limitations

The LSI was conducted in accordance with TO No. 07-1786A1-QV and Statewide Contract No. 43A0078.

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

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

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

4. INVESTIGATION METHODS

The field work was conducted on November 14 and 15, 2002. Traffic control consisted of shoulder closures provided on both days by American Barricade, Inc. of Anaheim, California. The following sections describe soil sampling completed by hand-auger, investigative derived wastes, laboratory analyses, and Geographical Information System (GIS) data.

4.1. Hand-Auger Sampling

A total of 130 soil samples were collected from 28 soil borings (from Sites 1 and 2). Soil samples were collected at the surface (0), 0.15, 0.3, 0.6, 0.9, and 1.5 m bgs, except for samples not collected due to refusal encountered during hand-augering. Samples collected and those not collected because of refusal in each boring are presented in Table 1.

Ninyo & Moore collected samples using a hand-auger and placed these samples into new, 2-inch-diameter by 3-inch-long brass sleeves, and capped with plastic end caps and labeled. The sampling equipment was decontaminated between each boring and equipment rinsate samples were collected and analyzed. Equipment rinsate samples were collected by pouring deionized water over/through decontaminated equipment and allowing the water to drain into laboratory-supplied sample containers. Soil samples and equipment rinsate samples were transferred under COC protocol to a State-certified laboratory within 24 hours of collection. In accordance with the TO soil sample homogenization was performed in the laboratory.

4.2. Investigative Derived Wastes

Soil cuttings generated by hand-auger drilling were returned to the boreholes upon collection of soil samples. Decontamination water was transported off the site and placed in a 55-gallon drum at the Ninyo & Moore office. As required by the TO, no decontamination water entered storm drains or escaped the Caltrans ROW. The decontamination water is currently being characterized for disposal. Upon completion of characterization, the decontamination water will be disposed of appropriately.

4.3. Laboratory Analyses

Soil samples were transferred under COC to Advanced Technology Laboratories (ATL) of Signal Hill, California. Once the samples were received by ATL, the analysis of the samples was performed within five days, the turnaround time specified in the TO. The holding time for metals analyses is 180 days. Prior to analysis, soil sample homogenization was performed by ATL. The laboratory analyses are presented in the laboratory results included in Appendix A.

In accordance with the TO, each soil sample (130 total) was analyzed for total lead (TTLC) by United States Environmental Protection Agency (EPA) Test Method No. 6010B. Of those, 50 samples contained total lead (TTLC) at concentrations greater than or equal to 50 mg/kg and less than 1,000 mg/kg, and were further analyzed for soluble lead (STLC) using the WET Method by EPA Test Method No. 7420. Forty-four (44) of these 50 samples contained soluble lead (STLC) at concentrations greater than or equal to 5 mg/l, and were further analyzed for soluble lead using the DI-WET Method by EPA Test Method No. 7420.

In accordance with the TO, selected samples (total 19) were analyzed for lead by TCLP using EPA Test Method Nos. 1311/7420. These 19 samples contained total lead (TTLC) greater than 350 mg/kg (material likely to be disposed of at a Class I landfill). Four (4) of the 19 samples contained 5mg/l or more of lead by TCLP. Analysis for TCLP is used to evaluate whether soils should be classified as hazardous for disposal purposes under Federal Law.

In accordance with the TO, samples were analyzed for pH using EPA Test Method No. 9045. Twelve (12) randomly selected samples were analyzed for pH.

In accordance with Contract No. 43A0078, one equipment rinsate sample was collected and analyzed per COC. Three equipment rinsate samples were collected and analyzed for total lead by EPA Test Method No. 6010B.

4.4. Geographical Information System (GIS)

Latitude and longitude (NAD 83) of sampling locations were recorded with a handheld Global Positioning System (GPS) unit (Geoexplorer 3, Trimble). Laboratory data and coordinates were entered into the Access database provided by Caltrans. Sample IDs intended for use by Caltrans for sampling and for GIS tables were provided to Ninyo & Moore. The GIS tables are presented in Appendix B. The sample IDs presented in Appendix B are identical to the sample IDs used throughout this report and shown on the attached Table 1, except for surface samples which were designated by "0" instead of "S". The sample IDs in Appendix B and Table 1 are in the following format: three-digit prefix – three-digit boring number – depth in meters. The three-digit prefix for this TO was 579. The three-digit boring numbers are based on sections as defined in Table T1 and the depth is in meters. For example, sample 579-101-1.5 is the sample collected from a depth of 1.5 m in boring 101 advanced for this TO (579).

5. INVESTIGATIVE RESULTS

The results of the completed work, field quality assurance/quality control (QA/QC), laboratory results and laboratory QA/QC is presented below.

5.1. Summary of Completed Work

The number of borings completed and samples collected relative to the number of borings and samples proposed in the TO is summarized in Table T2. As indicated in Table T2 each of the proposed 28 borings were completed. Some borings were completed with less than five samples collected per boring due to sampling equipment refusal. If refusal was encountered in a boring after collection of the third sample, the boring was terminated at that depth. If refusal was encountered prior to collection of the third sample, the boring was relocated and one additional attempt was made to collect the deeper sample. Each sample interval, at which samples were not collected due to refusal, is indicated on the attached Table 1 (following the text).

Table T2 – Summary of work

No. of Borings (Samples) Proposed in Work Plan	No. of Borings Not Completed	No. of Samples Attempted but not collected due to Refusal	No. of Borings Completed (Samples Collected and Analyzed)
28 (168)	0	38	28 (130)

5.1.1. Field Quality Assurance/Quality Control (QA/QC)

In order to reduce the likelihood of cross-contamination, sampling equipment was decontaminated between borings. Equipment was washed in a solution of non-phosphate detergent, rinsed in clear water, rinsed in distilled water, and dried. To evaluate the effectiveness of the decontamination procedures, one equipment rinsate blank was collected for each COC (three samples total). The samples were collected by pouring deionized water through/over decontaminated equipment and collecting the water in laboratory-supplied containers. The samples were analyzed for total lead. The highest detectable concentration of lead was 0.0061 mg/l. The results are indicative of thorough decontamination.

5.2. Laboratory Results

Tables T3 and T4 summarize the laboratory results (TTLC, STLC, DI-WET, and TCLP) for this TO. The attached Table 1 (following the text) contains each of the soil sample results as well as equipment rinsate sample results. The laboratory reports are included as Appendix A.

Table T3 – Summary of Laboratory Results for Site 1

	TTLC (mg/kg)			STLC (mg/l)		DI-WET (mg/l)		TCLP (mg/l)	
Maximum Concentration (Sample ID)	2,200 (579-101-0.15)			64 (579-102-S)		5.9 (579-111-S)		18 (579-101-S)	
Concentration	< 50	50 to 999	≥ 1,000	< 5	≥ 5	< 0.5	≥ 0.5	< 5	≥ 5
Number of Samples	45	39	6	5	34	10	24	13	3

Notes:
TTLC – Total Threshold Limit Concentration
STLC – Soluble Threshold Limit Concentration
DI-WET – deionized water extraction
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter

Table T4 – Summary of Laboratory Results for Site 2

	TTLC (mg/kg)			STLC (mg/l)		DI-WET (mg/l)		TCLP (mg/l)	
Maximum Concentration (Sample ID)	1,100 (579-128-S)			48 (579-127-0.15)		11 (579-127-0.15)		6.6 (579-127-S)	
Concentration	< 50	50 to 999	≥ 1,000	< 5	≥ 5	< 0.5	≥ 0.5	< 5	≥ 5
Number of Samples	27	11	2	1	10	2	8	2	1

Notes:
TTLC – Total Threshold Limit Concentration
STLC – Soluble Threshold Limit Concentration
DI-WET – deionized water extraction
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter

Per the variance and Assembly Bill 414, Caltrans may reuse fill soil containing less than 1,411 mg/kg of total lead (TTLC). For this TO, 3 samples contained 1,411 mg/kg or more of total lead (TTLC). If the soil contains less than 0.5 mg/l of soluble lead (DI-WET), the soil must be placed a minimum of 1.5 m above the maximum water table elevation and covered with at least 0.3 m of non-hazardous soil. If the soil contains 0.5 mg/l or more of soluble lead (DI-WET), the cover must be a pavement structure maintained by Caltrans. The pH values ranged between 6.2 (579-101-S and 579-128-0.6) and 8.4 (579-117-5) for this TO. Since the range of pH values is greater than 5.0 (the lower limit provided in the variance), no additional limitations are applicable.

Evaluation of TCLP concentrations is not referred to in the variance. Federal regulations indicate that waste soil containing 5 mg/l or more of lead by TCLP analyses be classified as a Resource, Conservation, and Recovery Act (RCRA)-regulated hazardous waste for disposal purposes. If a layer is found to contain samples with TCLP results of 5 mg/l or more, additional in-ground and/or stockpile soil sampling could be performed near these sample locations during construction activities.

5.2.1. Laboratory QA/QC

ATL conducted laboratory QA/QC in accordance with Statewide Contract No. 43A0078. QA/QC procedures included analyses of method blanks, duplicate samples, and spiked samples. These procedures are included in the analytical reports presented in Appendix A of this report.

6. STATISTICAL EVALUATION

A statistical evaluation on the laboratory results was completed in accordance with the procedures outlined in Chapter 9 of the EPA's SW-846 for each area (Appendix C). For samples having lead concentrations below the method detection limit, the value of one-half of the detection limit was used for the purpose of statistical evaluation.

A histogram for each site was developed to determine normality of the data (Appendix D). Data sets for each site are not normally distributed but skewed generally to the left.

As required by the TO, these analyses were performed for the 90 percent and 95 percent upper confidence limits (UCLs). The 90 percent UCL was used to evaluate whether the DTSC variance could be invoked; the 95 percent UCL was used to evaluate off-site handling and disposal options for soil to be relinquished to a contractor or disposed outside the Caltrans ROW as per the Health and Safety Code disposal criteria. When evaluating whether the DTSC Variance (90 percent UCL) applies, a maximum total lead concentration of 1,411 mg/kg and a soluble lead concentration of 5 mg/l were used; for evaluation of off-site soil handling and disposal (95 percent UCL), a maximum total lead concentration of 350 mg/kg and a soluble lead concentration of 5 mg/l were used.

A correlation function for Site 1 and Site 2 samples between the total and soluble lead concentrations was established (Appendix E) by calculating the correlation coefficient for each data set. The purpose of calculating the correlation coefficient for each TTLC/STLC data set is to evaluate the strength of the association between TTLC and STLC. Once the association has been evaluated, the 90 percent and 95 percent UCL TTLC value can be used to predict the 90 percent and 95 percent, respectively, UCL STLC value through a linear relationship.

For a set of variable pairs, the correlation coefficient gives the strength of the association. The square of the size of the correlation coefficient is the fraction of the variance of the one variable that can be explained from the variance of the other variable. The relation between the variables is called the regression line. The regression line is defined as the best fitting straight line through all value pairs, i.e., the one explaining the largest part of the variance.

It is important to note that this type of correlation is able to show whether two variables are connected. However, it is not able to show whether the variables are not connected. If one variable depends on another, i.e., there is a causal relation, then it is always possible to find some kind of correlation between the two variables. However, if both variables depend on a third (i.e., soil pH), they can show a sizable correlation without any causal dependency between them. All TTLC/STLC data pairs were used to establish each correlation function. Correlation functions are shown on Figures E-1 and E-2.

The procedure used to predict the soluble lead concentration was to calculate the correlation coefficient R of the pairs (TTLC, STLC) for each area using the following equation:

$$R = \frac{\{Sum(TTLC*STLC)-Sum(TTLC)*Sum(STLC)/N\}}{sqrt(\{Sum(TTLC**2)-Sum(TTLC)**2/N\}*\{Sum(STLC**2)-Sum(STLC)**2/N\})}$$

The regression line STLC=a*TTLC+b is calculated as:

a = {Sum(TTLC*STLC)-Sum(TTLC)*Sum(STLC)/N}/{Sum(TTLC**2)-Sum(TTLC)**2/N}
b = Sum(STLC)/N-a*Sum(TTLC)/N

The resulting correlation coefficients for the two directions are:

Site 1 R = 0.9229
Site 2 R = 0.9291

The resulting regression line for the two directions are:

Site 1 y = 0.0782x + 0.9494
Site 2 y = 0.123x – 4.8664

It appears that the relationship between the TTLC/STLC data sets is different in each site. Those differences are likely related to environmental conditions such as soil type, moisture content, biological activity, as well as physical conditions like traffic patterns over time.

The data analysis tables are presented in Appendix C. In accordance with the TO, statistical analyses were performed on each site independently. Each site was evaluated as described in the TO. The statistical datasets can be found in Tables C-1 through C-30 (Appendix C).

In general, first the mean and variance of the total lead for each data set were calculated. These values are shown in Tables C-1 through C-30. In each case, the mean was less than the variance. For total lead concentrations, the difference between the mean and variance was one to several orders of magnitude. In accordance with SW-846, the data were transformed with an arcsine transformation, and the subsequent calculations were done with the transformed data. To transform the data, the data were first converted to percentages of the maximum value in accordance with SW-846 (see Tables C-1 through C-30).

The arcsine-transformed data are listed in the bottom portion of each table (C-1 through C-30). Statistical "t" values were established for 90 percent and 95 percent UCLs based on the degrees of freedom of each data set, and 90 percent and 95 percent UCLs were calculated for each data set. The calculated values were "back transformed" to convert them to concentration values (see line Reverse Transformation for 90 / 95 % on Tables C-1 through C-30). These are listed at the bottom of each of the tables.

As shown on Table 1, there are some instances when deeper layers or combinations of deeper layers contain higher lead concentrations than some shallower layers or combinations of layers. One possible explanation for this trend is that in some areas shallower soils may be fill material emplaced over the original shoulder surface. The original shoulder surface could have been exposed to ADL when leaded gas was common and then covered with imported soil which was exposed to ADL for fewer years, including years after the removal of lead from gasoline.

The results of the statistical analyses are summarized in Table T5 below.

Table T5 – Summary of Statistical Analyses

Site	Depth (meters bgs)	Total Lead		Soluble Lead	
		90% UCL (mg/kg)	95% UCL (mg/kg)	90% UCL (mg/l)	95% UCL (mg/l)
Site 1	Layers Combined	325.63	346.47	26.41	28.04
Site 1	Surface	845.85	909.43	67.10	72.07
Site 1	0.15-Meter Layer	648.27	722.38	51.64	57.44
Site 1	0.3-Meter Layer	202.89	226.88	16.82	18.69
Site 1	0.6-Meter Layer	54.40	59.43	5.20	5.60
Site 1	0.9-Meter Layer	234.94	269.84	19.32	22.05
Site 1	1.5-Meter Layer	167.29	193.31	14.03	16.07
Site 1	0.15 to 1.5-Meter Layers	231.90	252.54	19.08	20.70
Site 1	Surface to 0.15-Meter Layers	649.64	693.78	51.75	55.20
Site 1	0.3 to 1.5-Meter Layers	119.11	129.48	10.26	11.07
Site 1	Surface to 0.3-Meter Layers	474.67	505.95	38.07	40.51
Site 1	0.6 to 1.5-Meter Layers	109.81	122.16	9.54	10.50
Site 1	Surface to 0.6-Meter Layers	380.90	406.03	30.74	32.70
Site 1	0.9 to 1.5-Meter Layers	182.52	206.89	15.22	17.13
Site 1	Surface to 0.9-Meter Layers	341.20	363.20	27.63	29.35

Table T5 – Summary of Statistical Analyses

Site	Depth (meters bgs)	Total Lead		Soluble Lead	
		90% UCL (mg/kg)	95% UCL (mg/kg)	90% UCL (mg/l)	95% UCL (mg/l)
Site 2	Layers Combined	209.37	229.18	20.89	23.32
Site 2	Surface	694.30	762.80	80.53	88.96
Site 2	0.15-Meter Layer	154.79	176.70	14.17	16.87
Site 2	0.3-Meter Layer	170.85	198.98	16.15	19.61
Site 2	0.6-Meter Layer	109.44	127.11	8.59	10.77
Site 2	0.9-Meter Layer	9.71	9.99	-3.67	-3.64
Site 2	1.5-Meter Layer	NA	NA	NA	NA
Site 2	0.15 to 1.5-Meter Layers	83.96	92.84	5.46	6.55
Site 2	Surface to 0.15-Meter Layers	405.69	446.72	45.03	50.08
Site 2	0.3 to 1.5-Meter Layers	85.03	96.34	5.59	6.98
Site 2	Surface to 0.3-Meter Layers	295.14	323.72	31.44	34.95
Site 2	0.6 to 1.5-Meter Layers	62.72	72.18	2.85	4.01
Site 2	Surface to 0.6-Meter Layers	243.78	266.84	25.12	27.96
Site 2	0.9 to 1.5-Meter Layers	9.30	9.64	-3.72	-3.68
Site 2	Surface to 0.9-Meter Layers	219.65	240.46	22.15	24.71

Notes:
meters bgs – meters below surface grade
UCL – upper confidence limit
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
NA – insufficient data to perform statistical analyses

The pH concentrations of the samples analyzed from the two areas were above 5.0 and, therefore, have no bearing on soil disposition in accordance with the DTSC variance.

The results for the TCLP analyses are summarized in Table T6 below.

Table T6 – Summary of TCLP Analyses

Site	Depth (meters bgs)	TCLP (mg/l)	
		Minimum Result	Maximum Result
Site 1	Surface	0.43	18
Site 1	0.15	4.7	8.6
Site 1	0.3	1.9	1.9
Site 1	0.6	NA	NA
Site 1	0.9	1.5	1.5
Site 1	1.5	NA	NA
Site 2	Surface	2.7	6.6
Site 2	0.15	NA	NA
Site 2	0.3	4	4
Site 2	0.6	NA	NA
Site 2	0.9	NA	NA
Site 2	1.5	NA	NA

Note:
TCLP – Toxicity Characteristic Leaching Procedure
meters bgs – meters below surface grade
mg/l – milligrams per liter
NA – not analyzed

7. DATA EVALUATION

Based upon the analytical results and subsequent statistical analysis, we have concluded the following as summarized in Tables T7 and T8:

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 1	Layers Combined	<1,411	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-101-0.9 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-0.6 579-106-0.9 579-106-S 579-107-S 579-108-0.3 579-108-S 579-109-0.6 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-111-1.5 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 1	Surface	<1,411	≥5	579-102-S 579-104-S 579-113-S 579-116-S 579-117-S	579-105-S 579-106-S 579-107-S 579-108-S 579-110-S 579-111-S 579-112-S 579-114-S 579-115-S 579-119-S	579-101-S
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 1	0.15-Meter Layer	<1,411	≥5	579-105-0.15 579-109-0.15	579-103-0.15 579-104-0.15 579-110-0.15 579-111-0.15 579-119-0.15	579-101-0.15 579-108-0.15
				DI – Wet Range 0.19 to 4.5 mg/l		TCLP Range 4.7 to 8.6 mg/l
Site 1	0.3-Meter Layer	<1,411	≥5	579-105-0.3	579-101-0.3 579-103-0.3 579-106-0.3 579-108-0.3 579-119-0.3	NA
				DI – Wet Range 0.46 to 11 mg/l		TCLP Range 1.9 mg/l*
Site 1	0.6-Meter Layer	<1,411	≥5	NA	579-106-0.6 579-109-0.6	NA
				DI – Wet Range 0.88 to 0.99 mg/l		TCLP Range NA
Site 1	0.9-Meter Layer	<1,411	≥5	NA	579-101-0.9 579-106-0.9	
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 mg/l*
Site 1	1.5-Meter Layer	<1,411	≥5	NA	579-111-1.5	NA
				DI – Wet Range 1.4 mg/l*		TCLP Range NA
Site 1	0.15 to 1.5-Meter Layers	<1,411	≥5	579-105-0.15 579-105-0.3 579-109-0.15	579-101-0.3 579-101-0.9 579-103-0.15 579-103-0.3 579-104-0.15 579-106-0.3 579-106-0.6 579-106-0.9 579-108-0.3 579-109-0.6 579-110-0.15 579-111-0.15 579-119-0.15 579-119-0.3 579-111-1.5	579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 to 8.6 mg/l

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 1	Surface to 0.15-Meter Layers	<1,411	≥5	579-102-S 579-104-S 579-105-0.15 579-109-0.15 579-113-S 579-116-S 579-117-S	579-103-0.15 579-104-0.15 579-105-S 579-106-S 579-107-S 579-108-S 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 1	0.3 to 1.5-Meter Layers	<1,411	≥5	579-105-0.3	579-101-0.3 579-101-0.9 579-103-0.3 579-106-0.3 579-106-0.6 579-106-0.9 579-108-0.3 579-109-0.6 579-111-1.5 579-119-0.3	NA
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 to 1.9 mg/l
Site 1	Surface to 0.3-Meter Layers	<1,411	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-S 579-107-S 579-108-0.3 579-108-S 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 1	0.6 to 1.5-Meter Layers	<1,411	≥5	NA	579-101-0.9 579-106-0.6 579-111-1.5 579-106-0.9 579-109-0.6	NA
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 mg/l*
Site 1	Surface to 0.6-Meter Layers	<1,411	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-0.6 579-106-S 579-107-S 579-108-0.3 579-108-S 579-109-0.6 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 1	0.9 to 1.5-Meter Layers	<1,411	≥5	NA	579-101-0.9 579-111-1.5 579-106-0.9	NA
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 mg/l*

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 1	Surface to 0.9-Meter Layers	<1,411	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-101-0.9 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-0.6 579-106-0.9 579-106-S 579-107-S 579-108-0.3 579-108-S 579-109-0.6 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 2	Layers Combined	<1,411	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3 579-128-0.6	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 66 mg/l
Site 2	Surface	<1,411	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S	579-127-S
				DI – Wet Range ND to 2.4 mg/l		TCLP Range 2.7 to 66 mg/l
Site 2	0.15-Meter Layer	<1,411	≥5	NA	579-127-0.15	NA
				DI – Wet Range ND to 11 mg/l		TCLP Range NA

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 2	0.3-Meter Layer	<1,411	≥5	NA	579-127-0.3	NA
				DI – Wet Range 6.9 mg/l*		TCLP Range 4 mg/l*
Site 2	0.6-Meter Layer	<1,411	≥5	NA	579-128-0.6	NA
				DI – Wet Range 1.3 mg/l*		TCLP Range NA
Site 2	0.9-Meter Layer	<1,411	<5	NA	NA	NA
				No DI – Wet Data		TCLP Range NA
Site 2	1.5-Meter Layer	Insufficient Data	Insufficient Data	NA	NA	NA
				DI – Wet Range NA		TCLP Range NA
Site 2	0.15 to 1.5-Meter Layers	<1,411	≥5	NA	579-127-0.15 579-127-0.3 579-128-0.6	NA
				DI – Wet Range ND to 11 mg/l		TCLP Range 4 mg/l*
Site 2	Surface to 0.15-Meter Layers	<1,411	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 4 mg/l*
Site 2	0.3 to 1.5-Meter Layers	<1,411	≥5	NA	579-127-0.3 579-128-0.6	NA
				DI – Wet Range 1.3 to 6.9 mg/l		TCLP Range 4 mg/l*
Site 2	Surface to 0.3-Meter Layers	<1,411	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 6.6 mg/l

Table T7 – Data Evaluation for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples with Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples with Soluble Lead ≥0.5 mg/l by DI-WET	Samples with Soluble Lead ≥5 mg/l by TCLP
Site 2	0.6 to 1.5-Meter Layers	<1,411	<5	NA	579-128-0.6	NA
				DI – Wet Range 1.3 mg/l*		TCLP Range NA
Site 2	Surface to 0.6-Meter Layers	<1,411	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3 579-128-0.6	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 6.6 mg/l
Site 2	0.9 to 1.5-Meter Layers	<1,411	<5	NA	NA	NA
				No DI Wet Data		TCLP Range NA
Site 2	Surface to 0.9-Meter Layers	<1,411	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3 579-128-0.6	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 6.6 mg/l

Notes:
UCL – upper confidence limit
meters bgs – meters below surface grade
TTLC – Total Threshold Limit Concentration
STLC – Soluble Threshold Limit Concentration
DI-WET – deionized water extraction
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
NA – not applicable
* = one sample only

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 1	Layers Combined	<350	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-101-0.9 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-0.6 579-106-0.9 579-106-S 579-107-S 579-108-0.3 579-108-S 579-109-0.6 579-110-0.15 579-110-S 579-111-1.5 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 1	Surface	≥350	≥5	579-102-S 579-104-S 579-113-S 579-116-S 579-117-S	579-105-S 579-106-S 579-107-S 579-108-S 579-110-S 579-111-S 579-112-S 579-114-S 579-115-S 579-119-S	579-101-S
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 1	0.15-Meter Layer	≥350	≥5	579-105-0.15 579-109-0.15	579-103-0.15 579-104-0.15 579-110-0.15 579-111-0.15 579-119-0.15	579-101-0.15 579-108-0.15
				DI – Wet Range 0.19 to 4.5 mg/l		TCLP Range 4.7 to 8.6 mg/l
Site 1	0.3-Meter Layer	<350	≥5	579-105-0.3	579-101-0.3 579-103-0.3 579-106-0.3 579-108-0.3 579-119-0.3	NA
				DI – 0.46 to 11 mg/l		TCLP Range 1.9 mg/l*
Site 1	0.6-Meter Layer	<350	≥5	NA	579-106-0.6 579-109-0.6	NA
				DI – Wet Range 0.88 to 0.99 mg/l		TCLP Range NA
Site 1	0.9-Meter Layer	<350	≥5	NA	579-101-0.9 579-106-0.9	NA
				DI – West Range ND to 5.2 mg/l		TCLP Range 1.5 mg/l*
Site 1	1.5-Meter Layer	<350	≥5	NA	579-111-1.5	NA
				DI – Wet Range 1.4 mg/l*		TCLP Range NA
Site 1	0.15 to 1.5-Meter Layers	<350	≥5	579-105-0.15 579-105-0.3 579-109-0.15	579-101-0.3 579-101-0.9 579-103-0.15 579-103-0.3 579-104-0.15 579-106-0.3 579-106-0.6 579-106-0.9 579-108-0.3 579-109-0.6 579-110-0.15 579-111-0.15 579-111-1.5 579-119-0.15 579-119-0.3	579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 to 8.6 mg/l

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 1	Surface to 0.15-Meter Layers	≥350	≥5	579-102-S 579-104-S 579-105-0.15 579-109-0.15 579-113-S 579-116-S 579-117-S	579-103-0.15 579-104-0.15 579-105-S 579-106-S 579-107-S 579-108-S 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – West Range ND to 5.9 mg/l		TCLP 0.43 to 18 mg/l
Site 1	0.3 to 1.5-Meter Layers	<350	≥5	579-105-0.3	579-101-0.3 579-101-0.9 579-103-0.3 579-106-0.3 579-106-0.6 579-106-0.9 579-108-0.3 579-109-0.6 579-111-1.5 579-119-0.3	NA
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 to 1.9 mg/l
Site 1	Surface to 0.3-Meter Layers	≥350	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-S 579-107-S 579-108-0.3 579-108-S 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 1	0.6 to 1.5-Meter Layers	<350	≥5	NA	579-101-0.9 579-106-0.6 579-106-0.9 579-109-0.6	NA
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 mg/l*
Site 1	Surface to 0.6-Meter Layers	≥350	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-0.6 579-106-S 579-107-S 579-108-0.3 579-108-S 579-109-0.6 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	579-101-S 579-101-0.15 579-108-0.15
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 1	0.9 to 1.5-Meter Layers	<350	≥5	NA	579-101-0.9 579-106-0.9 579-111-1.5	NA
				DI – Wet Range ND to 5.2 mg/l		TCLP Range 1.5 mg/l*
Site 1	Surface to 0.9-Meter Layers	≥350	≥5	579-102-S 579-104-S 579-105-0.15 579-105-0.3 579-109-0.15 579-113-S 579-116-S 579-117-S	579-101-0.3 579-101-0.9 579-103-0.15 579-103-0.3 579-104-0.15 579-105-S 579-106-0.3 579-106-0.6 579-106-0.9	579-101-S 579-101-0.15 579-108-0.15

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 1	Surface to 0.9-Meter Layers	≥350	≥5		579-106-S 579-107-S 579-108-0.3 579-108-S 579-109-0.6 579-110-0.15 579-110-S 579-111-0.15 579-111-S 579-112-S 579-114-S 579-115-S 579-119-0.15 579-119-0.3 579-119-S	
				DI – Wet Range ND to 5.9 mg/l		TCLP Range 0.43 to 18 mg/l
Site 2	Layers Combined	<350	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3 579-128-0.6	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 66 mg/l
Site 2	Surface	≥350	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S	579-127-S
				DI – Wet Range ND to 2.4 mg/l		TCLP Range 2.7 to 66 mg/l
Site 2	0.15-Meter Layer	<350	≥5	NA	579-127-0.15	NA
				DI – Wet Range ND to 11 mg/l		TCLP Range NA
Site 2	0.3-Meter Layer	<350	≥5	NA	579-127-0.3	NA
				DI – Wet Range 6.9 mg/l*		TCLP Range 4 mg/l*
Site 2	0.6-Meter Layer	<350	≥5	NA	579-128-0.6	NA
				DI – Wet Range 1.3 mg/l*		TCLP Range NA
Site 2	0.9-Meter Layer	<350	<5	NA	NA	NA
				No DI – Wet Data		TCLP Range NA

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 2	1.5-Meter Layer	NA	NA	NA	NA	NA
				DI – Wet Range NA		TCLP Range NA
Site 2	0.15 to 1.5-Meter Layers	<350	≥5	NA	579-127-0.15 579-127-0.3 579-128-0.6	NA
				DI – Wet Range ND to 11 mg/l		TCLP Range 4 mg/l*
Site 2	Surface to 0.15-Meter Layers	≥350	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 4 mg/l*
Site 2	0.3 to 1.5-Meter Layers	<350	≥5	NA	579-127-0.3 579-128-0.6	NA
				DI – Wet Range 1.3 to 6.9 mg/l		TCLP Range 4 mg/l*
Site 2	Surface to 0.3-Meter Layers	<350	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 6.6 mg/l
Site 2	0.6 to 1.5-Meter Layers	<350	<5	NA	579-128-0.6	NA
				DI – Wet Range 1.3 mg/l*		TCLP Range NA
Site 2	Surface to 0.6-Meter Layers	<350	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3 579-128-0.6	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 6.6 mg/l
Site 2	0.9 to 1.5-Meter Layers	<350	<5	NA	NA	NA
				No DI – Wet Data		TCLP Range NA

Table T8 – Data Evaluation for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Mean Lead Concentration by TTLC (mg/kg)	Mean Lead Concentration by STLC (mg/l)	Samples With Soluble Lead between ND and <0.5 mg/l by DI-WET	Samples With Soluble Lead ≥0.5 mg/l by DI-WET	Samples With Soluble Lead ≥5 mg/l by TCLP
Site 2	Surface to 0.9-Meter Layers	<350	≥5	NA	579-120-S 579-121-S 579-122-S 579-125-S 579-126-S 579-127-0.15 579-127-0.3 579-128-0.6	579-127-S
				DI – Wet Range ND to 11 mg/l		TCLP Range 2.7 to 6.6 mg/l

Notes:
UCL – upper confidence limit
meters bgs – meters below surface grade
TTLC – Total Threshold Limit Concentration
STLC – Soluble Threshold Limit Concentration
DI-WET – deionized water extraction
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
NA – not applicable
* - one sample only

8. RECOMMENDATIONS

Based on the findings of this study, recommendations for each project location and depth layer as summarized are Tables T9 and T10. Following is a brief summary of those recommendations:

- Recommendations for 90%UCL Evaluation/Variance Applies (soil can be re-used on site) – **SITE 1:** Soil in all layers or combinations of layers from Site 1 is hazardous but can be re-used as fill material on the job site in accordance with the Variance. All soil must be placed a minimum of 5 feet above the water table and protected by a paved surface.

- Recommendations for 90%UCL Evaluation/Variance Applies (soil can be re-used on site) – **SITE 2:** Soil in the 0.9 and 1.5-meters layers (representative depth 0.75 to 1.75 meters) is non-hazardous and can be re-used on site without restriction. All other soil layers (Surface to 0.6 meters [effective depth surface to 0.75 meters]) from Site 2 is hazardous but can be re-used as fill material on the job site in accordance with the Variance. This soil must be placed a minimum of 5 feet above the water table and protected by a paved surface.

- Recommendations for 95%UCL Evaluation (soil to be disposed of off-site) – **SITE 1:** Soil in all layers or combinations of layers is hazardous and must be disposed of at a Class 1 disposal site. Any load of soil disposed of from the site which includes any soil excavated from shallower that than the 0.3 meter layer (representative depth of 0.23 meter) must also be treated as RCRA waste (see footnote regarding RCRA in Table T10, please.)

- Recommendations for 95%UCL Evaluation (soil to be disposed of off-site) – **SITE 2:** Soil from the 0.9 and 1.5 meter layers (effective depth 0.75 to 1.75 meters) is non-hazardous and can be disposed of without restriction. Soil exclusively from the 0.15 to 0.6 meter layers (effective depth 0.08 to 0.75 meters) or combined with deeper layers is hazardous and must be disposed of at a Class 1 disposal site. Any load of soil disposed of from the site which includes any soil excavated from the surface (representative depth 0.08 meter) must be treated as RCRA waste (see footnote regarding RCRA in Table T10, please.)

Table T9 – Recommendations for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling
Site 1	Layers Combined	Surface to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	Surface	Surface to 0.08	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.15-Meter Layer	0.08 to 0.23	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.3-Meter Layer	0.23 to 0.45	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.6-Meter Layer	0.45 to 0.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.9-Meter Layer	0.75 to 1.20	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.

Table T9 – Recommendations for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling
Site 1	1.5-Meter Layer	1.20 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.15 to 1.5-Meter Layers	0.08 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	Surface to 0.15-Meter Layers	Surface to 0.23	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.3 to 1.5-Meter Layers	0.23 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	Surface to 0.3-Meter Layers	Surface to 0.45	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.6 to 1.5-Meter Layers	0.45 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	Surface to 0.6-Meter Layers	Surface to 0.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	0.9 to 1.5-Meter Layers	0.75 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 1	Surface to 0.9-Meter Layers	Surface to 1.20	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	Layers Combined	Surface to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and covered with at least 1 foot non-hazardous soil.
Site 2	Surface	Surface to 0.08	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table

Table T9 – Recommendations for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling
				elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.15-Meter Layer	0.08 to 0.23	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.3-Meter Layer	0.23 to 0.45	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.6-Meter Layer	0.45 to 0.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.9-Meter Layer	0.75 to 1.20	X	Non-hazardous. No restrictions.
Site 2	1.5-Meter Layer	1.20 to 1.75	X	Insufficient data to perform statistics. Available data suggests layer is: Non-hazardous, no restrictions. Additional in-ground and/or stockpile sampling should be performed at the time of construction.
Site 2	0.15 to 1.5-Meter Layers	0.08 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	Surface to 0.15-Meter Layers	Surface to 0.23	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.3 to 1.5-Meter Layers	0.23 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	Surface to 0.3-Meter Layers	Surface to 0.45	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.6 to 1.5-Meter Layers	0.45 to 1.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement

Table T9 – Recommendations for 90% UCL Evaluation As It Applies to the Variance

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling
				structure which will be maintained by Caltrans.
Site 2	Surface to 0.6-Meter Layers	Surface to 0.75	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Site 2	0.9 to 1.5-Meter Layers	0.75 to 1.75	X	Non-hazardous. No restrictions.
Site 2	Surface to 0.9-Meter Layers	Surface to 1.20	Y	Hazardous, variance applies. Use material on job-site. Place at minimum of 5 feet above maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans.
Notes: UCL – upper confidence limit meters bgs – meters below ground surface				

Table T10 – Recommendations for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling
Site 1	Layers Combined	Surface to 1.75	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 1	Surface	Surface to 0.08	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 1	0.15-Meter Layer	0.08 to 0.23	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 1	0.3-Meter Layer	0.23 to 0.45	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	0.6-Meter Layer	0.45 to 0.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	0.9-Meter Layer	0.75 to 1.20	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	1.5-Meter Layer	1.20 to 1.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	0.15 to 1.5-Meter Layers	0.08 to 1.75	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 1	Surface to 0.15-Meter Layers	Surface to 0.23	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 1	0.3 to 1.5-Meter Layers	0.23 to 1.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	Surface to 0.3-Meter Layers	Surface to 0.45	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.

Table T10 – Recommendations for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling
Site 1	0.6 to 1.5-Meter Layers	0.45 to 1.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	Surface to 0.6-Meter Layers	Surface to 0.75	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 1	0.9 to 1.5-Meter Layers	0.75 to 1.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 1	Surface to 0.9-Meter Layers	Surface to 1.20	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 2	Layers Combined	Surface to 1.75	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 2	Surface	Surface to 0.08	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 2	0.15-Meter Layer	0.08 to 0.23	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 2	0.3-Meter Layer	0.23 to 0.45	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 2	0.6-Meter Layer	0.45 to 0.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 2	0.9-Meter Layer	0.75 to 1.20	X	Non-hazardous, no restrictions.
Site 2	1.5-Meter Layer	1.20 to 1.75	X	Insufficient data to perform statistics. Available data suggests layer is: Non-hazardous, no restrictions. Additional in-ground and/or stockpile sampling should be performed at the time of construction.
Site 2	0.15 to 1.5-Meter Layers	0.08 to 1.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 2	Surface to 0.15-Meter Layers	Surface to 0.23	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 2	0.3 to 1.5-Meter Layers	0.23 to 1.75	Z-2	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply.
Site 2	Surface to 0.3-Meter Layers	Surface to 0.45	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 2	0.6 to 1.5-Meter Layers	0.45 to 1.75	X	Non-hazardous, no restrictions.
Site 2	Surface to 0.6-Meter Layers	Surface to 0.75	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.
Site 2	0.9 to 1.5-Meter Layers	0.75 to 1.75	X	Non-hazardous, no restrictions.
Site 2	Surface to 0.9-Meter Layers	Surface to 1.20	Z-3	Hazardous. Class 1 Disposal Site, all other Title 22 CCR requirements apply. RCRA*.

Table T10 – Recommendations for 95% UCL Evaluation As It Applies to Off-Site Disposal

Site	Layer (meters bgs)	Representative Depth (meters bgs)	Soil Type	Recommended Handling

Notes:
UCL – upper confidence limit
meters bgs – meters below surface grade
DTSC – United States Environmental Protection Agency, Department of Toxic Substances Control
CCR – California Code of Regulations
RCRA – Resource, Conservation and Recovery Act
*The majority of soil in sections classified as Z-3 may fall under the Z-2 criteria. Soil type classification and recommended handling as RCRA material is based on the failure of one or more Toxicity Characteristic Leaching Procedure (TCLP) analyses at this depth across entire section. The actual locations of the samples failing the TCLP analyses (which may represent isolated zones) are listed in Tables T7 and T8. The volume of soil requiring handling as a RCRA material may be reduced if additional in-ground and/or stockpile sampling is performed near these sample locations during construction activities.

9. HEALTH EFFECTS OF LEAD

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Lead in its element form is a heavy, ductile, soft gray metal. The permissible exposure limit (PEL) for lead is 0.05 milligrams per cubic meter (mg/m^3) in air based on an eight-hour time-weighted average (TWA); Immediately Dangerous to Life and Health (IDLH) exposure limit is 100 mg/m^3 has been established by the National Institute of Occupational Safety and Health (NIOSH). Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, nephropathy, encephalopathy, gingival lead line, hypertension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, gingival tissue, and the gastrointestinal tract.

Because of the potential hazard from exposure to lead-contaminated soil, a lead Health and Safety Plan should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 CFR 1910.120 and 8 CCR 1532.1 The plan developed by the CIH should include a hazard analysis, describe dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

TABLE 1 - SOIL SAMPLE RESULTS - LEAD AND PH

Sample ID	TTLC (mg/kg)	STLC (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
579-101- S	2000	--	--	18	6.3
579-101-0.15	2200	--	--	8.6	--
579-101-0.3	180	18	2.5	--	--
579-101-0.6	35	--	--	--	--
579-101-0.9	140	14	1.7	--	--
579-101-1.5	Refusal	--	--	--	--
579-102- S	830	64	ND	0.78	7.3
579-102-0.15	39	--	--	--	--
579-102-0.3	53	2.5	--	--	--
579-102-0.6	Refusal	--	--	--	--
579-102-0.9	Refusal	--	--	--	--
579-102-1.5	Refusal	--	--	--	--
579-103- S	1600	--	--	3.4	--
579-103-0.15	320	27	1.7	--	--
579-103-0.3	130	15	0.88	--	--
579-103-0.6	16	--	--	--	8.2
579-103-0.9	73	7.1	ND	--	--
579-103-1.5	Refusal	--	--	--	--
579-104- S	290	24	ND	--	--
579-104-0.15	210	19	0.59	--	--
579-104-0.3	79	4.2	--	--	--
579-104-0.6	20	--	--	--	--
579-104-0.9	13	--	--	--	--
579-104-1.5	Refusal	--	--	--	--
579-105- S	420	26	1.2	0.52	--
579-105-0.15	110	7.8	0.33	--	--
579-105-0.3	130	6.8	0.46	--	--
579-105-0.6	Refusal	--	--	--	--
579-105-0.9	Refusal	--	--	--	--
579-105-1.5	Refusal	--	--	--	--
579-106- S	380	49	1.8	1	--
579-106-0.15	1300	--	--	4.7	--
579-106-0.3	770	58	11	1.9	8.1
579-106-0.6	110	9.1	0.81	--	--
579-106-0.9	680	49	5.2	1.5	--
579-106-1.5	Refusal	--	--	--	--
579-107- S	620	42	0.69	1	--
579-107-0.15	55	3	--	--	--
579-107-0.3	82	2.7	--	--	--
579-107-0.6	43	--	--	--	--
579-107-0.9	53	4	--	--	--
579-107-1.5	Refusal	--	--	--	--
579-108- S	350	41	2.5	1.2	--
579-108-0.15	1200	--	--	6.7	--

TABLE 1 - SOIL SAMPLE RESULTS - LEAD AND PH

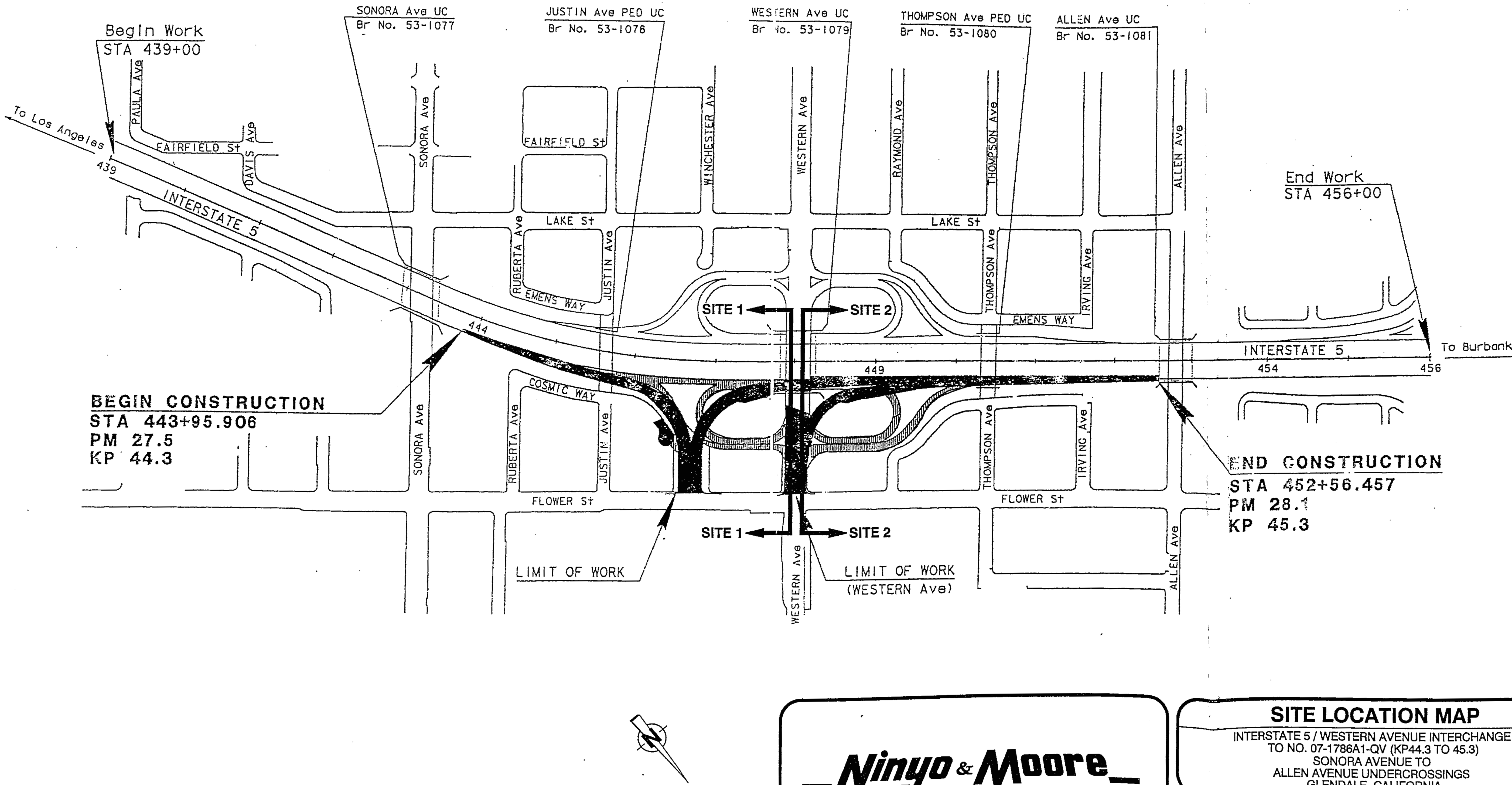
Sample ID	TTLC (mg/kg)	STLC (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
579-108-0.3	150	7.9	1.5	--	--
579-108-0.6	18	--	--	--	--
579-108-0.9	Refusal	--	--	--	--
579-108-1.5	Refusal	--	--	--	--
579-109- S	1400	--	--	2.3	6.5
579-109-0.15	150	12	0.43	--	--
579-109-0.3	20			--	--
579-109-0.6	130	12	0.99	--	--
579-109-0.9	Refusal	--	--	--	--
579-109-1.5	Refusal	--	--	--	--
579-110- S	310	47	1.6	--	--
579-110-0.15	130	8.9	0.98	--	--
579-110-0.3	26	--	--	--	--
579-110-0.6	23	--	--	--	--
579-110-0.9	Refusal	--	--	--	--
579-110-1.5	Refusal	--	--	--	--
579-111- S	440	49	5.9	2.2	--
579-111-0.15	23	--	--	--	--
579-111-0.3	26	--	--	--	--
579-111-0.6	6.3	--	--	--	--
579-111-0.9	47	--	--	--	--
579-111-1.5	230	15	1.4	--	--
579-112- S	370	28	1.5	0.43	5.8
579-112-0.15	18	--	--	--	--
579-112-0.3	48	--	--	--	--
579-112-0.6	47	--	--	--	--
579-112-0.9	20	--	--	--	--
579-112-1.5	10	--	--	--	--
579-113- S	260	21	ND	--	6.9
579-113-0.15	34	--	--	--	--
579-113-0.3	9.3	--	--	--	--
579-113-0.6	8	--	--	--	--
579-113-0.9	21	--	--	--	--
579-113-1.5	5.6	--	--	--	--
579-114- S	200	12	1.3	--	--
579-114-0.15	13	--	--	--	--
579-114-0.3	5.1	--	--	--	--
579-114-0.6	Refusal	--	--	--	--
579-114-0.9	Refusal	--	--	--	--
579-114-1.5	Refusal	--	--	--	--
579-115- S	91	12	1.1	--	--
579-115-0.15	46	--	--	--	--
579-115-0.3	6.6	--	--	--	--

TABLE 1 - SOIL SAMPLE RESULTS - LEAD AND PH

Sample ID	TTLC (mg/kg)	STLC (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
579-115-0.6	33	--	--	--	--
579-115-0.9	Refusal	--	--	--	--
579-115-1.5	Refusal	--	--	--	--
579-116- S	520	34	0.42	0.69	--
579-116-0.15	19	--	--	--	--
579-116-0.3	19	--	--	--	--
579-116-0.6	ND	--	--	--	--
579-116-0.9	5.8	--	--	--	--
579-116-1.5	5	--	--	--	--
579-117- S	110	6.4	ND	--	8.4
579-117-0.15	6.1	--	--	--	--
579-117-0.3	ND	--	--	--	--
579-117-0.6	ND	--	--	--	--
579-117-0.9	ND	--	--	--	--
579-117-1.5	Refusal	--	--	--	--
579-118- S	170	7.3	ND	--	--
579-118-0.15	ND	--	--	--	--
579-118-0.3	6.7	--	--	--	--
579-118-0.6	ND	--	--	--	--
579-118-0.9	5.3	--	--	--	--
579-118-1.5	14	--	--	--	7.3
579-119- S	200	13	1.1	--	6.9
579-119-0.15	330	27	4.5	--	--
579-119-0.3	150	14	1.5	--	--
579-119-0.6	9.1	--	--	--	--
579-119-0.9	8.5	--	--	--	--
579-119-1.5	Refusal	--	--	--	--
579-120- S	190	16	2	--	--
579-120-0.15	17	--	--	--	--
579-120-0.3	13	--	--	--	--
579-120-0.6	12	--	--	--	--
579-120-0.9	5.9	--	--	--	--
579-120-1.5	6.3	--	--	--	--
579-121- S	240	25	0.72	--	--
579-121-0.15	35	--	--	--	--
579-121-0.3	8.1	--	--	--	--
579-121-0.6	5.7	--	--	--	--
579-121-0.9	8.5	--	--	--	--
579-121-1.5	9.6	--	--	--	8.3
579-122- S	290	24	1.7	--	--
579-122-0.15	35	--	--	--	--
579-122-0.3	ND	--	--	--	--
579-122-0.6	ND	--	--	--	7.4

TABLE 1 - SOIL SAMPLE RESULTS - LEAD AND PH

Sample ID	TTLC (mg/kg)	STLC (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
579-122-0.9	ND	--	--	--	--
579-122-1.5	Refusal	--	--	--	--
579-123- S	190	12	ND	--	--
579-123-0.15	61	3.6		--	--
579-123-0.3	5.4	--	--	--	--
579-123-0.6	ND	--	--	--	--
579-123-0.9	Refusal	--	--	--	--
579-123-1.5	Refusal	--	--	--	--
579-124- S	35	--	--	--	--
579-124-0.15	6.1	--	--	--	7.7
579-124-0.3	ND	--	--	--	--
579-124-0.6	Refusal	--	--	--	--
579-124-0.9	Refusal	--	--	--	--
579-124-1.5	Refusal	--	--	--	--
579-125- S	230	24	2.4	--	--
579-125-0.15	12	--	--	--	--
579-125-0.3	ND	--	--	--	--
579-125-0.6	Refusal	--	--	--	--
579-125-0.9	Refusal	--	--	--	--
579-125-1.5	Refusal	--	--	--	--
579-126- S	110	8.7	0.67	--	--
579-126-0.15	7.2	--	--	--	--
579-126-0.3	33	--	--	--	--
579-126-0.6	24	--	--	--	7.8
579-126-0.9	Refusal	--	--	--	--
579-126-1.5	Refusal	--	--	--	--
579-127- S	1000	--	--	6.6	--
579-127-0.15	330	48	11	--	--
579-127-0.3	400	42	6.9	4	--
579-127-0.6	10	--	--	--	--
579-127-0.9	10	--	--	--	--
579-127-1.5	Refusal	--	--	--	--
579-128- S	1100	--	--	2.7	--
579-128-0.15	69	7.4	ND	--	--
579-128-0.3	29	--	--	--	--
579-128-0.6	200	20	1.3	--	6.3
579-128-0.9	Refusal	--	--	--	--
579-128-1.5	Refusal	--	--	--	--



NOT TO SCALE

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

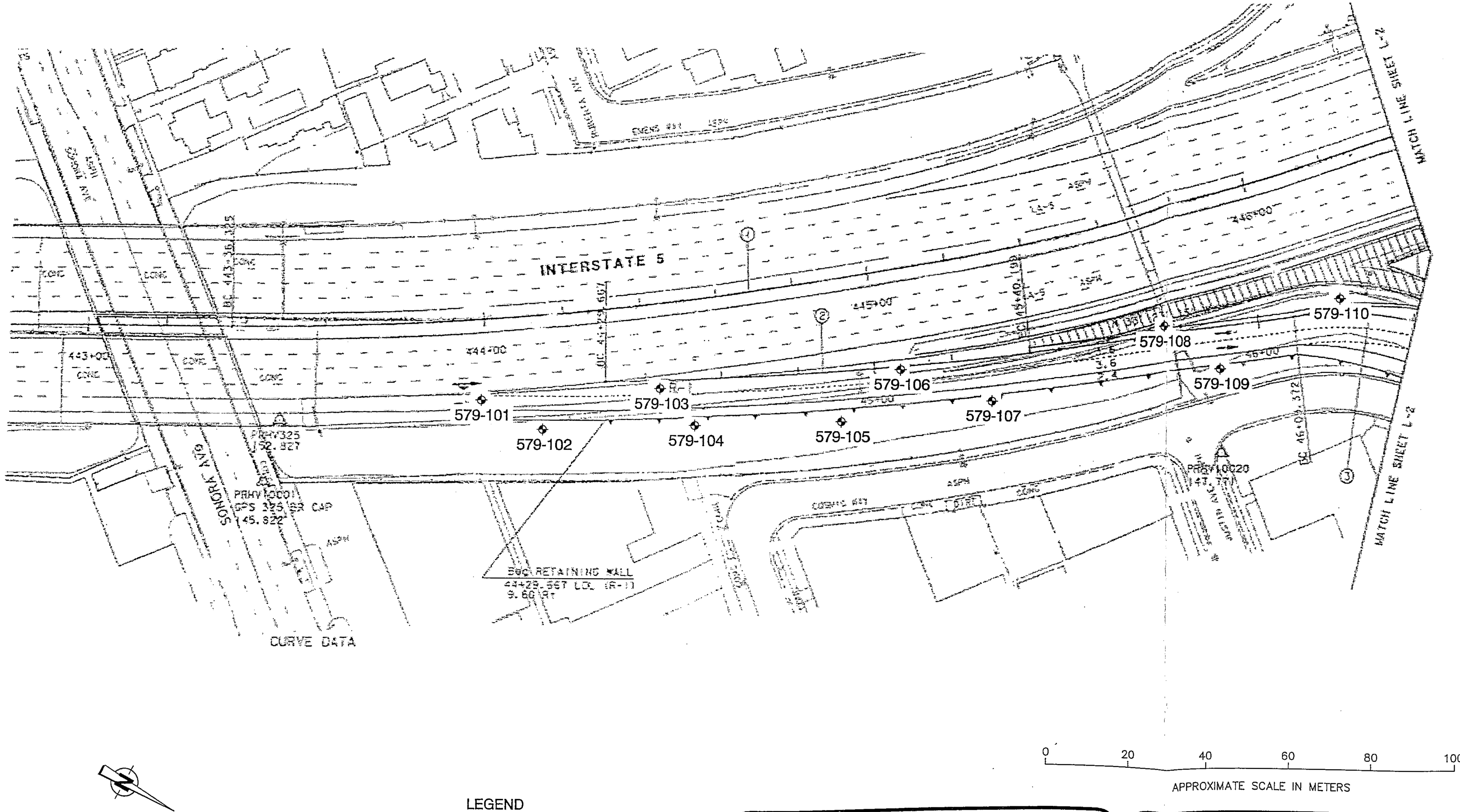
204268-B1.DWG

Ninyo & Moore

SITE LOCATION MAP

INTERSTATE 5 / WESTERN AVENUE INTERCHANGE
TO NO. 07-1786A1-QV (KP44.3 TO 45.3)
SONORA AVENUE TO
ALLEN AVENUE UNDERCROSSINGS
GLENDALE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
204268001	1/2003	1



LEGEND

579-110 APPROXIMATE LOCATION OF EXPLORATORY BORING

Ninyo & Moore

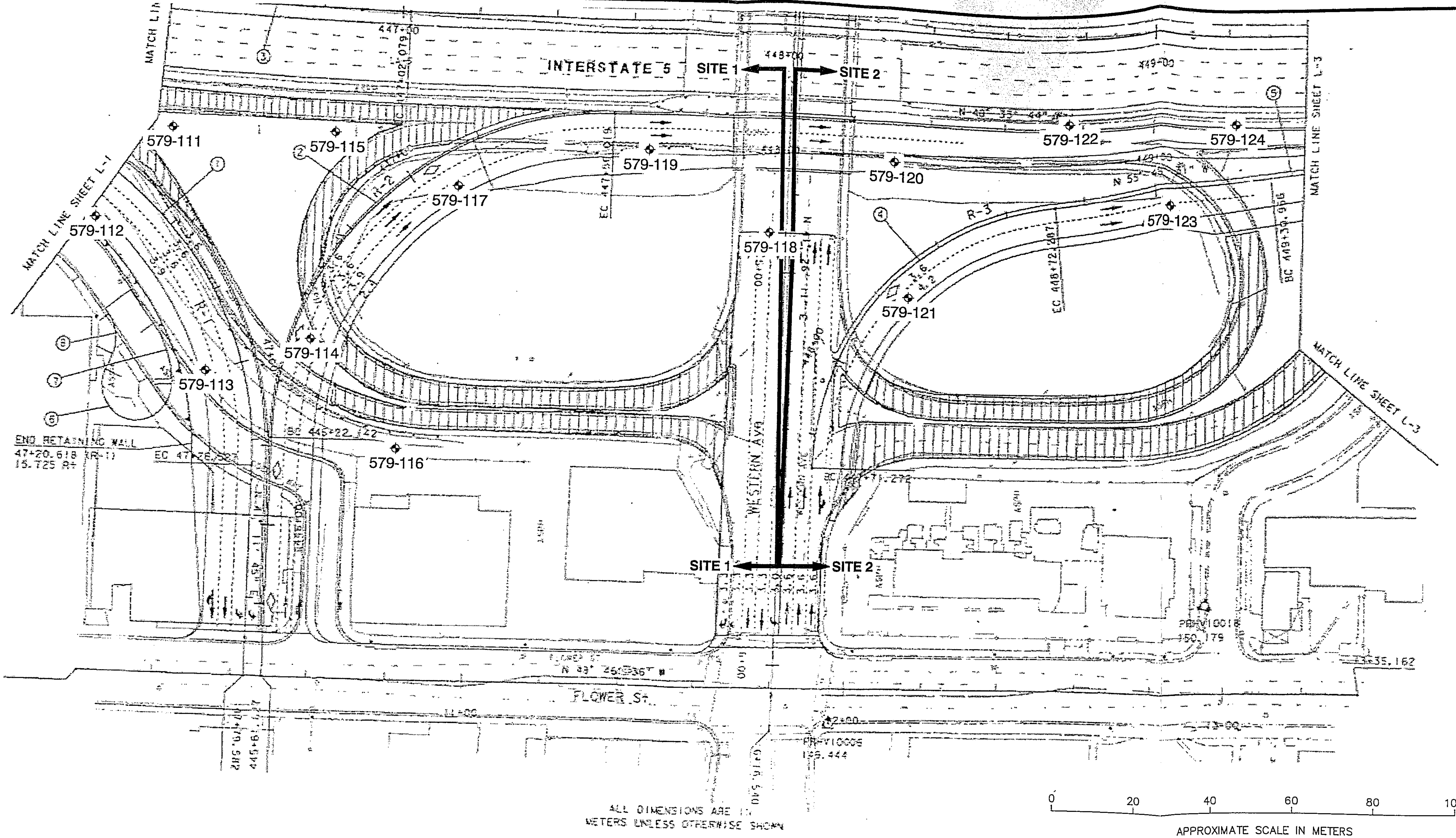
BORING LOCATION MAP LAYOUT L-1

INTERSTATE 5 / WESTERN AVENUE INTERCHANGE
TO NO. 07-1786A1-QV (KP44.3 TO 45.3)
SONORA AVENUE TO
ALLEN AVENUE UNDERCROSSINGS
GLENDALE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
204268001	1/2003	L-1 of L-3

204268-B2.DWG

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.



LEGEND

579-124 APPROXIMATE LOCATION OF EXPLORATORY BORING

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

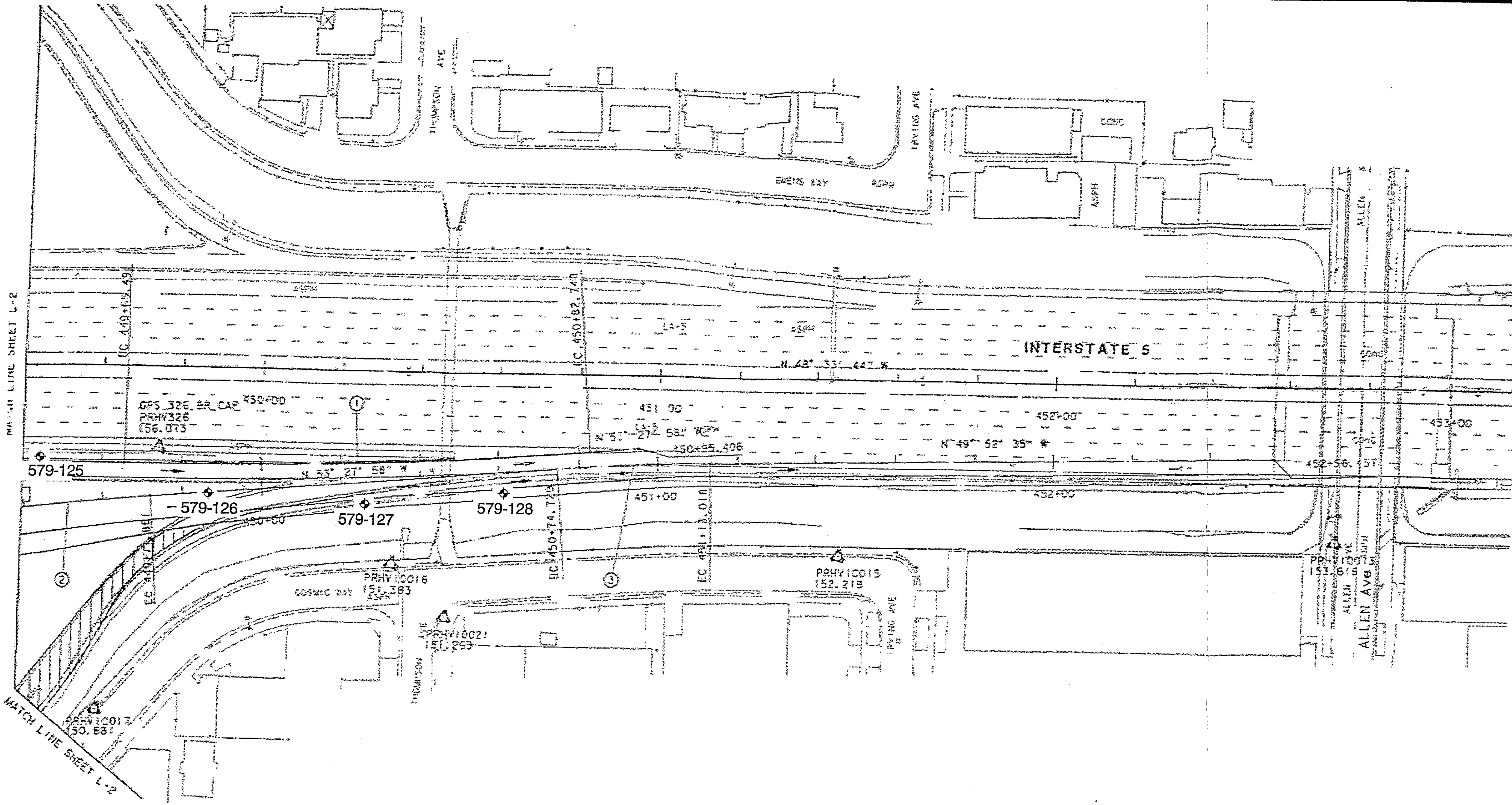
204268-B3.DWG

Ninyo & Moore

BORING LOCATION MAP LAYOUT L-2

INTERSTATE 5 / WESTERN AVENUE INTERCHANGE
TO NO. 07-1786A1-QV (KP44.3 TO 45.3)
SONORA AVENUE TO
ALLEN AVENUE UNDERCROSSINGS
GLENDALE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
204268001	1/2003	L-2 of L-3



0 20 40 60 80 100

APPROXIMATE SCALE IN METERS

LEGEND

579-128 APPROXIMATE LOCATION OF EXPLORATORY BORING

204268-B4.DWG

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

BORING LOCATION MAP LAYOUT L-3

INTERSTATE 5 / WESTERN AVENUE INTERCHANGE
TO NO. 07-1786A1-QV (KP44.3 TO 45.3)
SONORA AVENUE TO
ALLEN AVENUE UNDERCROSSINGS
GLENDALE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
204268001	1/2003	L-3 of L-3

1307-440

DIAZ•YOURMAN

& ASSOCIATES

Geotechnical Services

A Report Prepared for:

Dokken Engineering
11171 Sun Center Drive, Suite 435
Rancho Cordova, California 95670-6113

REVISED GEOTECHNICAL INVESTIGATION
WESTERN AVENUE UNDERCROSSING (53-1079S) KILOMETER POST 44.2/45.2
INTERSTATE 5
GLENDALE, CALIFORNIA
CALTRANS DISTRICT 7, LOS ANGELES COUNTY
EA 07-1786A1

Project No. 296-05

by

Allen M. Yourman, Jr.
Geotechnical Engineer 925

REGISTERED PROFESSIONAL ENGINEER
ALLEN MILES YOURMAN JR.
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July 12, 2002
(Revised May 8, 2003)

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LIST OF FIGURES

1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Diaz•Yourman & Associates (DYA) for the proposed widening of one of the bridges of the Western Avenue Undercrossing at Interstate 5 (I-5) in Los Angeles County, California. Dokken Engineering authorized this work by a contract agreement dated February 1, 2002.

1.1 PROJECT DESCRIPTION

1.1.1 Background

The project will consist of widening the existing bridge for the northbound collector road for I-5 at the Western Avenue Undercrossing. The bridge will be extended to the east by approximately 4.5 meters. The Western Avenue Undercrossing is located at kilometer post 44.2/45.2. A site vicinity map for the project is shown on Figure 1-1.

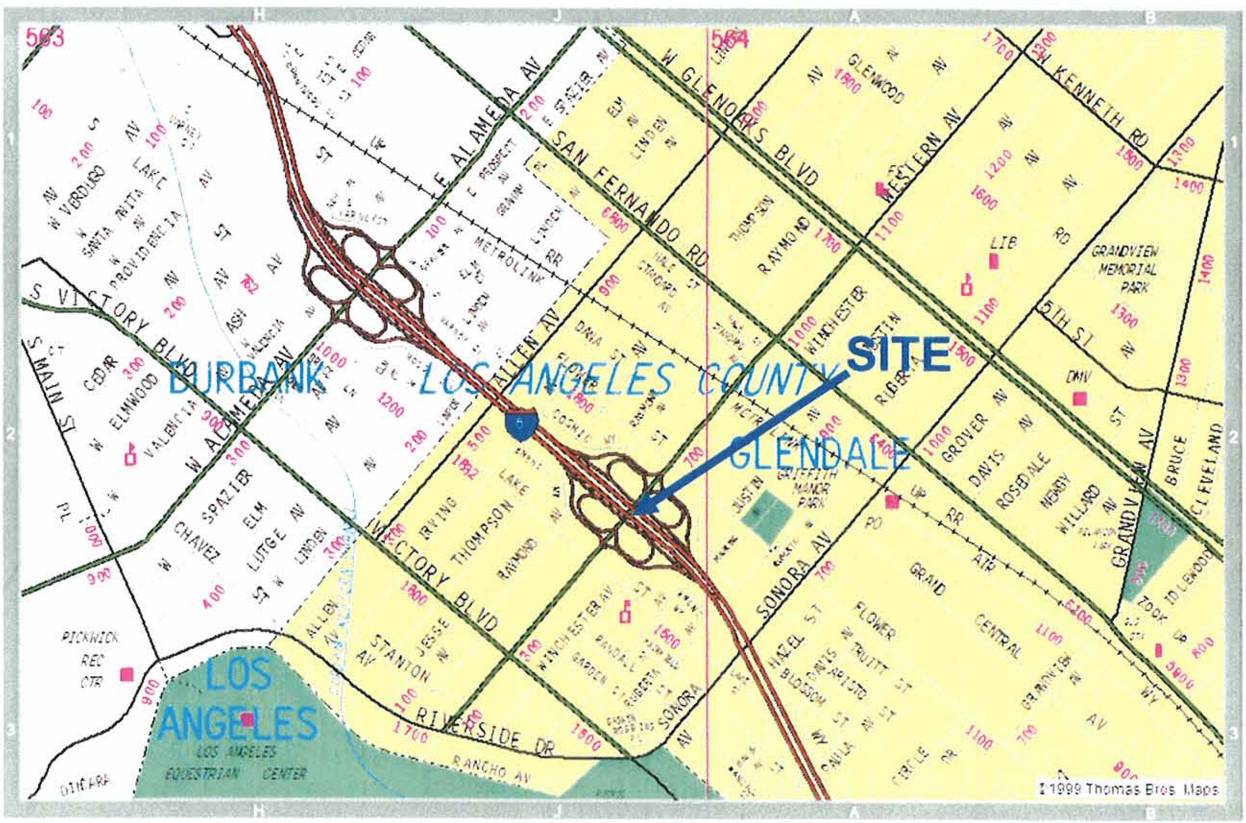


Figure 1-1 VICINITY MAP

1.1.2 Proposed Improvements and Existing Facilities

The location of the proposed widening is shown on Figure 1-2. The existing bridge structure (Bridge 53-1079S) is approximately 10.3 m wide (2 lanes) and 32 m long and serves as an on-ramp to the North Bound I-5 (collector road). Other separate bridge structures for the I-5 undercrossing are located to the west of this structure. The two-span bridge is supported on one center bent and two abutments. Retaining walls, up to 7 m high, are located on each abutment. The bridge abutments and center bent are supported on Raymond tapered piles as shown on the as-built general plan (Caltrans, 1956b). The minimum pile tip diameter is 200 mm. The pile tip elevations are between 141.7 m (minimum) and 137.8 m (maximum) mean sea level (MSL), resulting in pile lengths between 7.3 and 11.6 m.

The existing piles (Alternative Z as shown on the as built pile details [Caltrans, 1956c]) are 45 ton Raymond tapered piles. Although the plans refer to these piles as cast-in-place, the Raymond piles are driven into place using a mandrel inside a steel shell. After driving, the mandrel is removed and the steel shell filled with concrete.

The existing bridge deck elevation is near 155.3 m MSL. Western Avenue is approximately 26 m wide with the top of pavement near elevation 149 m MSL.

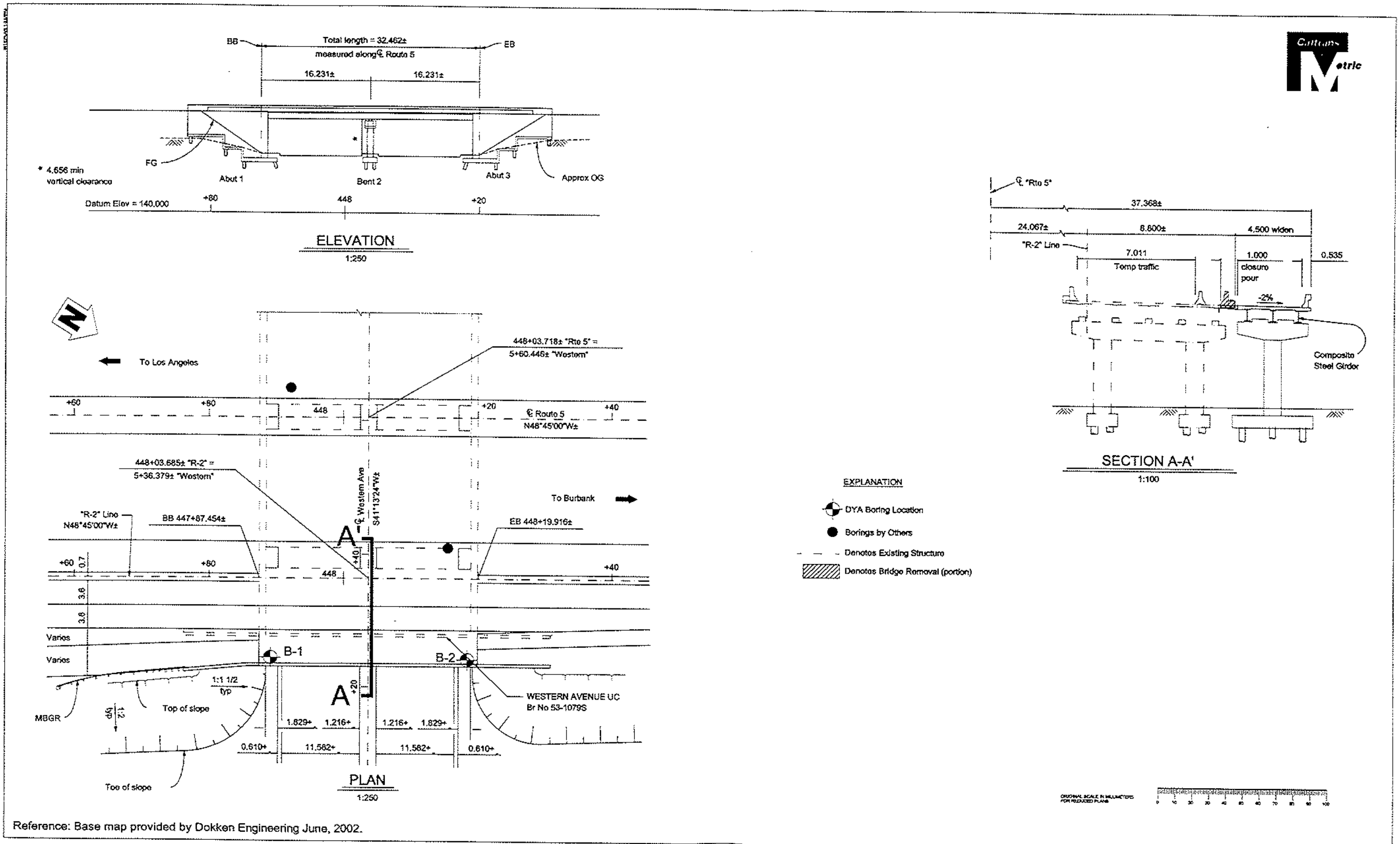
The proposed bridge widening will be 32.4 m long and 4.5 m wide. Top of deck is near 155.3 m MSL resulting in a 4.6 m minimum clearance above Western Avenue. The bridge widening section will be supported on the center bent and on each abutment. Retaining walls up to approximately 7 m high are proposed on the east side of the approach embankments.

1.2 PURPOSE AND SCOPE

The purpose of DYA's investigation was to provide geotechnical input for the design of the proposed widening. The scope of our services consisted of:

- Reviewing data.
- Conducting a field investigation.
- Performing laboratory tests on selected samples.

- Performing engineering analyses to develop conclusions and recommendations regarding the following:
  - Seismic criteria
  - Site preparation and grading
  - Foundation type and allowable bearing capacity
  - Estimated total and differential foundation settlements
  - Resistance to lateral loads
  - Vertical and lateral earth pressures
  - Corrosion potential
- Preparing this report.



Reference: Base map provided by Dokken Engineering June, 2002.

Figure 1-2 SITE PLAN

2.0 DATA REVIEW, FIELD INVESTIGATION, AND LABORATORY TESTING

2.1 DATA REVIEW

Our understanding of the project was based on discussions with Dokken Engineering, review of the general plans prepared by Dokken Engineering, review of the as built plans and Log of Test Borings (LOTB) for the existing bridge, and review of existing information for the bridge provided by Dokken Engineering. We reviewed California Department of Conservation, Division of Mines and Geology (CDMG) maps to check for the presence of known faults on the site and Caltrans maps for peak bedrock acceleration. A list of the documents reviewed is presented in the bibliography (Section 7).

2.2 FIELD INVESTIGATION

The field investigation was conducted on April 26, 2002 and consisted of drilling two soil borings. The boring locations are shown on Figure 1-2. The borings were located near the proposed abutments to provide data for the foundation design. Because of the site access constraints, borings were not drilled through the approach embankments. The boring depths, approximately 18 m, were selected to extend to the depth of significant influence of the proposed foundation loads (approximately 6.5 m below the existing pile tip elevations) and to investigate liquefaction potential. Details of the field investigation, including sampling procedures, boring logs, and the LOTB, are presented in Appendix A.

2.3 LABORATORY TESTING

The soil samples collected from the borings were reexamined in the laboratory to substantiate field classifications. Selected soil samples were tested for moisture content, dry density, grain-size distribution, percent passing the No. 200 sieve, Atterberg limits, shear strength, compaction characteristics, resistance (R-value) and corrosion potential (pH, electrical resistivity, soluble chlorides, and soluble sulfates). The soil samples tested are identified on the boring logs. Laboratory test data are summarized on the boring logs in Appendix A and presented on individual test reports in Appendix B.

3.0 SITE CONDITIONS

3.1 CLIMATIC CONDITIONS

The range of average climatic conditions near the site area is shown in Table 3-1.

Table 3-1 SUMMARY OF AVERAGE CLIMATIC CONDITIONS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Maximum Temperature (°F)	66.9	68.8	70.3	74.0	76.6	81.7	88.7	89.3	87.2	81.1	73.4	67.9	77.2
Average Minimum Temperature (°F).	41.6	43.6	45.6	49.0	53.4	57.1	60.9	61.3	59.2	53.3	45.9	41.7	51.0
Average Total Precipitation (mm)	3.37	3.72	3.00	1.20	0.27	0.08	0.01	0.12	0.20	0.47	1.60	2.25	16.30

Notes:

- Climatic conditions are for reporting station located at Burbank Valley Pump Plant, California, approximately 1.5 km west of the site and obtained from Western Regional Climate Center, Internet Web page.
- Period of Record – December 1, 1939 to December 31, 2001.

3.2 GEOLOGY AND FAULTING

The site is situated on alluvial deposits at the southeast corner of the San Fernando Valley, between the Verdugo Mountains on the northeast and the Santa Monica Mountains to the southwest. Granitic rocks of Mesozoic age are exposed along the flanks of both of these mountain ranges at their proximity to the site (Dibblee, 1991; Hitchcock and Wills, 2000).

The near-surface alluvial soils beneath the site consist of Holocene age flood plain and stream deposits of the Los Angeles River and its tributaries (Hoots and Kew, 1930; Dibblee, 1991). Older, coarse-grained alluvial fan deposits derived from the Verdugo Mountains to the northeast underlie these sediments. The alluvial section is likely underlain, at a depth on the order of 100 to 200 feet, by granitic crystalline bedrock.

No known active faults are reported to cross or trend towards the site. The closest potentially active fault to the site is the Verdugo fault, along the base of the Verdugo Mountains, 2.4 km to the northeast of the site (Dibblee, 1991). However, the controlling fault for the proposed project is the Malibu Coast-Santa Monica-Hollywood Raymond (MMR) fault located approximately 5 km south of the site.

3.3 SUBSURFACE CONDITIONS

Based on the results of this and previous investigations, the subsurface consisted of alluvial soils consisting of silty sands and sandy silts to the bottom of the borings, approximately 18 m below ground surface (bgs) of Western Avenue. The existing approach embankments were not investigated and were assumed to consist of compacted fill in accordance with Caltrans requirements. A 3- to 4-m thick dense to very dense sand layer was encountered in the borings approximately 13 to 15 m bgs. Firm to hard 1- to 2-m thick clay layers were encountered approximately 5.5 and 17 m bgs. The consistency of the silty sands and sandy silts generally increased from soft or loose near the ground surface to stiff or dense with increasing depth. Equivalent standard penetration test (SPT) and SPT blow counts ranged from 4 blows per 30 cm near the ground surface to 40 to 50 blows per 30 cm, 13 to 15 m bgs.

The subsurface soils at the site will classify as seismic soil profile S_d in accordance with Caltrans Seismic Design Criteria (Caltrans SDC, 2001).

3.4 GROUNDWATER

Groundwater was encountered during drilling at depths of 17.7 to 18 m bgs, corresponding to approximately elevation 131 m MSL. Based on the well monitoring data at the State well No. 1N14W13R01 between January 1957 and October 2001, the historical high groundwater was estimated to be elevation 135.3 m MSL. Therefore, the design groundwater level was assumed to be elevation 135.3 m MSL.

3.5 SOIL PROFILE AND ENGINEERING PARAMETERS

The generalized soil profile and geotechnical design parameters for engineering analyses are summarized in Table 3-2.

Table 3-2 SUMMARY OF GEOTECHNICAL PROFILE AND PARAMETERS

SOIL TYPE	APPROXIAMTE ELEVATION (m)	TOTAL UNIT WEIGHT (kN/m^3)	SHEAR STRENGTH PARAMETERS		
			Effective		Total
			Cohesion (kPa)	Friction Angle (degrees)	Undrained Shear Strength (kPa)
Sandy Silt (ML) and Silty Sand (SM)	148.7 to 143.3	18	5	32	--
Clay (CL)	143.3 to 141.5	20	14	27	53
Sandy Silt (ML) and Silty Sand (SM)	141.5 to 135	18	5	32	--
Silty Sand (SM) to Poorly Graded Sand (SP)	135 to 133	20	5	36	--
Clay (CH)	133 to 131	19	14	27	95
Silty Sand (SM) to Poorly Graded Sand (SP)	<131	20	5	38	--

Notes:
- Simplified soil types.
- For the sandy silt (ML) and silty sand (SM), the total and effective shear parameters were assumed to be the same.
- kN/m^3 = kiloNewton per cubic meter.
- kPa = kiloPascal

4.0 CONCLUSIONS AND RECOMMENDATIONS

The primary geotechnical considerations for the proposed widening include foundation support for the proposed 4.5 m bridge widening and associated retaining walls. We recommend that the proposed bridge and retaining structures be founded on driven piles.

4.1 SEISMIC HAZARDS

4.1.1 Surface Rupture

The potential for ground surface rupture is considered low because no known active faults are mapped on the site. However, ground rupture or cracking can occur due to earthquakes at locations where faults have not been mapped.

4.1.2 Maximum Credible Earthquake

The controlling active fault for the proposed project is the Malibu Coast Santa Monica Hollywood Raymond (MMR) fault, which is a reverse-oblique type fault located approximately 5 km south of the site. This fault may generate a maximum credible earthquake (MCE) of magnitude 7.5 based on the Caltrans Seismic Hazard Map (Caltrans, 1996).

4.1.3 Ground Acceleration

The site horizontal peak bedrock acceleration (PBA) according to Caltrans Seismic Hazard Map and the Seismic Design Criteria (SDC) (Caltrans, 2001) report was estimated to be approximately 0.6g.

The site design acceleration response spectrum (ARS) was derived by modifying the average SDC report ARS curve for soil type S_d, a PBA of 0.60 g, and an earthquake magnitude of 7.25 ± 0.25 as follows:

- Fault type effect for reverse-oblique fault, 10 percent increase over all periods of acceleration response spectrum from SDC.
- Near-fault effects as recommended in Caltrans SDC, additional 20 percent increase in response spectra for period equal to and greater than one second; no changes for periods less than 0.5 second; and a linear interpolation in between.

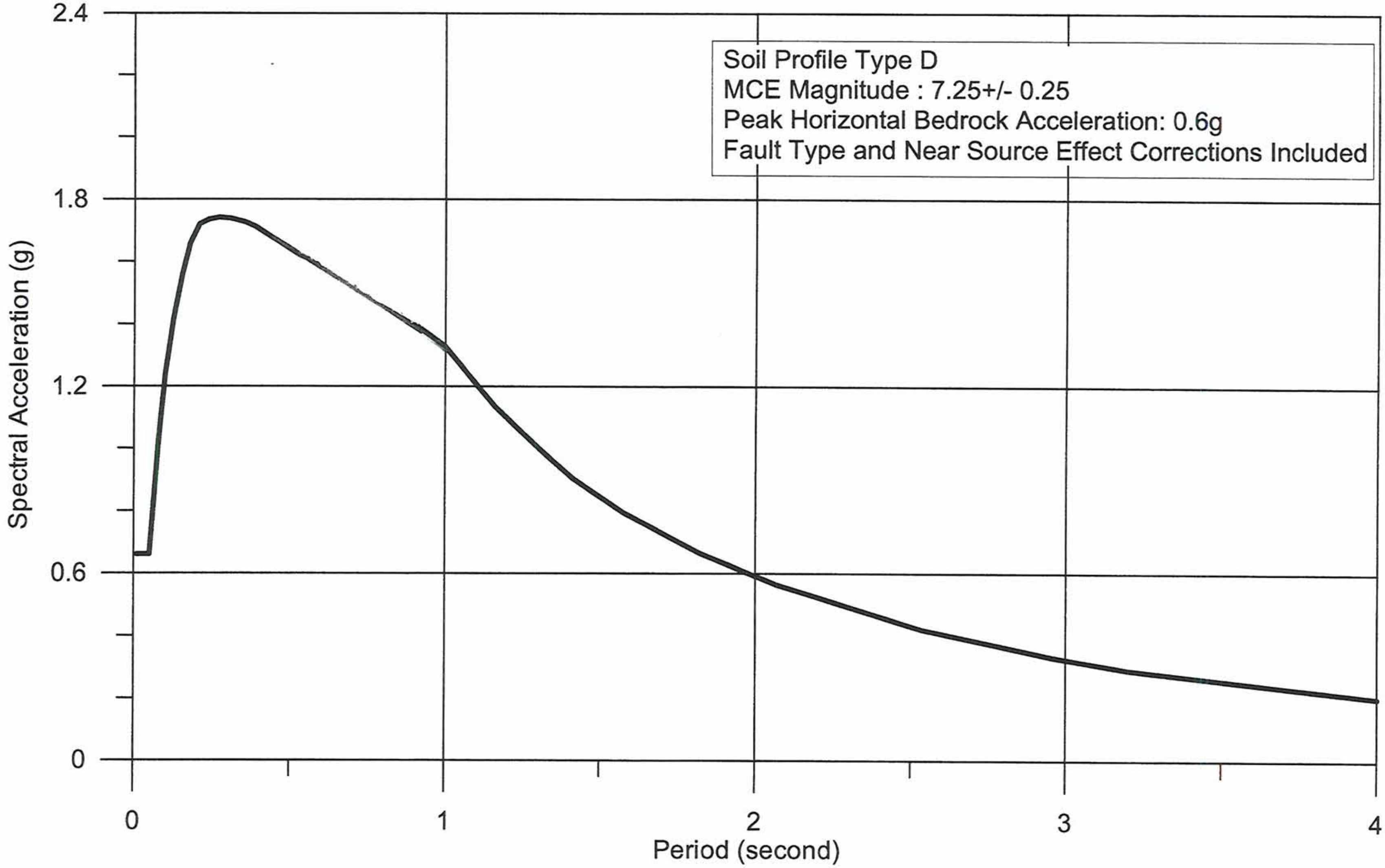
The final corrected site design ARS curve is summarized in Table 4-1 and is shown on Figure 4-1.

Table 4-1 ACCELERATION SPECTRA COORDINATES

T (sec)	SPECTRAL ACCELERATION (g)
0.01	0.660
0.05	0.660
0.0788	1.032
0.0993	1.240
0.124	1.412
0.1537	1.561
0.1774	1.657
0.2078	1.720
0.2364	1.735
0.271	1.742
0.3092	1.738
0.3545	1.727
0.3864	1.712
0.4421	1.677
0.5328	1.619
0.6495	1.568
0.7866	1.474
0.8681	1.423
0.9981	1.330
1.1617	1.134
1.3074	0.996
1.4112	0.904
1.5747	0.795
1.8193	0.666
2.0678	0.565
2.5369	0.421
2.9542	0.334
3.2028	0.293
3.4628	0.263
4	0.204

4.1.4 Liquefaction and Seismic Settlement

The project site was located within potential liquefaction zones on the State of California seismic hazard zones. The likelihood of liquefaction was assessed using procedures presented in the National Center for Earthquake Engineering Research (NCEER) guidelines (1997). Because the depth to groundwater was greater than approximately 14 m bgs liquefaction potential at this site is considered low. However, non-saturated sands can also settle under cyclic loading. We estimate that seismic induced settlement would be approximately 12 mm for the design level earthquake. Seismically induced settlement may occur within 30 days of seismic events.



Reference: Caltrans Seismic Design Criterea, December 2001, Version 1.2, Figure B-8, Page B-10

Figure 4-1 - ACCELERATION RESPONSE SPECTRUM, FIVE PERCENT DAMPING

g:\datafls\projects\200\296-05\calcs\ARS Curve.grf [MMR sheet]

4.2 SCOUR POTENTIAL

Because the bridge spans a paved roadway undercrossing and there is no existing streambed, scour is not an issue for the proposed project.

4.3 SOIL CORROSION POTENTIAL

Corrosion test results are summarized in Table 4-2 and presented in Appendix B. A corrosive environment is not present to piling and concrete substructures in accordance with Section 3-1 of the Caltrans Memo to Designers (1996b).

Table 4-2 SUMMARY OF CORROSION RESULTS

	CRITERIA FOR CORROSIVE ENVIRONMENT[1]	RANGE IN VALUES
pH	<5.5	7.9-8.6
Water-Soluble Sulfate Content (ppm)	>2,000	64-141
Water-Soluble Chloride Content (ppm)	>500	154-179
Minimum Electrical Resistivity (ohms-cm)	<1,000	1,583-4,182
Notes: 1. Caltrans 1996b. • See Appendix B for summary of test results.		

4.4 FOUNDATION DESIGN

4.4.1 Pile Foundations

We recommend that the proposed bridge widening be supported on class 625 driven piles. The specified pile tip elevations presented in Table 4-3, correspond to the dense to very dense sand layer, encountered at an average elevation of approximately 136 m MSL. The methods used to calculate axial pile capacities are described in Appendix C. The calculations are also presented in Appendix C.

Table 4-3 SUMMARY OF PILE DATA

LOCATION	PILE TYPE[1]	DESIGN LOADING (kN)	NOMINAL RESISTANCE		DESIGN TIP ELEVATIONS[2] (m)	SPECIFIED TIP ELEVATIONS (m)
			Compression (kN)	Tension (kN)		
Abutment 1	Class 625	425	850	0	134 (1); 137 (3)	134
Bent 2	Class 625	600	1200	0	133 (1); 139 (3)	133
Abutment 3	Class 625	425	850	0	134 (1); 137 (3)	134

Notes:
1. Alternatives V, X, Y only; Alternative W is excluded in type selection.
2. Design tip elevation is controlled by the following demands: (1) Compression, (2) Tension, (3) Lateral.

The minimum center-to-center spacing between the piles should not be less than three pile diameters (sides of a square pile). For piles spaced at three pile diameters or greater, a group efficiency reduction factor need not be applied.

4.5 SETTLEMENT

4.5.1 Approach Embankment Fill

The proposed approach embankment will be approximately 7 m high. The static settlement of the subsurface soils due to the approach embankment was calculated to be approximately 25 mm. Most of the static settlement is expected to occur within 30 days of completion of earthwork operations. Settlement calculations are provided in Appendix E.

Estimates of the seismic settlement were provided in Section 4.1.4.

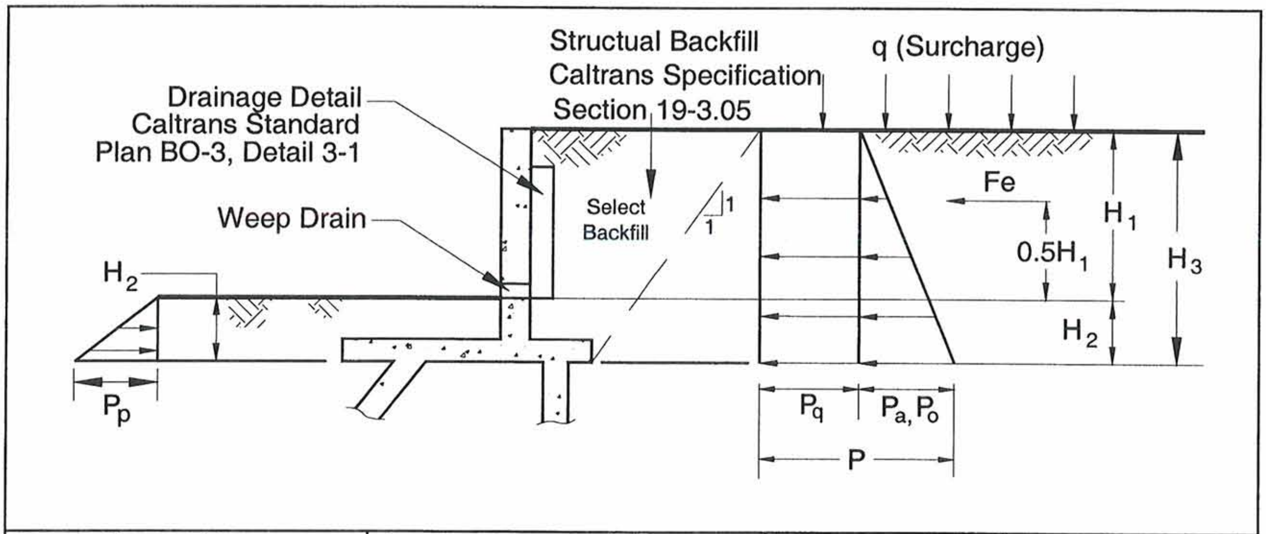
4.5.2 Deep Foundations

The settlement of the deep foundations designed and constructed in accordance with the recommendations provided in Section 4.4.1 is estimated to be less than 12 mm. Most of this settlement should occur shortly after application of the structural loads. Differential settlement between the pile supports is estimated to be less than 12 mm. Settlement calculations are provided in Appendix E.

4.6 LATERAL EARTH PRESSURES AND RESISTANCE TO LATERAL LOADS

4.6.1 Lateral Pressures

The abutment walls may be designed for lateral earth pressures shown on Figure 4-2. Restrained wall conditions should be assumed when the wall movement is limited. If the wall is allowed to deflect at the top by at least 6 mm for every 3 m of vertical wall height, the free-to-rotate conditions may be assumed. The earth pressures provided on Figure 4-2 assume a level surface behind the wall for a distance greater than the wall height and a positive drainage system behind the wall. For sloping surface behind or in front of the wall, the pressures should be modified in accordance with Figure 4-2. The estimated seismic wall force is also presented on Figure 4-2.



$P_p = 60\ H_2 \leq 200$ kPa	Cantilever Walls	Restrained Walls
	$P = P_a + P_q = 6\ H_3 + 0.3q$	$P = P_o + P_q = 9\ H_3 + 0.5q$
	$Fe = 3\ H_1^2$	$Fe = 6\ H_1^2$

Notes:

- All values of height (H) in meters, pressure (P) and surcharge (q) in kiloPascals and force (F) in kiloNewtons.
- P_p, P_a, and P_o are the passive, active, and at-rest earth pressures, respectively. Fe is the incremental seismic force.
- P_q is the incremental surcharge pressure applied to dead loads. Fe is a force and is in addition to the active and at-rest pressures. Below groundwater, active and at-rest pressure should be reduced by 50 percent and hydrostatic pressure should be added to active and at-rest pressures. P_p should be reduced by 50 percent below the groundwater.
- For 1V:2 H slopes above the wall, increase the active and at-rest pressures by 50 percent; for 1V:1.5 H slope, increase the active and at-rest pressures by 100 percent.
- For 1V:2 H descending slopes below the wall, decrease the passive earth pressure by 25 percent; for 1V:1.5 H descending slope, decrease the passive earth pressure by 50 percent.
- Neglect the upper 300 mm for passive pressure unless the surface is contained by a pavement or slab.
- Seismic coefficient was used to calculate Fe (50 percent of peak ground acceleration [PGA] for cantilever walls and 75% of PGA for restrained walls).

Figure 4-2 LATERAL EARTH PRESSURES

4.6.2 Resistance to Lateral Loads

Lateral loads can be resisted by batter or vertical piles.

4.6.2.1 Batter Piles

Batter piles provide lateral resistance equal to the horizontal component of the axial capacity. The angle of batter for the proposed foundation type corresponds to a 3V:1H slope (vertical to horizontal).

4.6.2.2 Vertical Piles

The behavior of piles under lateral loads was evaluated using the p-y curve approach as described in Appendix D. Calculations are presented in Appendix D. Graphical summaries presenting the deflection, moment, and shear along the pile length for various loading conditions are included in Appendix D. A tabular summary of lateral pile analysis results is provided in Table 4-4.

Table 4-4 SUMMARY OF LATERAL PILE ANALYSIS RESULTS

LOCATION	PILE DIAMETER (m)	PILE LENGTH (m)	AXIAL LOAD (kN)[1]	LATERAL LOAD (kN)[1]	MAX. PILE HEAD DEFLECTION (mm)	MAX. MOMENT (kN.m)	MAX. SHEAR (kN)	DEPTH TO MAXIMUM POSITIVE MOVEMENT (m)
Abutment	0.305	15.2	405	62	3	-58.4	62	2
Bent 2	0.305	15.2	587	129	9	40	129	1.8
Abutment 3	0.305	15.2	405	62	3	-58.4	62	2
Note: Values represent "fixed head" condition.								

4.6.2.3 Ultimate Lateral Capacity of Abutment Walls

Ultimate lateral capacity for wall heights of 1.7 m and greater should be taken as 239 kPa. For wall heights less than 1.7 m, we recommend that the ultimate capacity be obtained by multiplying 239 kPa value with the ratio (H/1.7) where H is the wall height in meters. Passive pressures are mobilized when the deflection of the wall reaches 0.01 H meters.

4.7 APPROACH SLABS

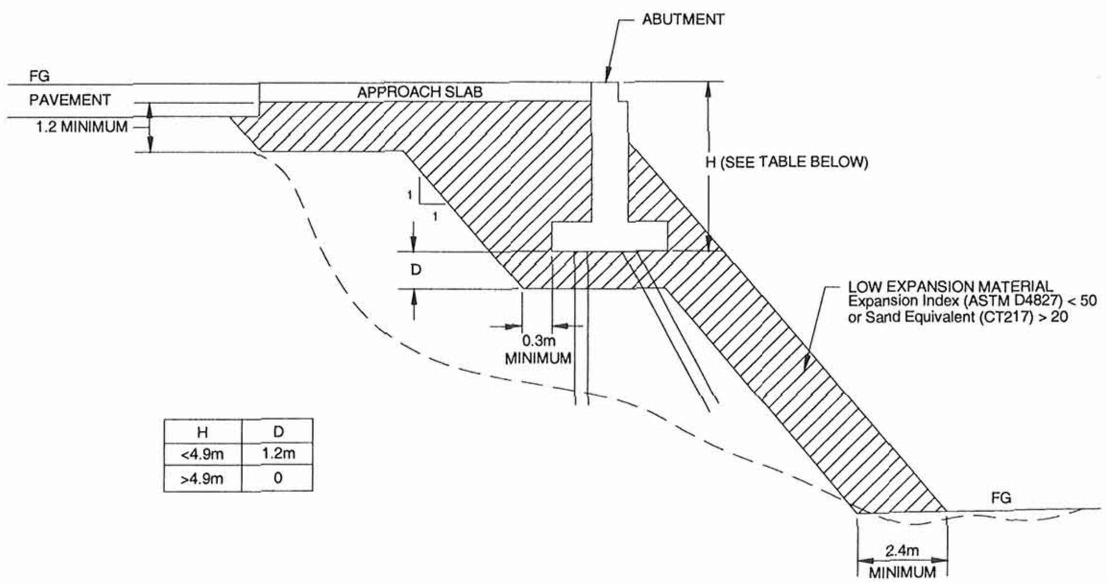
The height of approach fill will be approximately 4.8 m. Long-term settlement potential due to static loading conditions at the abutments is presented in Section 4.5.1. The need for approach slabs should be evaluated in accordance with Section 5-3 of Caltrans Memo to Designers Manual (1995a), considering the type of pavement to be used, the usage, and importance.

4.8 EARTHWORK

Earthwork should be performed in accordance with Sections 6 and 19 of Caltrans Standard Specifications (1999b). Site grading may generally be accomplished with conventional construction equipment. The fill should be compacted using equipment as defined by the Caterpillar Performance Handbook (1998) or equivalent.

4.8.1 Low Expansive Soils in Approach Embankment

Low expansive soils (expansion index [EI] less than 50) should be used within the approach embankment in accordance with standard Caltrans requirements as shown on Figure 4-3. The near surface soils at the site were predominantly sandy silts and will likely meet the criteria for low expansive material.



H	D
<4.9m	1.2m
>4.9m	0

Figure 4-3 LOW EXPANSIVE SOILS IN BRIDGE EMBANKMENT

4.8.2 Excavations and Temporary Slopes

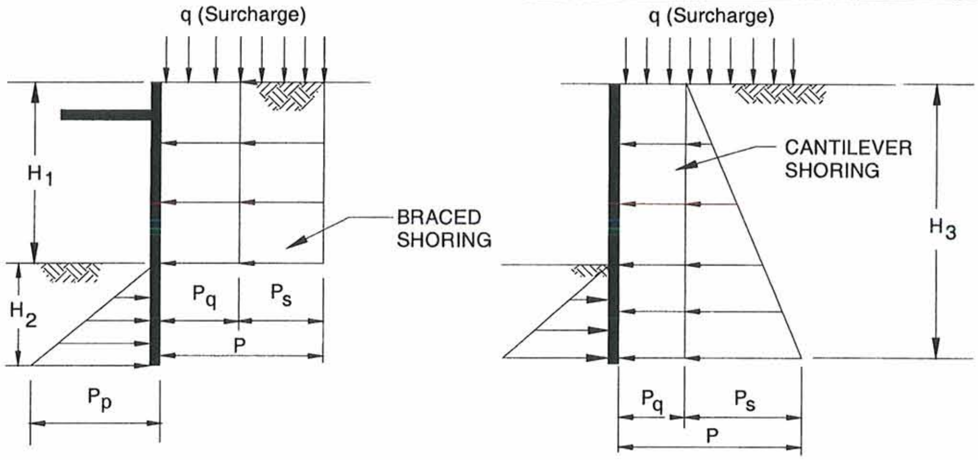
Temporary excavations may be required for construction and should be sloped or will required shoring.

All soils are susceptible to caving, depending on conditions. Stability of temporary excavations is a function of several factors, including the total time the excavation is exposed, steepness, moisture conditions, weather, soil type and consistency, and contractor's operations. The contractor is responsible for excavation safety. The soils encountered in the borings indicate that most of the materials are highly susceptible to caving.

The support of temporary excavations is the responsibility of the contractor. Shoring is usually designed as either cantilever (unbraced) or braced. Cantilevered shoring is commonly constructed by either using soldier piles with lagging placed between piles or using sheet piles. If soldier piles and lagging are used, continuous lagging will be required. Difficulty in installing the lagging due to caving cohesionless soils should be anticipated. Recommended minimum temporary shoring design criteria are provided on Figure 4-4.

Shoring should be monitored for lateral and vertical movement. If large deflections (greater than 0.5 percent of the shoring height) are noted, the bracing systems should be checked and strengthened as needed. If tension cracks appear in the ground surface adjacent to the shoring, the cracks should be monitored and sealed to prevent infiltration of water, and the significance of the cracks should be immediately evaluated.

In addition, the contractor should strictly adhere to any requirements of Caltrans and applicable federal and state health and safety regulations such as those of the Occupational Safety and Health Administration (OSHA). In accordance with OSHA regulations, the near-surface onsite soils are classified as Type C.



BRACED SHORING

$P = P_q + P_s$

$= 0.5q + 6H_1$

(15 kPa minimum)

CANTILEVER SHORING

$P = P_q + P_s$

$= 0.5q + 9H_3$

(15 kPa minimum)

$P_p = 60\, H_2 < 200$ kPa

Notes:

- All values of height (H) in m, pressure (P) and surcharge (q) in kPa.
- Value for temporary excavations using flexible walls.
- For traffic surcharge, assume no less than a 5 kPa uniform horizontal pressure along the top 3 m.
- Earth pressures assume no hydrostatic pressures.
- Values assume soil behind shoring is Caltrans standard fill material.

Figure 4-4 LATERAL EARTH PRESSURES FOR TEMPORARY STRUCTURES

4.8.3 Permanent Slopes

Permanent compacted fill slopes should be planned no steeper than 1V:2H. The slopes should be planted and/or protected to reduce surface erosion.

4.9 CONSTRUCTION CONSIDERATIONS

4.9.1 Pile Installation

Criteria for pile driving should be established after the contractor's pile-hammer-cushion system is known and dynamic pile wave equation (WEAP) analyses are performed. Standard Engineering News Record (ENR) driving formulas presented by Caltrans along with design service loads presented in Table 4-3 can be used for preliminary estimates on whether pile driving can be terminated at the specified tip evaluation. Predrilling is not required. The piles should not be terminated above the specified tip elevation unless pile driving refusal is met. If refusal is met above the design tip elevation, the depth of predrill on subsequent piles should be adjusted so the refusal is met at design tip elevation. The piles should not be driven more than 0.3 m beyond specified pile tip. If a pile does not meet driving criteria, the pile should be redriven after a set-up time of at least 10 hours.

4.9.2 Site Access

The site is accessible to conventional construction equipment.

4.9.3 Excavability

The site material may be excavated using conventional construction equipment.

5.0 PLAN REVIEW, CONSTRUCTION OBSERVATION, AND TESTING

DYA should be retained to review the project plans and specifications to check them for conformance with the intent of our recommendations.

During construction, we should be retained to provide the following services:

1. Observation of site preparation and pile installation.
2. Observation and testing of fill, backfill quality, placement, moisture content, and compaction.
3. Consultation on geotechnical matters.

These services would enable DYA to observe field conditions as they are exposed to check them for conformance with the assumptions we have made in developing conclusions and recommendations. They would also allow us to provide compatible recommendations regarding conditions found during construction. The field and laboratory tests would allow us to confirm that material quality, compaction, moisture content, and strength are consistent with the parameters upon which our recommendations were based.

6.0 LIMITATIONS

This report was prepared for this project in accordance with generally accepted geotechnical engineering practice common to the local area. No other warranty, expressed or implied, is made.

The analyses and recommendations contained in this report are based on the literature review, field investigation, and laboratory testing conducted in the area. The results of the field investigation indicate subsurface conditions only at the specific locations and times, and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between such locations. Although subsurface conditions have been explored as part of the investigation, we have not conducted chemical laboratory testing on samples collected, nor evaluated the site with respect to the presence or potential presence of contaminated soil or groundwater conditions.

The validity of our recommendations is based in part on assumptions about the stratigraphy. Observations during construction can help confirm such assumptions. If subsurface conditions different from those described are noted during construction, recommendations in this report must be reevaluated. We should be retained to observe earthwork construction in order to help confirm that our assumptions and recommendations are valid or to modify them accordingly. DYA cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

This report is intended for use only for the project described. In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by Diaz•Yourman & Associates. We are not responsible for any claims, damages, or liability associated with the interpretation of subsurface data or reuse of the subsurface data or engineering analyses without our express written authorization.

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APPENDIX A
FIELD INVESTIGATION

APPENDIX A – FIELD INVESTIGATION

The field investigation for the proposed project consisted of drilling two borings (Borings B-1 and B-2) to depths of approximately 18 m. The approximate boring locations are shown on Figure 1-2.

Layne Christenson, Inc. drilled borings on April 26, 2002 with a truck-mounted drill rig using hollow-stem auger drilling techniques. Our field engineer observed the drilling operations and collected drive samples for visual examination and subsequent laboratory testing. Drive samples were collected with a 61-mm-inside-diameter (76-mm-outside-diameter) modified California split-barrel sampler lined with brass tubes, and a standard split-spoon penetration test sampler (SPT) with dimensions in accordance with ASTM 3550 and 1586, respectively. Both samplers were driven with a 63-kg hammer falling 760 mm. An automatic trip hammer was used to raise the hammer. The samplers were driven 450 mm or to refusal at each sampling depth. Blow counts were noted for each 150-mm increment. Bulk samples were obtained from the drill cuttings.

Soils encountered in the borings were classified in general accordance with the ASTM Soil Classification System (ASTM D2487 and 2488), summarized on Plate A1. Boring logs presented on Plates A2 through A7 were prepared from visual examination of the soil samples, cuttings obtained during drilling operations, and results of laboratory tests. The actual and equivalent SPT blow counts are presented in the boring logs. The blows required to drive the modified California sampler were converted to equivalent SPT values by multiplying by 0.5 (N=0.5 x modified California blows per 300 mm). A log of test boring sheet is attached at the end of this appendix.

Groundwater was encountered during the field investigation at depths of 17.7 and 18 m below ground surface (bgs.) Borings were backfilled with cuttings.

Borings were located in the field using a measuring wheel from known locations.

SOIL CLASSIFICATION SYSTEM-ASTM D2487

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

"Push" Sampler

Split Barrel "Drive" Sampler With Liner

Standard Penetration Test (SPT) Sampler

Bag Sample

Concrete/Rock Core

Groundwater Surface

NP = Nonplastic
EIT = Expansion Index Test
SG = Specific Gravity
SE = Sand Equivalent
CBR = California Bearing Ratio
CD = Consol. Drained Comp.
CU = Consol. Undrained Comp.
UU = Undrained, Unconsol. Comp.
RV = R-Value
CHEM = Chemical Analysis
DS = Direct Shear
CON = Consolidation
SA = Grain size; HYD = Hydrometer
COMP= Compaction Test
[PID] Reading in ppm above background

SPT "N" = Uncorrected equivalent blow count for last foot of driving (set to 100 for driving refusal)
Consistency based on Caltrans criteria as listed on the Log of Test Borings (LOTB)

KEY TO LOG OF BORINGS

Caltrans Western Avenue UC
Project No. 296-05

PLATE **A1**

Template: DYLG1M; Prj ID: 296-05.GPJ

BORING LOCATION (m): Station 5+24.2, L 14.6 m	**ELEVATION AND DATUM (m):** 148.7 MSL
DRILLING EQUIPMENT: CME-75	**DRILLING METHOD:** Hollow Stem Auger
BORING DIAMETER (cm): 20	**BORING DEPTH (m):** 18.1
DATE STARTED: 4/26/02	**DATE COMPLETED:** 4/26/02
SPT HAMMER DROP: 76 cm **WT:** 0.62 kN	**DRIVE HAMMER DROP:** 76 cm **WT:** 0.62 kN
LOGGED BY: SN **CHECKED BY:** SS	**DRIVE SAMPLER DIAMETER (cm)** **ID:** 6.1 **OD:** 7.6

Elevation (meter)	Depth (meter)	Blows per 15 cm	SPT N Blows/30 cm	Field Unc. Comp. Str. (kPa)	DESCRIPTION	Dry Density (kN/m^3)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
					ASPHALT CONCRETE - 200 mm						
					SANDY SILT (ML); olive brown, moist, soft, fine- to medium-grained sand, low plasticity, trace fine gravel, trace coarse gravel, trace mica						COMP RV
148							14	NP	NP	50	
	1				dark olive brown, nonplastic, trace mica						
		2 2 2	4				14	NP	NP	61	
										53	
147	2										
146	3	6 8 12	10		light olive brown, stiff, no gravel	15.6	8				
145	4				SILTY SAND (SM); olive brown, moist, medium dense, fine-grained sand, trace mica						
		4 6 8	14							32	
144	5										
143	6	4 8 8	8		LEAN CLAY with SAND (CL); light olive gray, moist, firm, medium plasticity, trace fine gravel	16.7	21	34	13	80	DS
142	7				CLAYEY SAND (SC); olive brown, moist, loose, fine- to coarse-grained sand, trace fine gravel						
		3 4	10								

LOG OF BORING B- 1

Caltrans Western Avenue UC

Project No. 296-05

PLATE

A2

Template: DYLG1M; Prj ID: 296-05.GPJ

Elevation (meter)	Depth (meter)	Sampler	Symbol	Blows per 15 cm	SPT N Blows/30 cm	Field Unc. Comp. Str. (kPa)	DESCRIPTION	Dry Density (kN/m^3)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
141	8			6									
140	9			17 25 47	36		SILTY SAND (SM); dark yellowish brown, moist, dense, fine- to coarse-grained sand, trace fine gravel	19.1	10	NP	NP	28	
139	10						SANDY SILT (ML); light olive gray, moist, hard, low plasticity, fine-grained sand, trace fine gravel						
				12 14 25	39								
138	11						POORLY GRADED SAND with SILT (SP-SM); light olive brown, moist, dense, fine- to coarse-grained sand, trace fine gravel					12	
137	12			10 12 27	19		SILT (ML); olive brown, moist, very stiff, low plasticity	15.9	27				
136	13						POORLY GRADED SAND with SILT (SP-SM); light yellowish brown, moist, dense, fine- to medium-grained sand						
135	14			13 21 23	44							6	
134	15			30 50/ 15 cm	>50		olive gary, very dense, trace fine gravel	15.5	4				DS
133	16						FAT CLAY with SAND (CH); olive, moist, very stiff, high plasticity, fine-grained sand						
132				5 7 9	16				33	50	23	82	
	17						FAT CLAY (CH); very dark gray, moist, very stiff, high plasticity						
131							SILTY SAND (SM); yellowish brown, reddish brown, wet,						

Template: DYLG1M; Prj ID: 296-05.GPJ

Elevation (meter)	Depth (meter)	Sampler	Symbol	Blows per 15 cm	SPT N Blows/30 cm	Field Unc. Comp. Str. (kPa)	DESCRIPTION	Dry Density (kN/m^3)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
	18			42 50/ 13 cm	>50		∇ very dense, fine- to coarse-grained sand, few fine gravel					27	
							Bottom of boring at 18.1 meters. Groundwater encountered at 18 meters during drilling. Boring backfilled with cuttings.						
130	19												
129	20												
128	21												
127	22												
126	23												
125	24												
124	25												
123	26												
122	27												
121													

LOG OF BORING B- 1

Caltrans Western Avenue UC

Project No. 296-05

PLATE

A4

Template: DYLG1M; Prj ID: 296-05.GPJ

BORING LOCATION (m): Station 5+24.2, R 14.6 m	**ELEVATION AND DATUM (m):** 148.7 MSL
DRILLING EQUIPMENT: CME-75	**DRILLING METHOD:** Hollow Stem Auger
BORING DIAMETER (cm): 20	**BORING DEPTH (m):** 18.7
DATE STARTED: 4/26/02	**DATE COMPLETED:** 4/26/02
SPT HAMMER DROP: 76 cm **WT:** 0.62 kN	**DRIVE HAMMER DROP:** 76 cm **WT:** 0.62 kN
LOGGED BY: SN **CHECKED BY:** SS	**DRIVE SAMPLER DIAMETER (cm)** **ID:** 6.1 **OD:** 7.6

Elevation (meter)	Depth (meter)	Sampler	Symbol	Blows per 15 cm	SPT N Blows/30 cm	Field Unc. Comp. Str. (kPa)	DESCRIPTION	Dry Density (kN/m^3)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							ASPHALT CONCRETE - 200 mm						
							SANDY SILT (ML); dark olive brown, moist, firm, nonplastic, trace fine gravel		15	NP	NP	65	CHEM
									20	NP	NP	64	
148	1												
147	2			4 5 6	5			16.8	15				
146	3			3 4 8	12		olive brown, stiff						
145	4						SILTY SAND (SM); light olive brown, moist, loose, fine-grained sand						
144	5			4 7 10	8			16.5	13			34	
							LEAN CLAY with SAND (CL); light olive brown, moist, stiff, low plasticity, fine-grained sand						
143	6			3 5 7	12				20	33	13	75	
142	7						SILTY SAND (SM); olive gray, moist, loose, fine- to medium-grained sand, trace fine gravel						

LOG OF BORING B- 2

Caltrans Western Avenue UC

Project No. 296-05

PLATE

A5

Elevation (meter)	Depth (meter)	Sampler	Symbol	Blows per 15 cm	SPT N Blows/30 cm	Field Unc. Comp. Str. (kPa)	DESCRIPTION	Dry Density (kN/m^3)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
141	8			5 8 9	8			18.3	15			48	DS
140	9			5 6 8	14		medium dense, decreased fines content						CHEM
139	10												
138	11			19 22 27	24		no gravel	18.6	11				
137	12						SILT (ML); olive brown, moist, very stiff, low plasticity						
136	13			3 7 11	18								
							POORLY GRADED SAND (SP); light yellowish brown, moist, medium dense, fine- to coarse-grained sand, trace fine gravel						
135	14			13 18 23	20			15.3	5			2	
134	15												
133	16			16 21 23	44		olive gray, dense, fine- to medium-grained sand						
132	17			18	12		olive, yellowish brown, medium dense						
				10			SILT (ML); light olive brown, moist, stiff, low plasticity, trace fine-grained sand		31	37	8	88	
				13			FAT CLAY (CH); very dark olive gray, moist, stiff, high plasticity	13.6	39	56	27	98	
131							∇						

LOG OF BORING B- 2

Page 2 of 3

Caltrans Western Avenue UC

Project No. 296-05

PLATE

A6

Elevation (meter)	Depth (meter)	Sampler	Symbol	Blows per 15 cm	SPT N Blows/30 cm	Field Unc. Comp. Str. (kPa)	DESCRIPTION	Dry Density (kN/m^3)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
	18	X		17 37 50	>50		POORLY GRADED SAND with SILT (SP-SM); olive gray, reddish brown, wet, very dense, fine- to coarse-grained sand, trace fine gravel					10	
130							Bottom of boring at 18.7 meters. Groundwater encountered at 17.7 meters during drilling. Boring backfilled with cutting and surface patched with cold patch asphalt.						

Elevation scale: 130, 129, 128, 127, 126, 125, 124, 123, 122, 121

Depth scale: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27

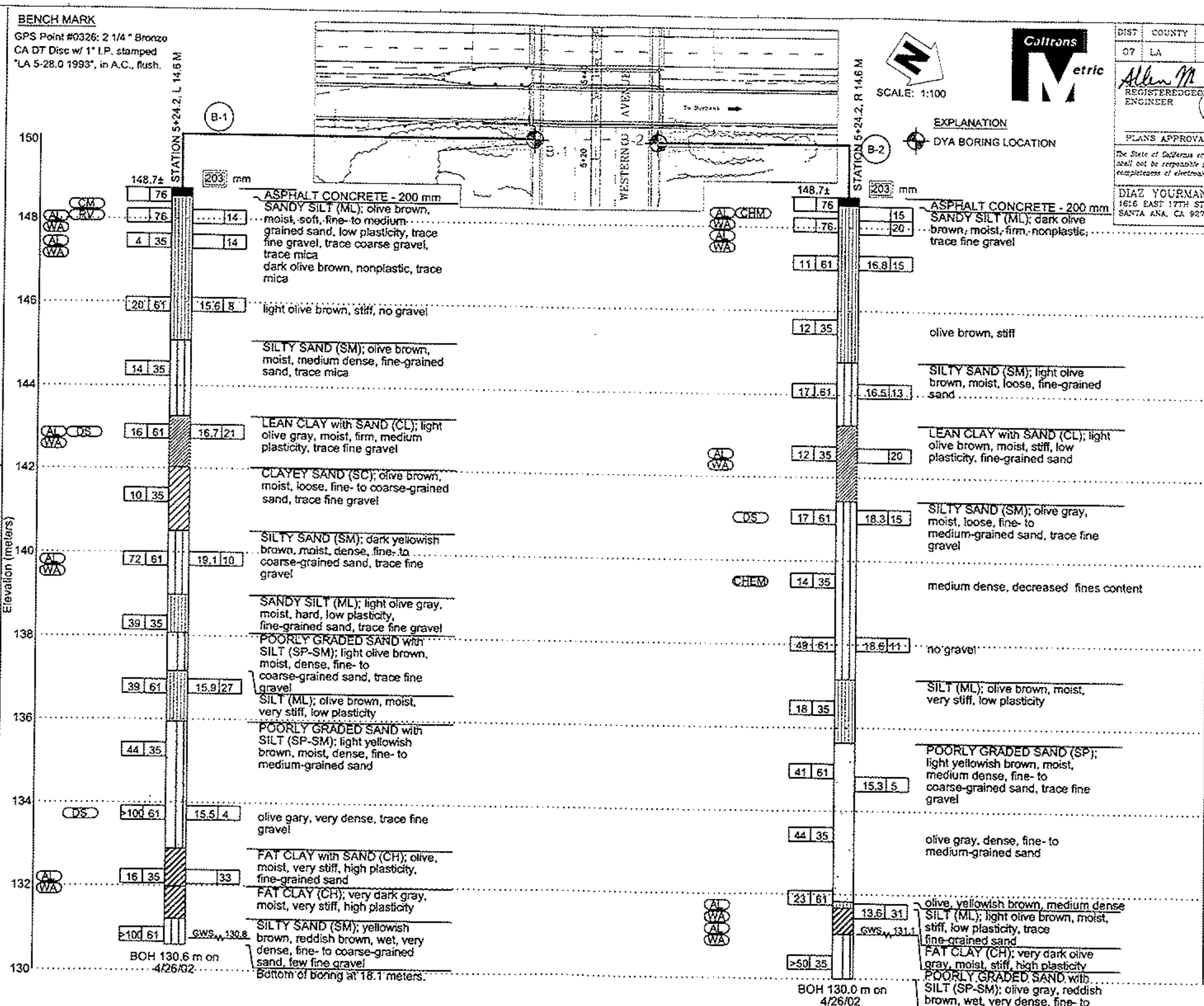
LOG OF BORING B- 2

Caltrans Western Avenue UC

Project No. 296-05

PLATE

A7



Reference: Base map provided by Dokken Engineering June, 2002.

LEGEND OF BORING OPERATIONS

Cone Penetrometer dimensions and testing procedures are in accordance with ASTM standard D-3441-79 or as noted.

JET BORING	ELECTRONIC CONE PENETROMETER
AUGER BORING (DRY)	57 mm CONE PENETROMETER
TEST PIT	SAMPLE BORING (DRY)
DIAMOND CORE BORING	ROTARY SAMPLE BORING (WET)

LEGEND OF EARTH MATERIALS
According to ASTM D-2487

SYMBOLS LETTER	LETTER
GW	ML
GP	CL
GM	OL
GC	MH
SW	CH
SP	OH
SM	PT
SC	

SOIL TESTS

(AL) ATTERBERG LIMITS · (C) CONSOLIDATION · (HYD) HYDROMETER ANALYSIS · (WA) WASH #200 · (UU) TRIAXIAL
(CA) CORROSION ANALYSIS · (DS) DIRECT SHEAR · (PP) POCKET PENETROMETER · (SA) SIEVE ANALYSIS · (CHM) CHEMICAL ANALYSIS
(CP) COMPACTION · (EI) EXPANSION INDEX TEST · (RV) R-VALUE · (SE) SAND EQUIVALENT

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

GRANULAR Penetration Index	GRANULAR Consistency	COHESIVE Penetration Index	COHESIVE Consistency
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		>30	Hard

NOTE: Classification of earth material as shown on this sheet is based upon visual inspection and/or mechanical analysis where indicated.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL
07	LA	5	44.2/45.2	1	1

REGISTERED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

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

REGISTERED PROFESSIONAL ENGINEER ALLEN M. YOURMAN, JR. No. 925 Exp. 12-31-04 GEOTECHNICAL STATE OF CALIFORNIA

DIAZ YOURMAN ASSOCIATES
1616 EAST 17TH STREET
SANTA ANA, CA 92705-8509

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

SCALE: AS NOTED	VERT DATUM NAVD 88	HORZ DATUM NAD 83	DESIGN BY R. Miller	CHECKED H. Hamzawi
PHOTOGRAMMETRY AS OF:		ALIGNMENT TIES	DETAILS BY K. Dong	CHECKED H. Hamzawi
SURVEYED BY		DRAFTED BY	QUANTITIES BY R. Neves	CHECKED C. Tornaci
FIELD CHECKED BY		CHECKED BY		

DESIGN OVERSIGHT
SIGN OFF DATE
FOUNDATION PLAN SHEET (METRIC) (REV 3/1/99) 298-05\CAD\LOTB.DWG 08-09-02

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Raymond Miller
PROJECT ENGINEER
Field Investigation by: S. Nirenganan

BRIDGE NO. 53-1079S
KILOMETER POST 44.2/45.2

WESTERN AVE UC (WIDEN)
LOG OF TEST BORINGS B-1 AND B-2

CU 07265
EA 07-178601

SHEET 2 OF 13

APPENDIX B
LABORATORY TESTING

APPENDIX B - LABORATORY TESTING

Diaz•Yourman & Associates (DYA) selected soil samples to be tested and the tests to be performed on the samples. Teratest Labs, Inc. (a City of Los Angeles certified testing lab) performed laboratory testing. Laboratory data are summarized on the boring logs and presented on Plates B1 through B11. We have reviewed and concur with the test results and accept full responsibility for their use in our analysis. A summary of the geotechnical laboratory testing is presented in Table B1. Corrosion potential test results are summarized in Table B2.

Table B1 – LABORATORY TESTING SUMMARY

TEST NAME	PROCEDURE	PURPOSE	LOCATION
Percent Passing the No. 200 Sieve	ASTM D1140-92	Classification, index properties	Boring Logs
Moisture Content, Dry Density	ASTM D2216-92	Classification, index properties	Boring Logs
Grain-Size Distribution	ASTM D422-63	Classification, index properties	B1 through B3
Atterberg Limits	ASTM D 4318-93	Expansion potential, classification, index properties	B4 and B5
Direct Shear	ASTM D3080-90	Shear strength	B6 through B8
Compaction	ASTM D1557-91	Earthwork	B9
Resistance (R-) Value	ASTM D2844-69 CTM 301	Pavement thickness design	B10
pH	CTM 532	Corrosion potential	Table B3, Plates B11 and B12
Resistivity	CTM 532	Corrosion potential	Table B3, Plates B11 and B12
Soluble Sulfates	CTM 417-B	Corrosion potential	Table B3, Plates B11 and B12
Soluble Chlorides	CTM 422	Corrosion potential	Table B3, Plates B11 and B12

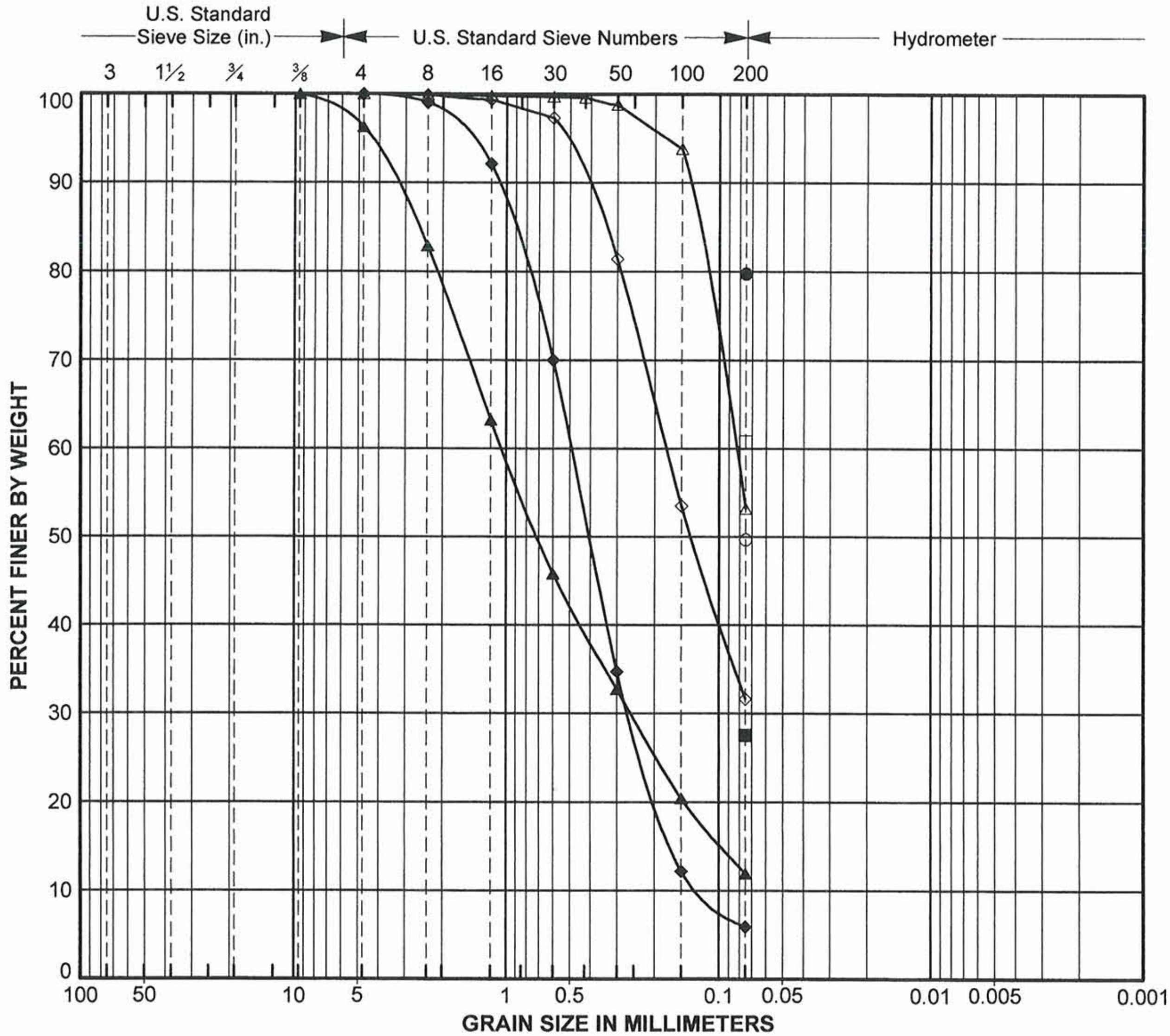
Notes:

- ASTM = American Society for Testing and Materials
- CTM = California (Caltrans) Test Method

Table B2 – CORROSION POTENTIAL TEST RESULTS

Boring No.	B- 2	B- 2
Depth (m)	0 to 1.5	7.6 to 10.7
pH	7.86	8.16
Water-Soluble Sulfate Content (ppm)	141	64
Water-Soluble Chloride Content (ppm)	154	179
Minimum Resistivity (ohms-cm)	1,583	4,182

Template: DY_SIEVE_WIN



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Laboratory Testing by: TeraTest Labs, Inc.

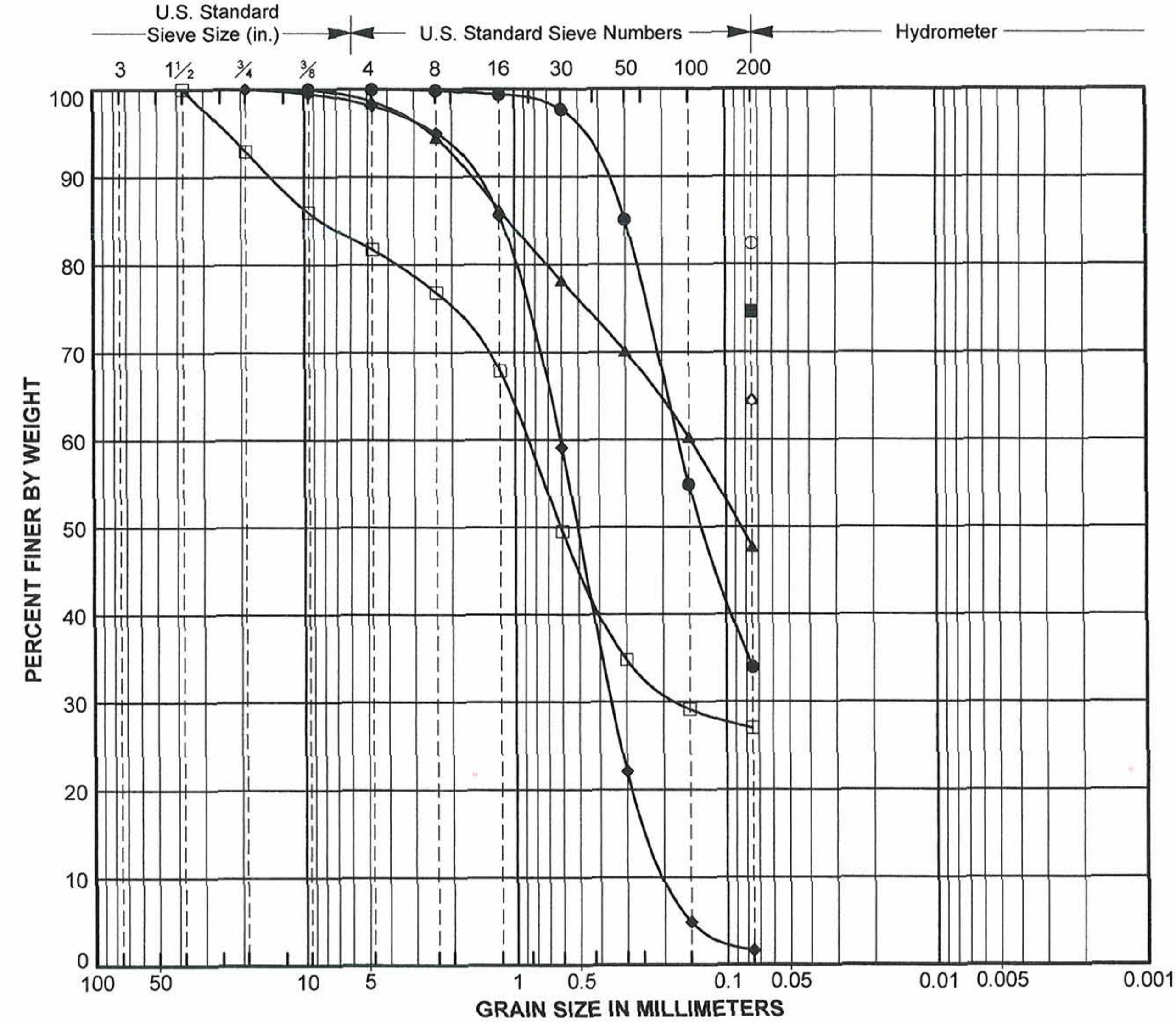
Symbol	Source	Depth (meters)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B- 1	0.6	SANDY SILT (ML)	14	NP	NP	50
□	B- 1	1.2	SANDY SILT (ML)	14	NP	NP	61
△	B- 1	1.5	SANDY SILT (ML)				53
◇	B- 1	4.3	SILTY SAND (SM)				32
●	B- 1	5.8	LEAN CLAY with SAND (CL)	21	34	13	80
■	B- 1	8.8	SILTY SAND (SM)	10	NP	NP	28
▲	B- 1	10.7	POORLY GRADED SAND with SILT (SP-SM)				12
◆	B- 1	13.4	POORLY GRADED SAND with SILT (SP-SM)				6

PARTICLE SIZE ANALYSIS

Caltrans Western Avenue UC
Project No. 296-05

PLATE

B1



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

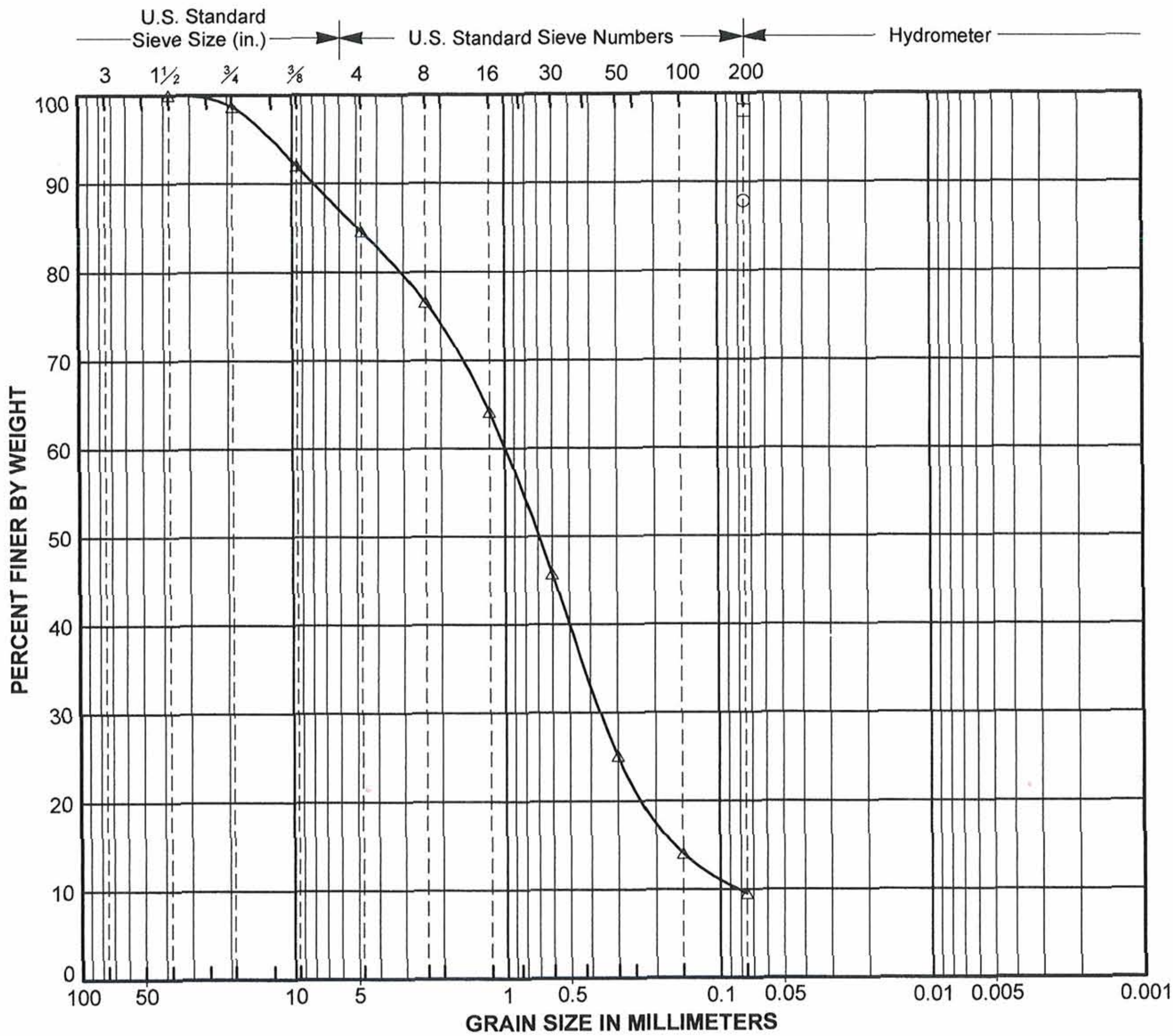
Laboratory Testing by: TeraTest Labs, Inc.

Symbol	Source	Depth (meters)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B- 1	16.5	FAT CLAY with SAND (CH)	33	50	22	82
□	B- 1	17.8	SILTY SAND (SM)				27
△	B- 2	0.3	SANDY SILT (ML)	15	NP	NP	65
◇	B- 2	0.6	SANDY SILT (ML)	20	NP	NP	64
●	B- 2	4.6	SILTY SAND (SM)	13			34
■	B- 2	6.1	LEAN CLAY with SAND (CL)	20	33	13	75
▲	B- 2	7.6	SILTY SAND (SM)	15			48
◆	B- 2	13.7	POORLY GRADED SAND (SP)				2

PARTICLE SIZE ANALYSIS

Caltrans Western Avenue UC
Project No. 296-05

PLATE
B2



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Laboratory Testing by: TeraTest Labs, Inc.

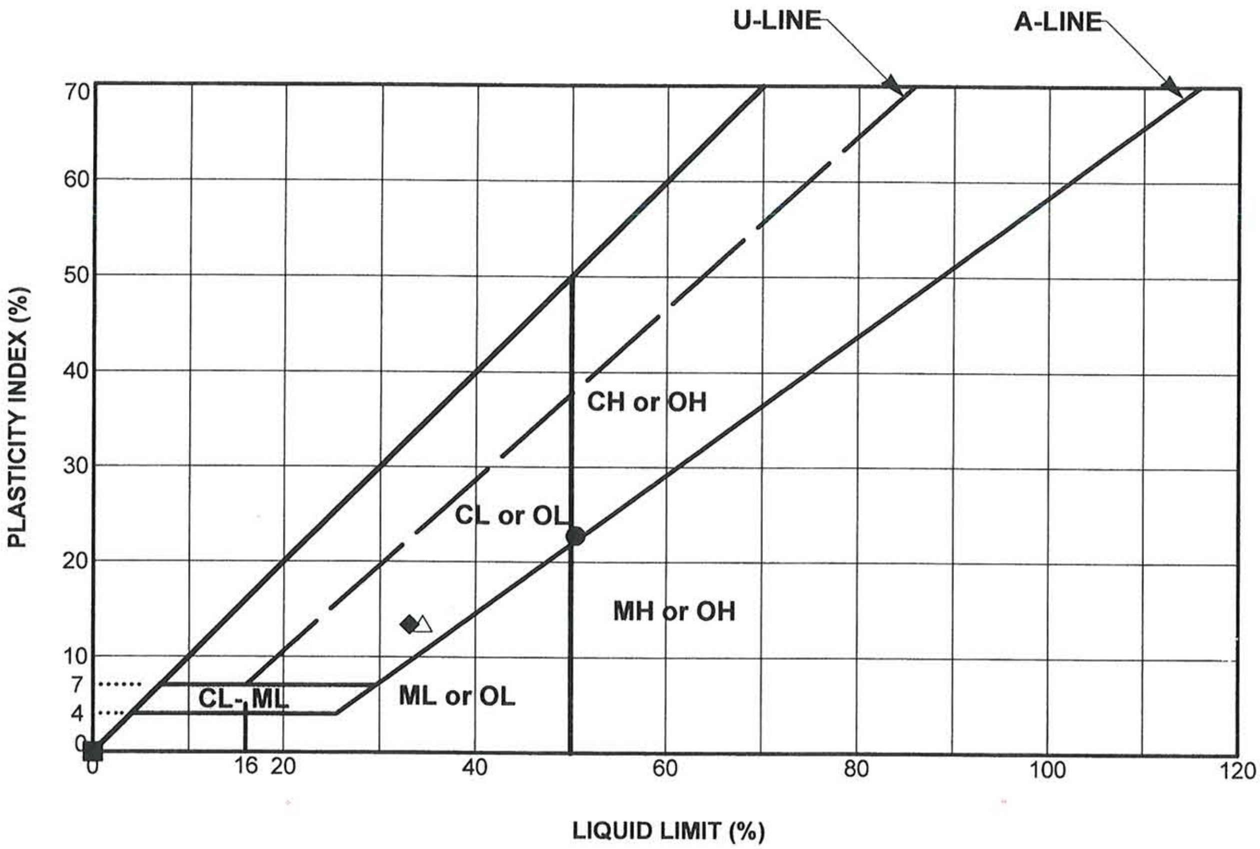
Symbol	Source	Depth (meters)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B- 2	16.9	SILT (ML)	31	37	8	88
□	B- 2	17.1	FAT CLAY (CH)	39	56	26	98
△	B- 2	18.3	POORLY GRADED SAND with SILT (SP-SM)				10

PARTICLE SIZE ANALYSIS

Caltrans Western Avenue UC
Project No. 296-05

PLATE
B3

Template: DY_ATTERBERG_CHART_WIN



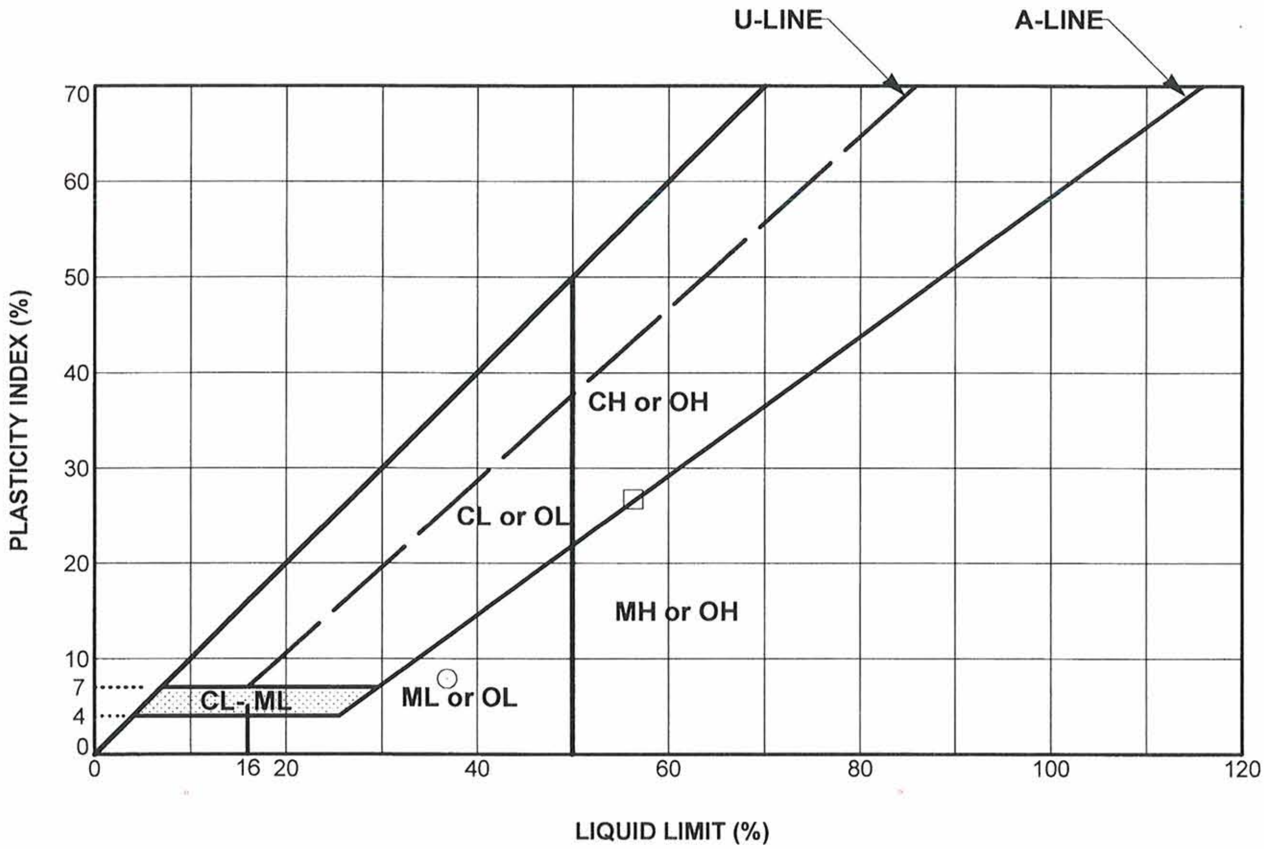
Laboratory Testing by: TeraTest Labs, Inc.

Symbol	Source	Depth (meters)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B- 1	0.6	SANDY SILT (ML)	14	NP	NP	NP	50
□	B- 1	1.2	SANDY SILT (ML)	14	NP	NP	NP	61
△	B- 1	5.8	LEAN CLAY with SAND (CL)	21	34	21	13	80
◇	B- 1	8.8	SILTY SAND (SM)	10	NP	NP	NP	28
●	B- 1	16.5	FAT CLAY with SAND (CH)	33	50	28	22	82
■	B- 2	0.3	SANDY SILT (ML)	15	NP	NP	NP	65
▲	B- 2	0.6	SANDY SILT (ML)	20	NP	NP	NP	64
◆	B- 2	6.1	LEAN CLAY with SAND (CL)	20	33	20	13	75

PLASTICITY CHART

Caltrans Western Avenue UC
Project No. 296-05

PLATE
B4



Laboratory Testing by: TeraTest Labs, Inc.

Symbol	Source	Depth (meters)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B- 2	16.9	SILT (ML)	31	37	29	8	88
□	B- 2	17.1	FAT CLAY (CH)	39	56	30	26	98

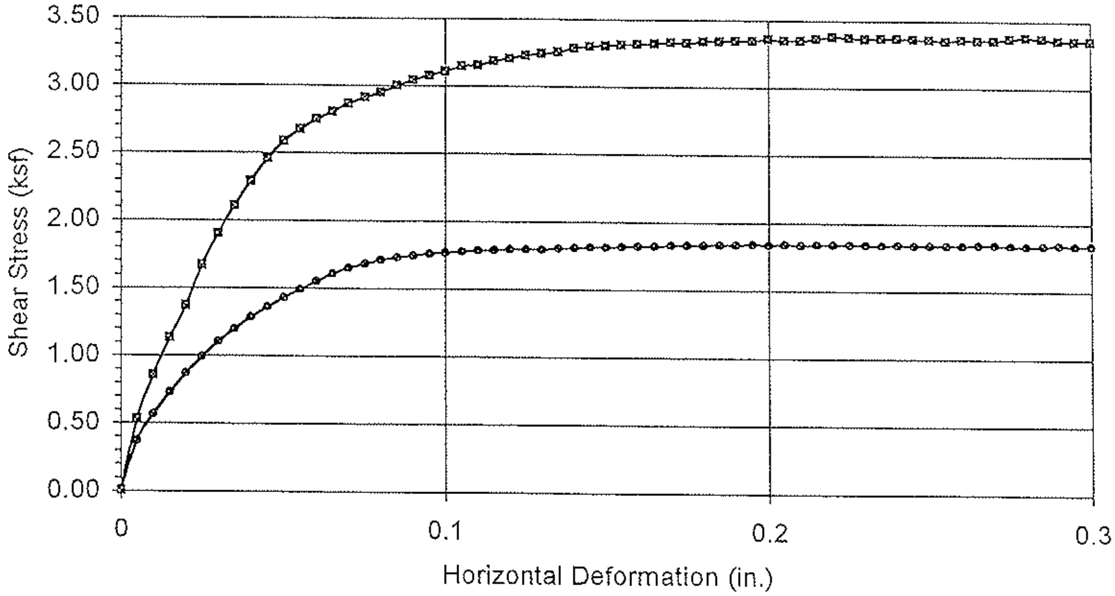
PLASTICITY CHART

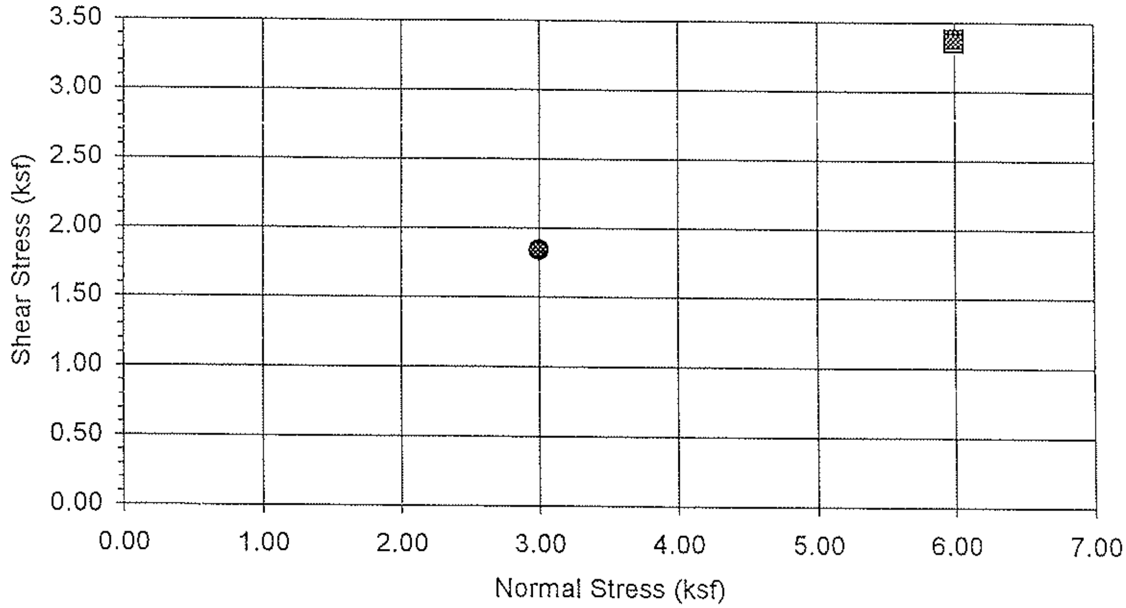
Caltrans Western Avenue UC

Project No. 296-05

PLATE

B5



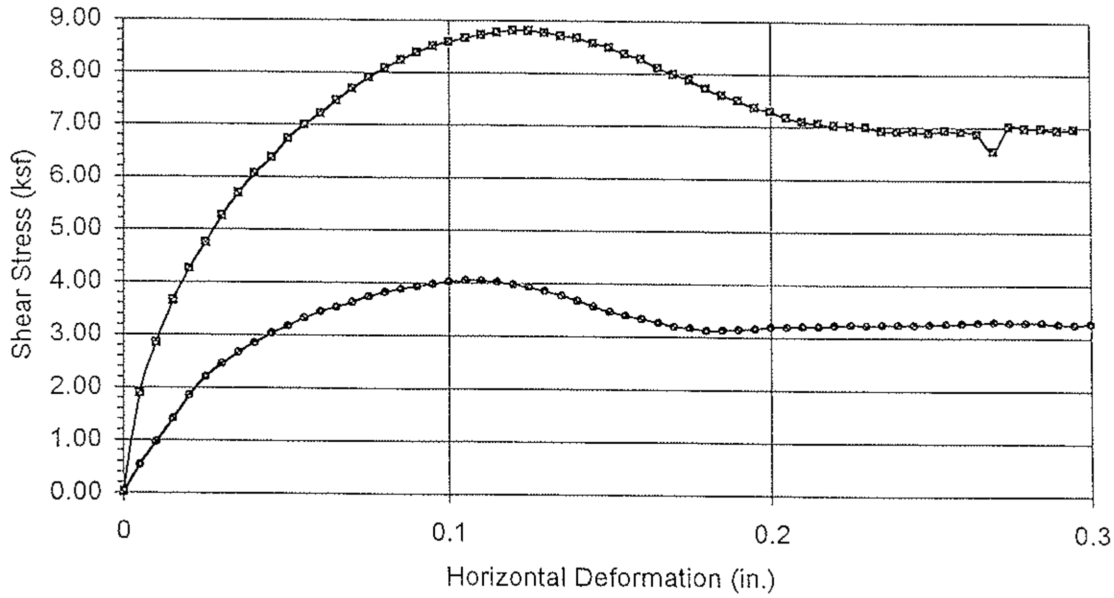


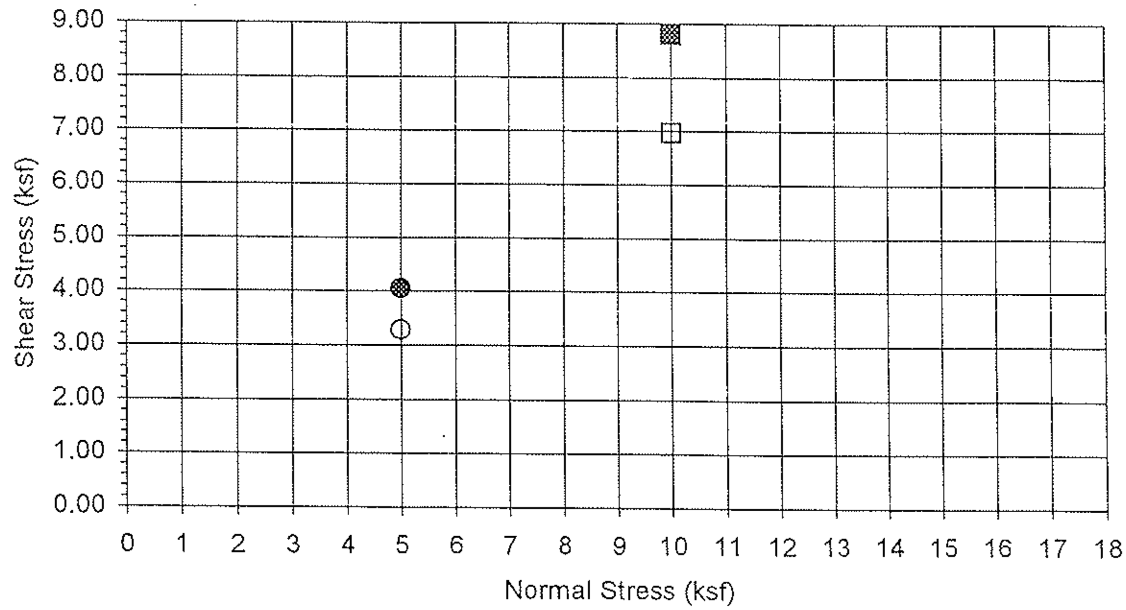
Normal Stress (kip/ft²)	3.000	6.000	
Peak Shear Stress (kip/ft²)	● 1.840	■ 3.380	
Shear Stress @ End of Test (ksf)	○ 1.836	□ 3.352	
Deformation Rate (in./min.)	0.0017	0.0017	
Initial Sample Height (in.)	1.000	1.000	
Diameter (in.)	2.415	2.415	
Initial Moisture Content (%)	20.72	20.72	
Dry Density (pcf)	105.3	106.1	
Saturation (%)	93.1	95.1	
Soil Height Before Shearing (in.)	0.9736	0.9431	
Final Moisture Content (%)	21.2	20.1	

B6

TERATEST LABS	**DIRECT SHEAR TEST RESULTS** *Consolidated Drained - ASTM D 3080*	Boring No.: B-1 Sample No.: 5 Depth (ft) 19 Soil Description: Brown Lean Clay with Sand (CL)s	Project No.: 296-0 Caltrans Western Avenue 05-02

DS B-1 #5 @ 19.xls





Normal Stress (kip/ft²)	5.000	10.000	
Peak Shear Stress (kip/ft²)	● 4.050	■ 8.802	
Shear Stress @ End of Test (ksf)	○ 3.286	□ 6.965	
Deformation Rate (in./min.)	0.0033	0.0033	
Initial Sample Height (in.)	1.000	1.000	
Diameter (in.)	2.415	2.415	
Initial Moisture Content (%)	4.24	4.24	
Dry Density (pcf)	95.3	101.5	
Saturation (%)	14.9	17.3	
Soil Height Before Shearing (in.)	0.9845	0.9707	
Final Moisture Content (%)	24.8	22.1	

B7

TERATEST LABS

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

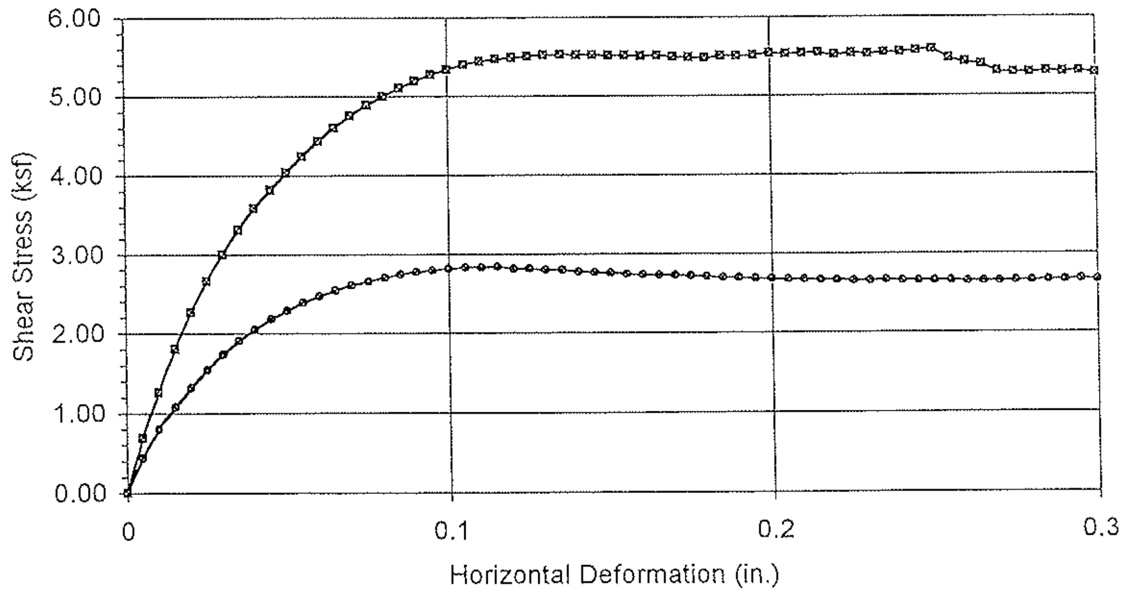
Boring No.:	B-1	
Sample No.:	11	
Depth (ft)	49	
Soil Description:	Brown Silty Sand (SM)	

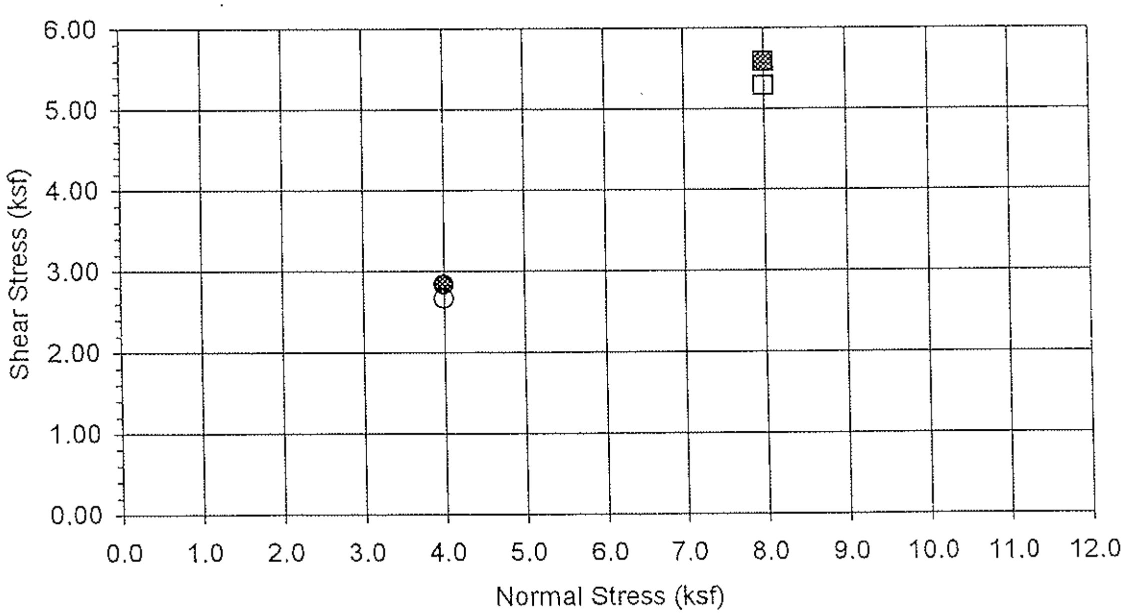
Project No.: 296-0

Caltrans Western Avenue

05-02

DS B-1 #11 @ 49.xls





Normal Stress (kip/ft²)	4.000	8.000	
Peak Shear Stress (kip/ft²)	● 2.834	▩ 5.581	
Shear Stress @ End of Test (ksf)	○ 2.663	□ 5.282	
Deformation Rate (in./min.)	0.0025	0.0025	
Initial Sample Height (in.)	1.000	1.000	
Diameter (in.)	2.415	2.415	
Initial Moisture Content (%)	14.53	14.53	
Dry Density (pcf)	119.4	120.4	
Saturation (%)	95.2	98.2	
Soil Height Before Shearing (in.)	0.9836	0.9522	
Final Moisture Content (%)	14.7	13.4	

B8

TERATEST LABS	***DIRECT SHEAR TEST RESULTS*** *Consolidated Drained - ASTM D 3080*	Boring No.: B-2 Sample No.: 6 Depth (ft) 25 Soil Description: Brown Clayey Sand (SC)	Project No.: 296-0 Caltrans Western Avenue 05-02

DS B-2 #6 @ 25.xls

TERRATEST LABS

COMPACTION TEST

ASTM D 1557

Project Name:	Caltrans Western Avenue	Tested By :	MTR	Date:	May-8-02
Project No.:	296-05	Calculated By :	ESS	Date:	May-10-02
Boring No.:	B-1	Depth (ft.)	0-5		
Sample No. :	N/A				

Visual Sample Description: Brown Silty Sand (SM)

Preparation Method: [X] Moist [ ] Dry [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03322 *Ram Weight 10 LBS Drop 18 inches*

	-2.5	0	2.5	5		
TEST NO.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3802.0	3935.0	3883.0	3792.0		
Wt. of Mold (gm.)	1803.0	1803.0	1803.0	1803.0		
Net Wt. of Soil (gm.)	1999.0	2132.0	2080.0	1989.0		
Wet Wt. of Soil + Cont. (gm.)	593.70	565.80	553.80	539.60		
Dry Wt. of Soil + Cont. (gm.)	555.60	517.90	495.80	473.80		
Wt. of Container (gm.)	54.40	54.70	51.80	50.60		
Moisture Content (%)	7.60	10.34	13.06	15.55		
Wet Density (pcf)	132.7	141.5	138.0	132.0		
Dry Density (pcf)	123.3	128.2	122.1	114.2		

Maximum Dry Density (pcf) 128.5 **Optimum Moisture Content(%)** 10.5

PROCEDURE USED

[X] Procedure A
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained < 20%

[ ] Procedure B
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if + #4 > 20% and + 3/8 " < 20%

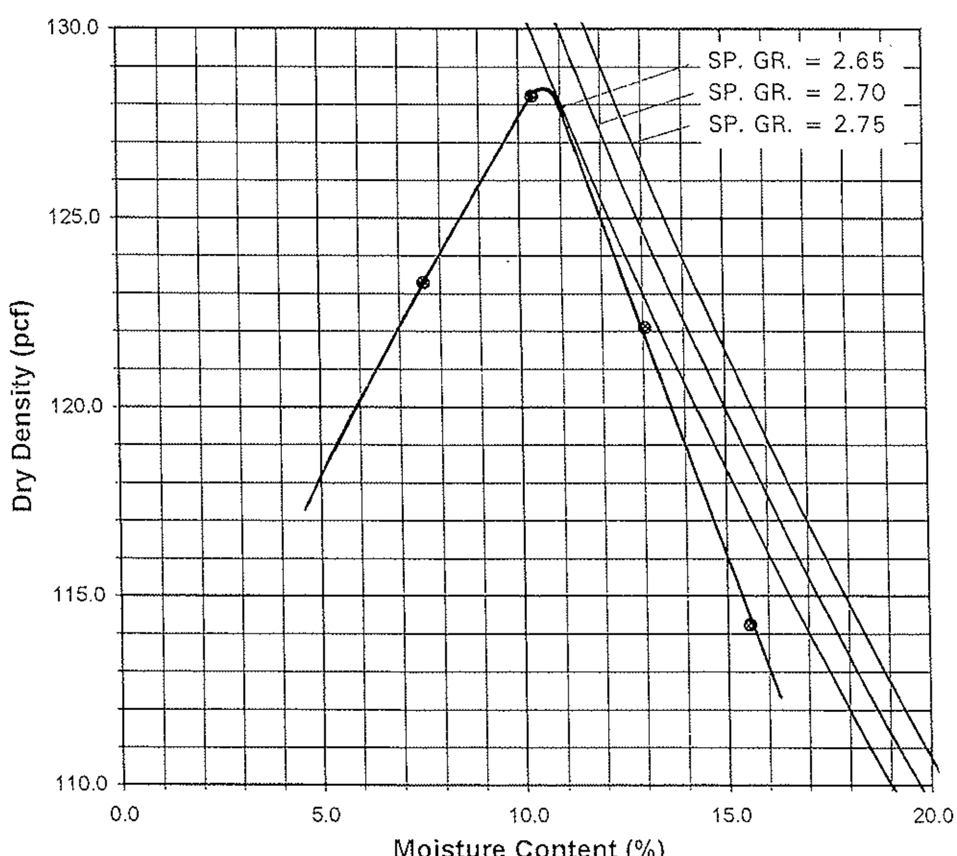
[ ] Procedure C
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if + 3/8 in >20% and + ¾ in <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



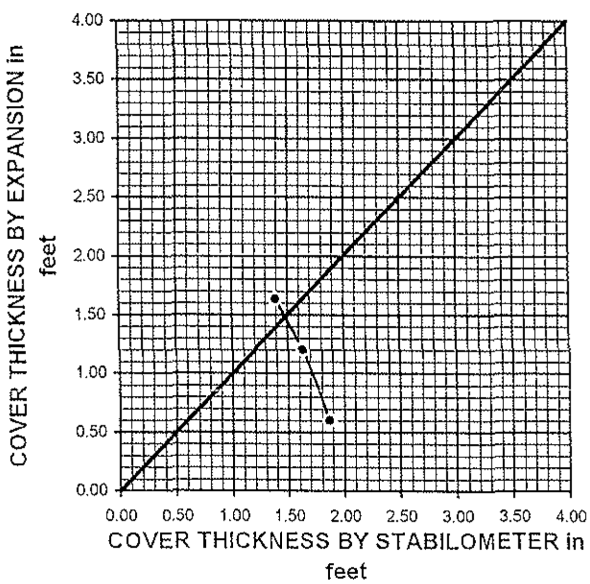
TERATEST LABS	R-VALUE TEST RESULTS

PROJECT NAME:	Caltrans Western Ave.	PROJECT NUMBER:	296-05
SAMPLE NUMBER:		SAMPLE LOCATION:	B-1
SAMPLE DESCRIPTION:	SM	TECHNICIAN:	ACS
		DATE SAMPLED	4/29/02

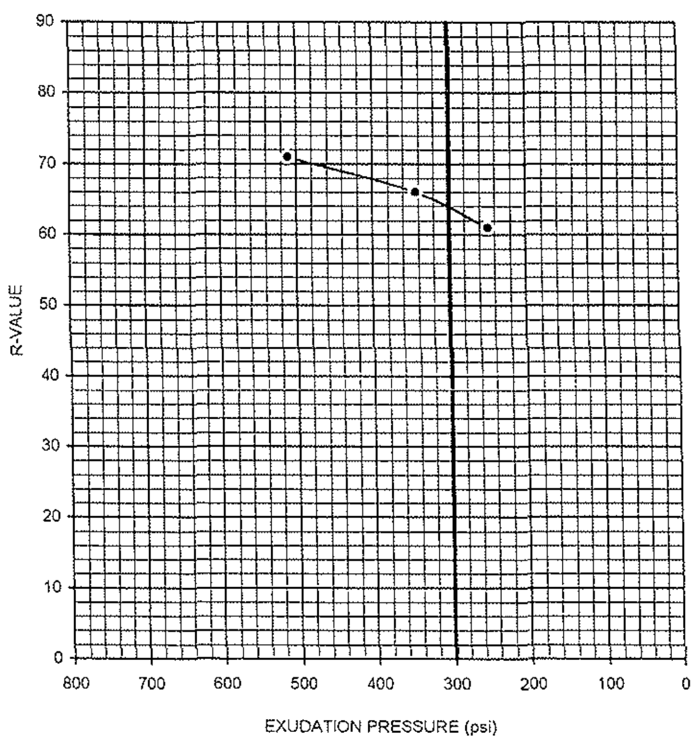
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	11.1	11.5	12.0
HEIGHT OF SAMPLE, Inches	2.42	2.43	2.50
DRY DENSITY, pcf	121.7	121.0	118.6
COMPACTOR AIR PRESSURE, psf	380	350	300
EXUDATION PRESSURE, psf	511	343	248
EXPANSION, Inches x 10exp-4	49	36	18
STABILITY Ph 2,000 lbs (160 psi)	28	33	41
TURNS DISPLACEMENT	4.36	4.53	4.63
R-VALUE UNCORRECTED	73	68	61
R-VALUE CORRECTED	71	66	61

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	15.0	15.0	15.0
STABILOMETER THICKNESS, ft.	1.39	1.63	1.87
EXPANSION PRESSURE THICKNESS, ft.	1.63	1.20	0.60

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	69
R-VALUE BY EXUDATION:	64
EQUILIBRIUM R-VALUE:	64

SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

Project Name: Caltrans Western Avenue
Tested By: VJ Date: 05/09/02
Project No. : 296-05
Data Input By: LF Date: 05/13/02
Boring No.: B-2
Depth (ft.) : 0-5
Sample No. : N/A
Sample Description: s(ML)

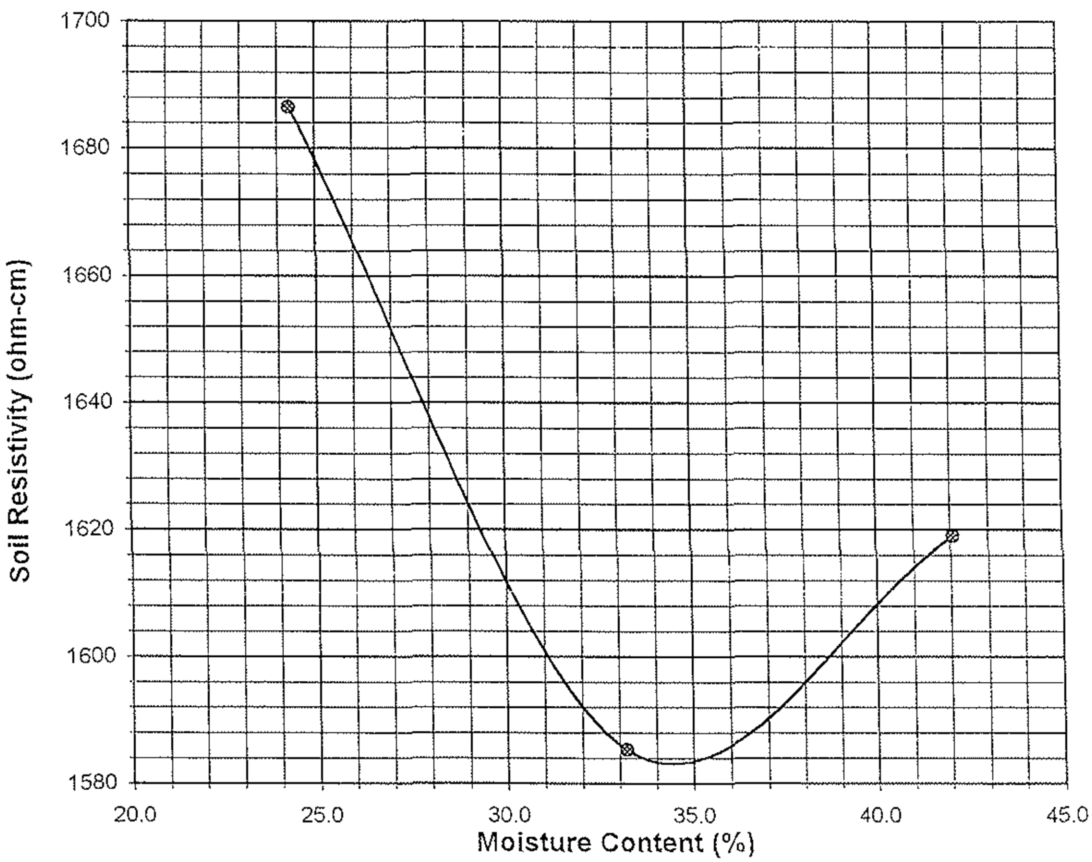
Initial Moisture Content (%)

Wet Wt. of Soil + Cont. (gm.)	175.91
Dry Wt. of Soil + Cont. (gm.)	161.34
Wt. of Container (gm.)	66.97
Moisture Content (%) (MCi)	15.44

Initial Soil Wt. (gm) (Wt)	1300.00
Box Constant:	6.7460

MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100

Remolded Specimen	Moisture Adjustments			
Water Added (ml) (Wa)	100	200	300	
Adj. Moisture Content (MC)	24.32	33.20	42.08	
Resistance Rdg. (ohm)	250	235	240	
Soil Resistivity (ohm-cm)	1687	1585	1619	



Minimum Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
1583	**34.3**	**141**	**154**	**7.86**	**22.5**

SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

TERRATEST LABS

Project Name:	Caltrans Western Avenue	Tested By	VJ	Date:	05/09/02
Project No. :	296-05	Data Input By:	LF	Date:	05/13/02
Boring No.:	B-2	Depth (ft.) :	25, 30 & 35		
Sample No. :	6, 7 & 8				
Sample Description:	SM				

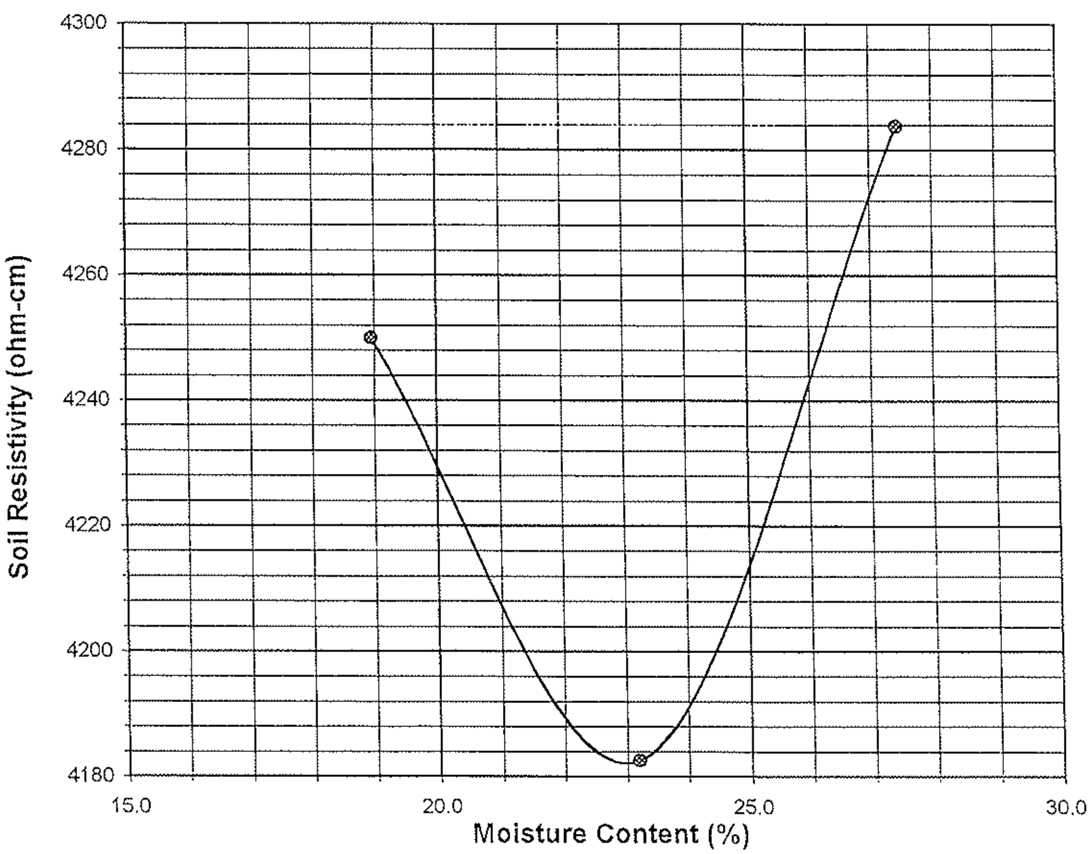
Initial Moisture Content (%)

Wet Wt. of Soil + Cont. (gm.)	180.36
Dry Wt. of Soil + Cont. (gm.)	168.72
Wt. of Container (gm.)	57.36
Moisture Content (%) (MCi)	10.45

Initial Soil Wt. (gm) (Wt)	1300.00
Box Constant:	6.7460

MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100

Remolded Specimen	Moisture Adjustments			
Water Added (ml) (Wa)	100	150	200	
Adj. Moisture Content (MC)	18.95	23.20	27.45	
Resistance Rdg. (ohm)	630	620	635	
Soil Resistivity (ohm-cm)	4250	4183	4284	



Minimum Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
4182	23.0	64	179	8.16	23.0

APPENDIX C
AXIAL PILE CAPACITY

APPENDIX C - AXIAL PILE CAPACITY

Axial pile capacities were evaluated using principles described in the Naval Facilities Engineering Command (NAVFAC), Foundation and Earth Structure Design Manual 7.02 (DM7). The ultimate capacity was obtained by using the formula:

Ultimate Axial Pile Capacity = Σ incremental side friction + end bearing

Using conventional notation used by DM7, for both the ultimate load capacity in compression,

$$Q_{ult} = P_T N_q A_T + \sum_{H=H_o}^{H=H_o+D} (K_{HC})(P_o)(TAN\delta)(s)$$

Q_{ult}	= Ultimate load capacity in compression (kN)
P_T	= Effective Vertical Stress at pile tip (kPa)
Nq	= Bearing capacity factor
A_T	= Area of pile tip (m^2)
K_{HC}	= Ratio of horizontal to vertical effective stress on the side of an element when the element is in compression
P_o	= Effective vertical stress over the length of embedment, D (kPa)
δ	= Friction angle between pile and soil (degrees)
s	= Surface area of pile per unit length (m)

and for the ultimate load capacity in tension,

$$T_{ult} = \sum_{H=H_o}^{H=H_o+D} (K_{HT})(P_o)(TAN\delta)(s)(H)$$

T_{ult}	= Ultimate load capacity in tension, pullout (kN)
K_{HT}	= Ratio of horizontal to vertical effective stress on the side of an element when the element is in tension

To obtain allowable axial pile capacities, a factor of safety (FS) of 2 for side friction and an FS of 3 for end bearing were applied to the ultimate capacities. Other factors of safety could be used, depending on load duration and type (dead structural load, dead equipment load, transient loads [wind and seismic]), previous experience in the area, and level of acceptable risk.

DRIVEN PILE CAPACITY

Project No 296-05
By: VT/NS

INPUT 12-inch pile

Pile top Elevation (m)	148.4	
Width (m)	0.305	
Perimeter (m)	1.22	
X-section area (m^2)	0.09	
Critical Depth (m)	6	
Approximate Critical Overburden Pressure (kPa)	110.0	
FOS for friction	2	
FOS for end bearing	3	
Downdrag Seismic.	*N/A*	*kN*

DM7 Figure 1, Page 7.2-194 (→ Kc, δ/φ)

Top depth (m)	Bottom depth (m)	Soil Type	Unit Weight (kN/m^3)	Cu (kPa)	Friction Angle (deg)	Middle Depth (m)	Overburden Pressure (kPa)	Overburden Pressure for Analysis(kPa)	Kc	δ/φ	α
0	2.5	ML/SM	18	0	32	1.3	23	23	1.00	0.75	1.00
2.5	5.1	ML/SM	18	0	32	3.8	68	68	1.0	0.75	1.00
5.1	6	CL	20	14	27	5.6	101	101	1.0	0.75	0.50
6	6.9	CL	20	14	27	6.5	119	110	1.0	0.75	0.50
6.9	9	ML/SM	18	0	32	8.0	147	110	1.0	0.75	1.00
9	11.5	ML/SM	18	0	32	10.3	188	110	1.0	0.75	1.00
11.5	13.4	ML/SM	18	0	32	12.5	228	110	1.0	0.75	1.00
13.4	15.4	SM/SP	10.2	0	36	14.4	255	110	1.0	0.75	1.00
15.4	17.4	CH	9.2	14	27	16.4	274	110	1.0	0.75	0.50
17.4	18.4	SM/SP	10.2	0	38	17.9	289	110	1.0	0.75	1.00

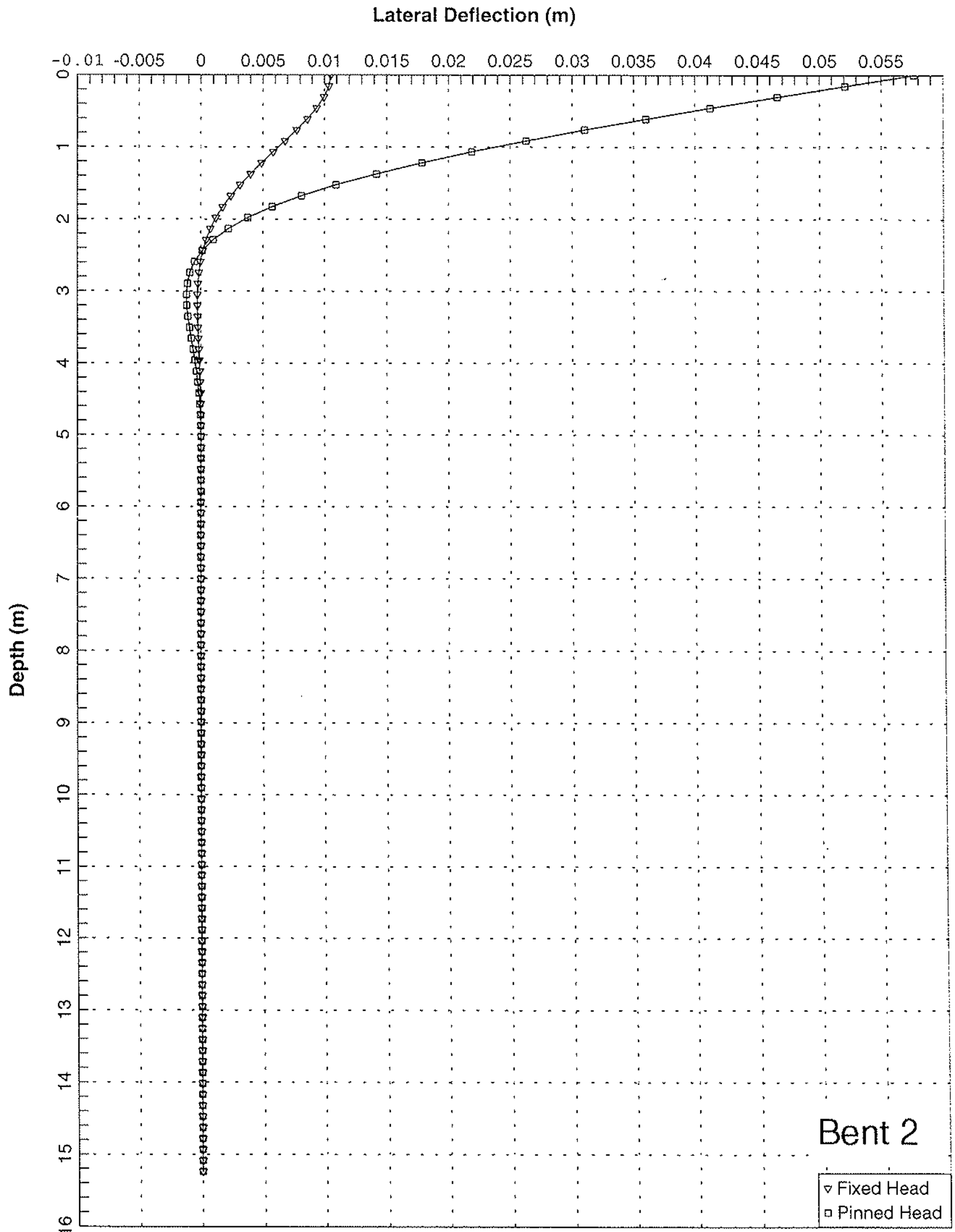
Top depth (m)	Calculated *Unit Skin* Friction (kPa)	Ultimate Skin *Friction (kN) for* depth interval	Cumulative Ultimate Skin Friction (kN)	Length of pile (m)	Tip Overburden Pressure (kPa)	Nq	Ultimate Unit End Bearing (kPa)	Ultimate End Bearing (kN)	Ultimate total capacity (kN) - static	KT	*Ultimate* tension (kN) depth *interval*	*Cumulative* Ultimate tension (kN) - *Static*	Elevation of *pile tip(m)*
				0					0			0	148.4
0	10.0	31	31	2.5	22.5	0	0	0	31	0.6	18	18	145.9
2.5	30.5	97	127	5.1	68.4	0	0	0	127	0.6	58	76	143.3
5.1	44.2	49	176	6	100.8	0	0	0	176	0.6	29	105	142.4
6	47.6	52	228	6.9	118.8	0	0	0	228	0.6	31	137	141.5
6.9	49.0	126	354	9	146.7	29	3190	297	650	0.6	75	212	139.4
9	49.0	149	503	11.5	188.1	29	3190	297	800	0.6	90	302	136.9
11.5	49.0	114	617	13.4	227.7	29	3190	297	913	0.6	68	370	135
13.4	56.1	137	753	15.4	255.0	62	6820	634	1388	0.6	82	452	133
15.4	47.6	116	870	17.4	274.4	13	1430	133	1003	0.6	70	522	131
17.4	59.8	73	942	18.4	288.7	86	9460	880	1822	0.6	44	565	130

APPENDIX D

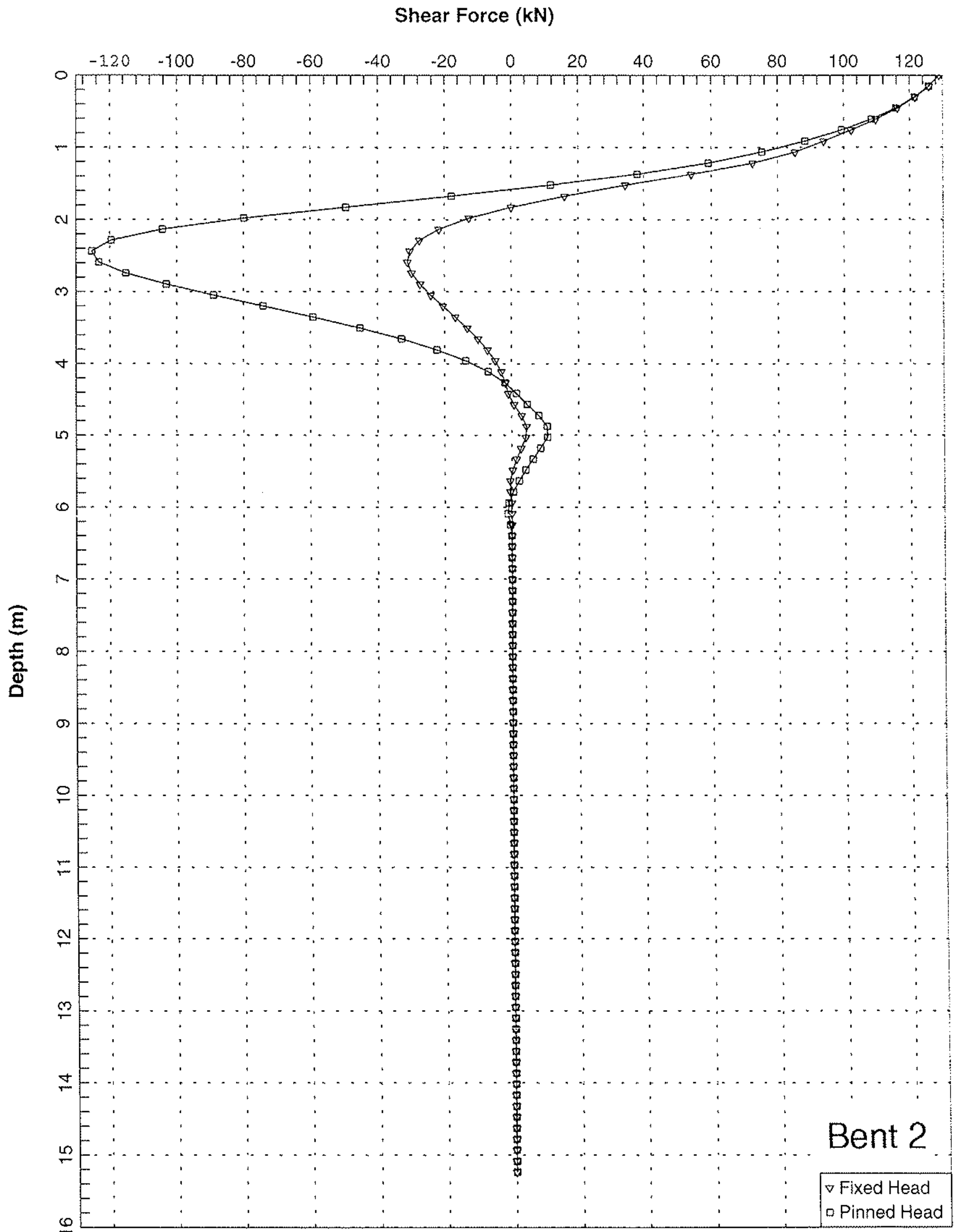
LATERAL PILE ANALYSIS

moment, and shear versus pile depth for the bridge abutment are presented on Plates D4 through D6 for the fixed- and free-head conditions, respectively.

Pile lateral load tests have shown that the predicted deflections and moments are generally +/- 33 percent of actual values. However, the depth at which the maximum moment occurs is 25 percent deeper than predicted by the p-y analysis based on the results of full-scale pile lateral load tests.

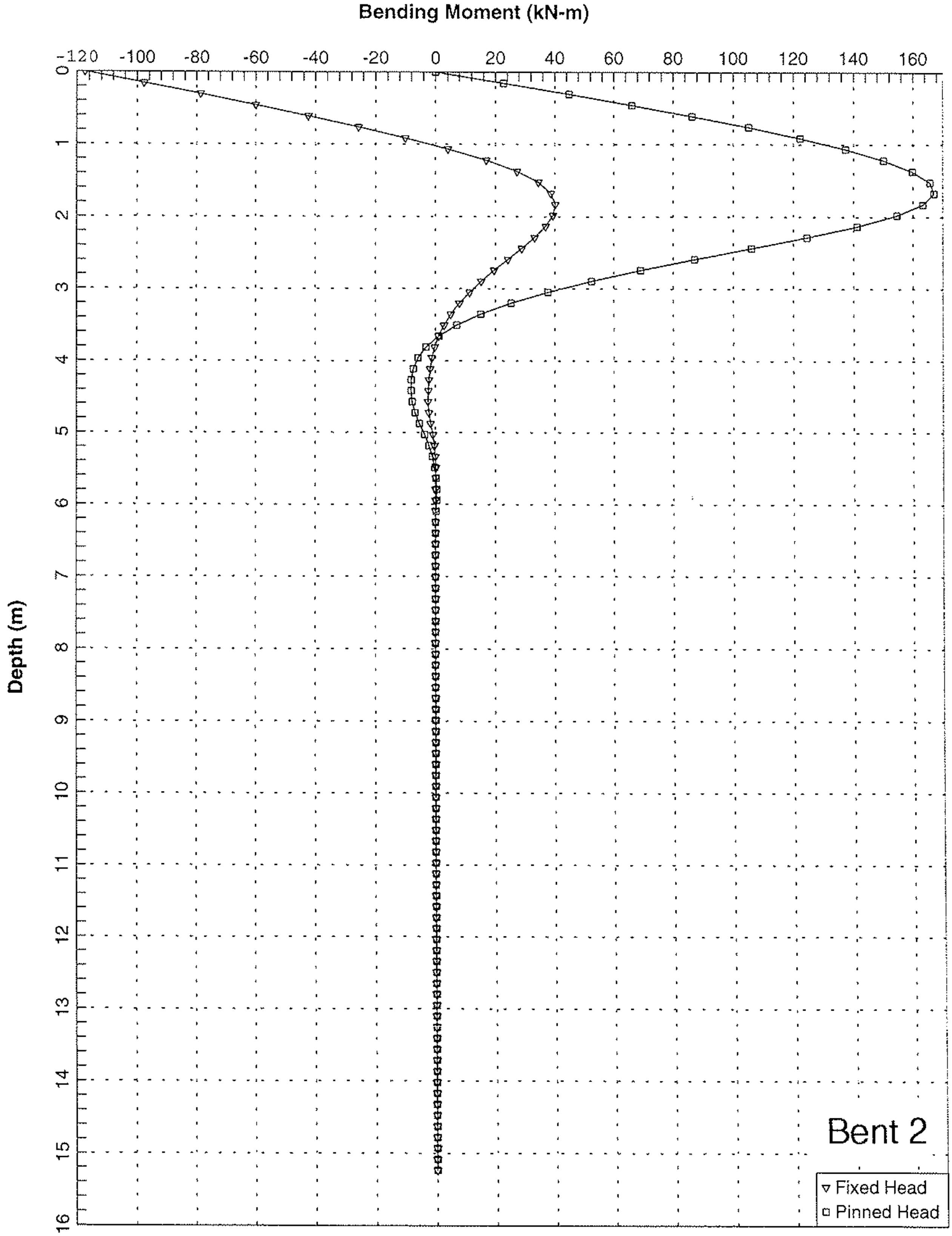


Caltrans Class 625 Pile, Cracked Moment of Inertia, Cyclic Loading (15 cycles), Lateral Load = 128 kN, Vertical Load = 587 kN

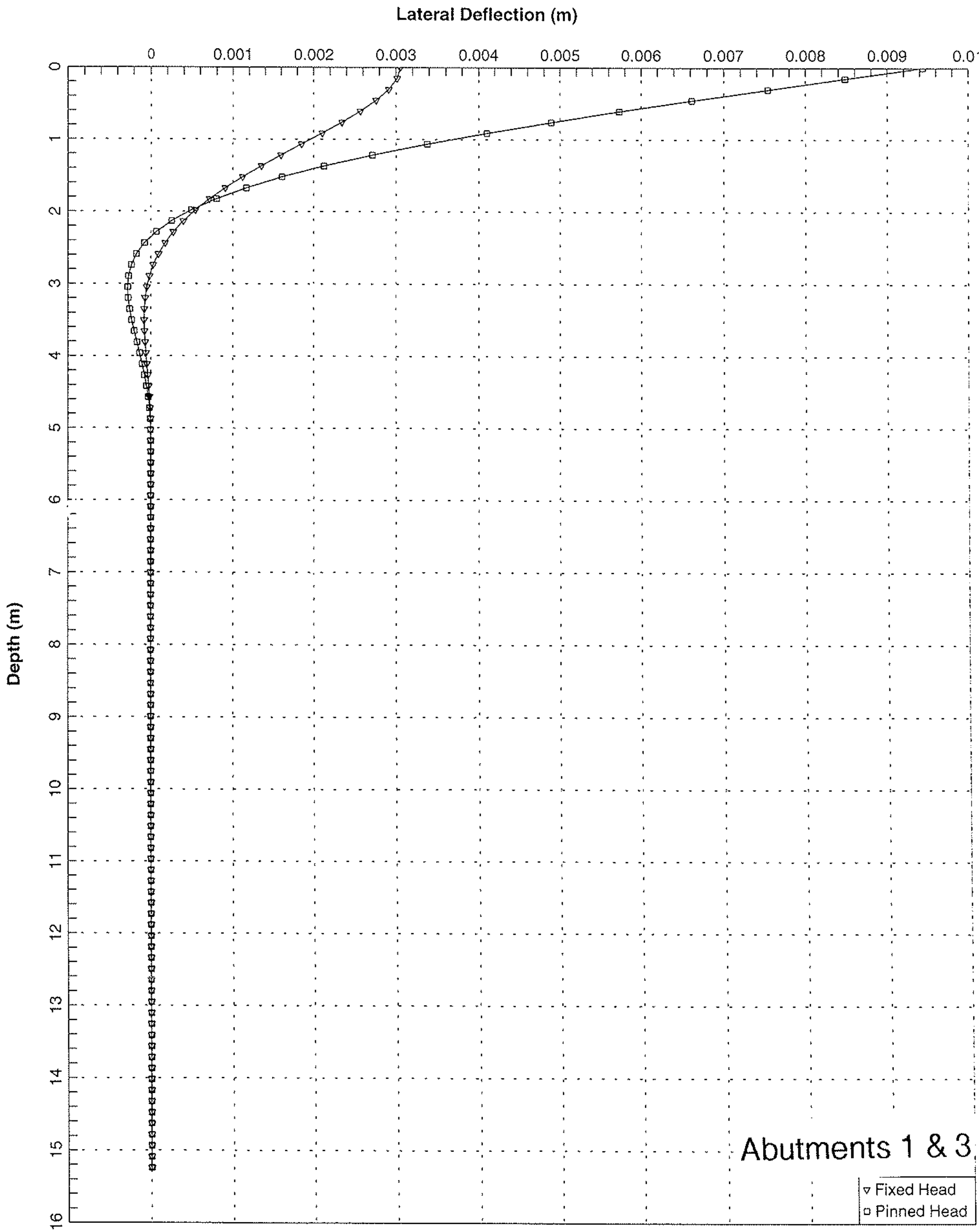


Caltrans Class 625 Pile, Cracked Moment of Inertia, Cyclic Loading (15 cycles), Lateral Load = 128 kN, Vertical Load = 587 kN

D2



Caltrans Class 625 Pile, Cracked Moment of Inertia, Cyclic Loading (15 cycles), Lateral Load = 128 kN, Vertical Load = 587 kN



Caltrans Class 625 Pile, Gross Moment of Inertia, Static Loading, Lateral Load = 62 kN, Vertical Load = 405 kN

D4

APPENDIX E

ANALYSES AND CALCULATIONS

SETTLEMENT

DIAZ·YOURMAN
Geotechnical Services

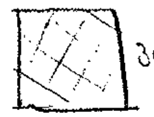
SHEET 1 OF ~~3~~ 4
PROJECT NO. 296-05
DATE 07-08-02
COMPUTED BY SN.
CHECKED BY VT

PROJECT Westem Avenue Undercrossing
SUBJECT pile Settlement

A-pile Analysis.

12inch — (14) inch Square pile (305mm) Caltrans Class 625 (305mm).

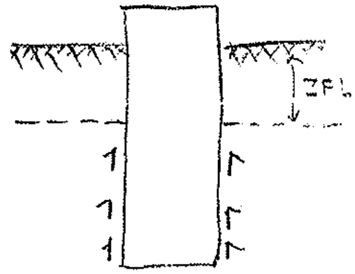
Computatio method



Non-Circular pile properties

→ Zero friction from Length Ground

ZFL (m) = 0



→ Total length TL(m) = ~~19.2 m~~ 12.7 m

→ Perimeter for Non-circular Section (mm) = 1220mm.

→ Tip area for non-Circular Section (m^2) = 0.093 m^2

Pile material

→ Select pile material

✓ Precast Concrete pile.

Modulus of Elasticity E (kN/m²) = 21×10^6 kPa

API recommendations for ko (Coefficient of lateral earth pressure)

✓ Ko=1 for full displacement piles

k = 0.8 for open-ended pipe piles.

x

DIAZ·YOURMAN
Geotechnical Services

SHEET 2 OF ~~3~~ 4
PROJECT NO. 296-05
DATE 7/8/02
COMPUTED BY SN
CHECKED BY VT

PROJECT Western Av. undercrossing UC
SUBJECT

piles to be tiped here.

Depth		Layer	Soil	Unit weight (KN/m³)	Friction angle	Nq
0						
		①	Silt	18.3	27	
3.7	11	②	Sand	18.9	32	8
5.2	10	③	Clay	20.4	27	
7	18	④	Sand	21.1	32	8
11.6	14	⑤	Silt	20.4	27	
13.1	50	⑥	Sand	20.7	36	20
15.25	?	⑦	Sand	20.7	36	8
17.4	?	⑧	Clay	18.8	27	
18.3	50	⑨	Sand	20.7	28	20
19.2						

Table 3 2 (3-13) gives Nq values.

Input data from Driven pile capacity excel Spread Sheet By VT (6/10/2).

DIAZ·YOURMAN
Geotechnical Services

SHEET	3 OF ~~7~~ 4
PROJECT NO.	296-05
DATE	07/08/02
COMPUTED BY	SN
CHECKED BY	VT

PROJECT: Western Avenue UC
SUBJECT: pile settlement.

Computation mtds

(1) Based on output from FHWA mtd
(2) " " " US Army
(3) " " " Lamada Mtd
(4) " " " API RP 2A mtd
(5) " load-transfer units specified by user

for 680kN axial Load. approximate settlement
of the piles = $\frac{0.011 \times 1000}{25.4}$
= ~~0.4 inch~~

AVG SETTLEMENT ≈ 0.5 INCH

From A-Pile plus. for windows 4/4

$$q = \overline{p}_o N_q \qquad (3.10)$$

where

$\overline{p}$ = effective overburden pressure at pile tip, and
N_q = bearing capacity factor.

Table 3.2 was recommended as a guideline only for siliceous soil.

TABLE 3.2. Guideline for Tip Resistance in Siliceous Soil

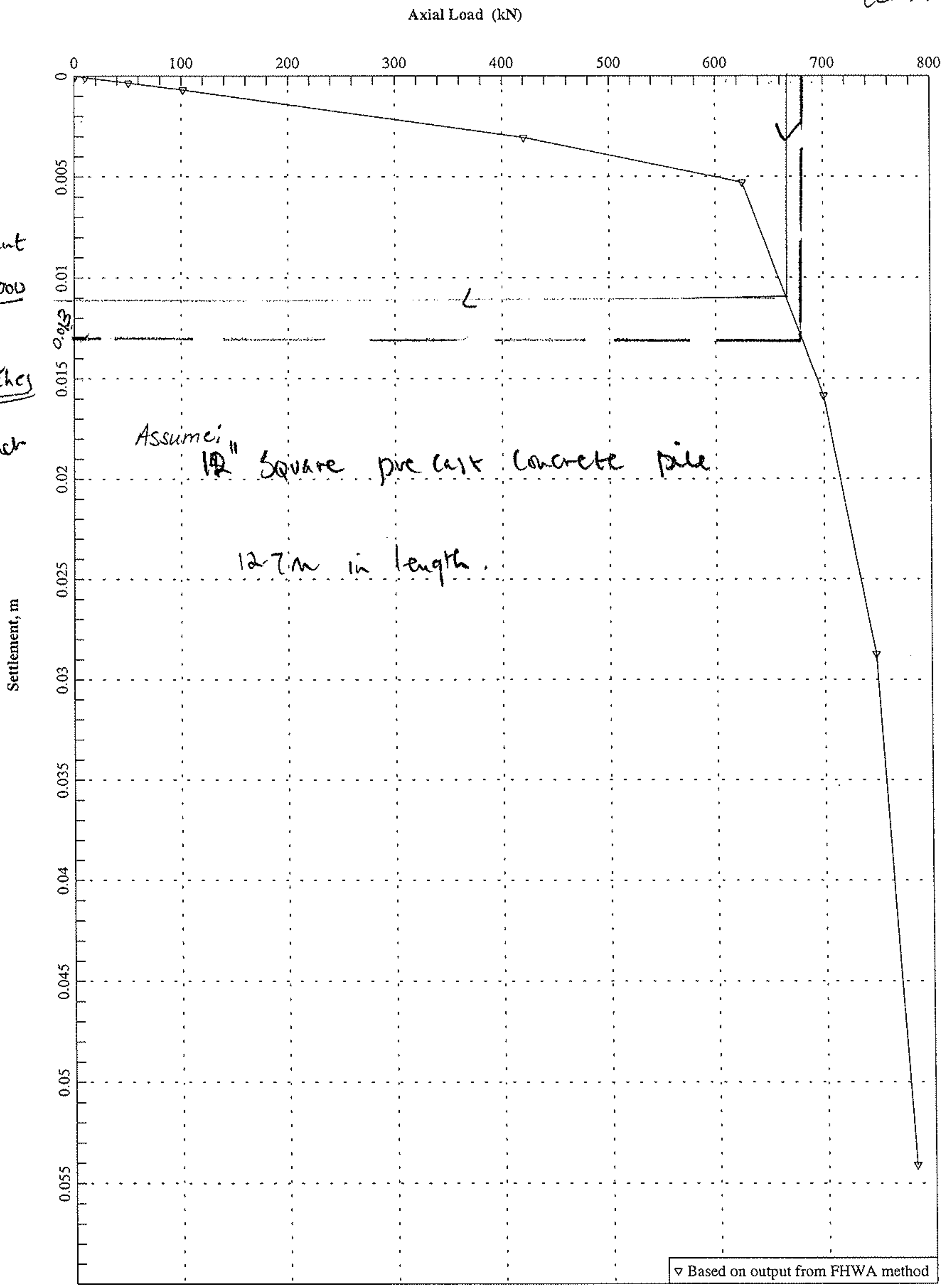
Soil	N_q	Limiting q, kips/ft^2 MPa)
Very loose to medium, sand silt	8	40 (1.9)
Loose to dense, sand to silt	12	60 (2.9)
Medium to dense, sand to sand-silt	20	100 (4.8)
Dense to very dense sand to sand-silt	40	200 (9.6)
Dense to very dense, gravel to sand	50	250 (12.0)

The API publication points out that many soils do not fit the description of those in the tables and that the design parameters are not suitable for these soils. Examples are loose silts, soils containing large amounts of mica or volcanic grains, and calcareous sands. These latter soils are known to have substantially lower design parameters.

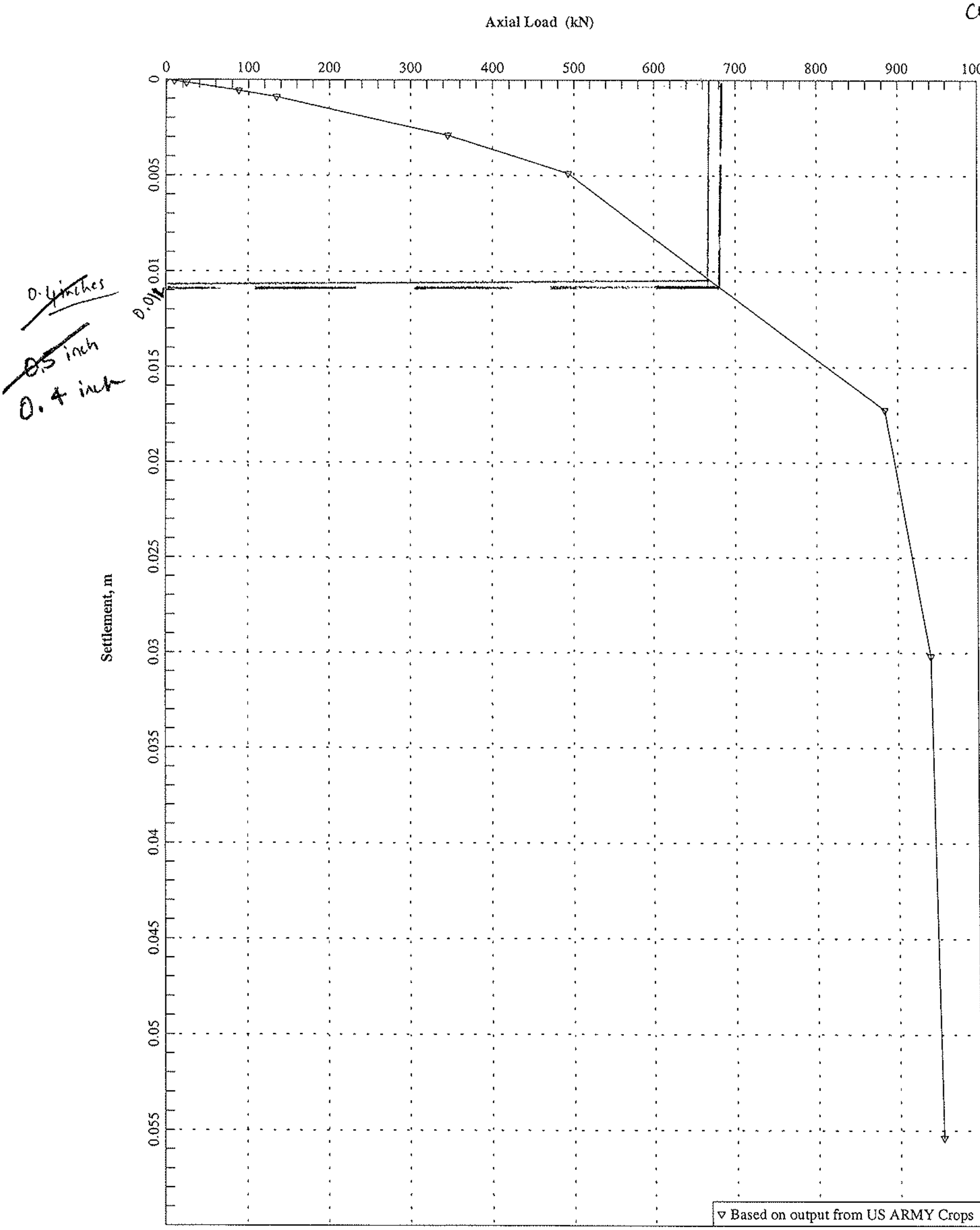
Drilled and grouted piles may have higher capacities than driven piles in calcareous soils.

296-05 1/4
7/9/12
CK-VT

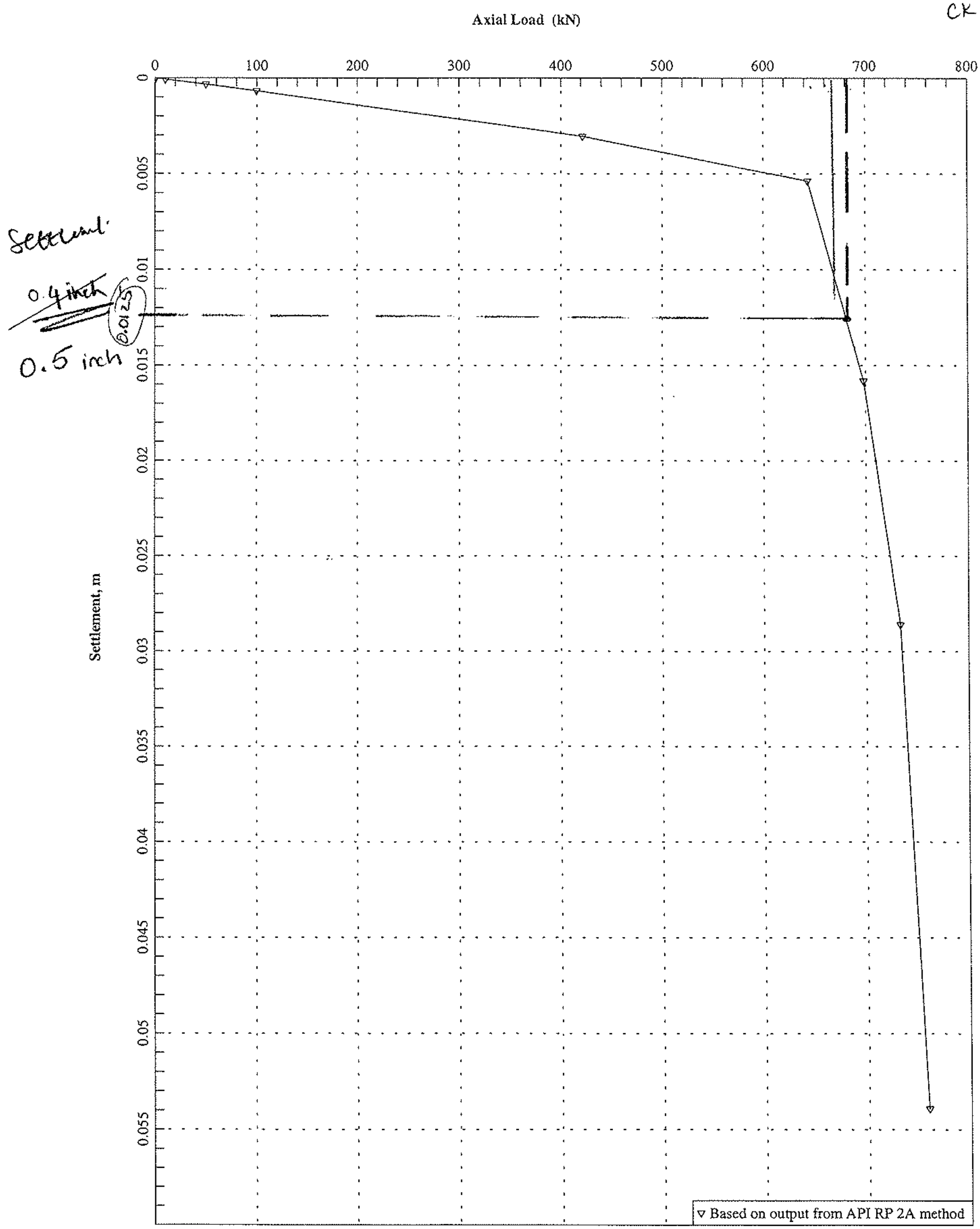
Settlement
= 0.011 x 1000 / 25.4
= 0.43 ~~inches~~
0.5 inch



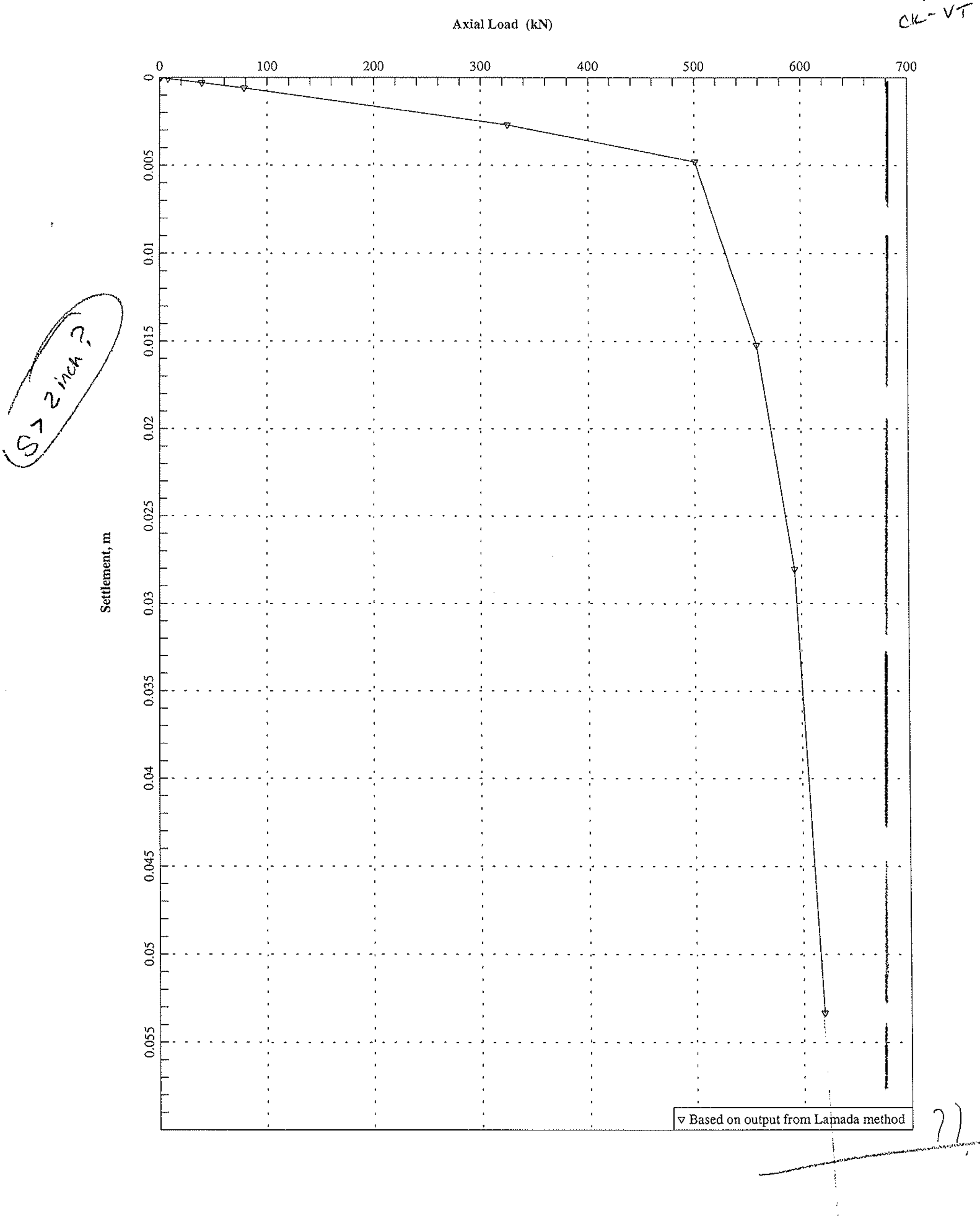
296-05
7/9/12 2/4
CK-VJ



296-05 3/4
7/9/2
CK - VT



291-05 4/4
7/9/2
CK-VT



LATERAL EARTH PRESSURES

Job No.: 296-05
Job Name: Western Avenue UC
Date: 9-Jun-02
By: VRT

STATIC AND DYNAMIC, ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENTS

Based on Seed and Whitman, "Design of Retaing Earth Structures for Dynamic Loads"
ASCE, 1970 Specialty Conference, Lateral Stresses in the Ground and the Design of Earth Retaining Structures. Library reference: S-36, pages 113 - 118

This Page created by SM based on VRN's spread sheet

INPUT		Radians
phi = soil friction angle (degrees)	32	0.5585054
beta = wall angle w.r.t. vertical (degrees)	0	0
i = slope angle of the backfill w.r.t. horizontal (degrees)	0	0
delta = wall friction - (degrees)	0	0
gamma = bulk soil density (pcf)	120	
H = height of wall		
Kh = horizontal component of the earthquake acceleration	0.3	
= 0 for static case (PGA*0.5 for cantilever and PGA*0.75 for restrained)		
Kv = vertical component of the earthquake acceleration	0	
= 0 for static case (usually 0)		

OUTPUT	**Dynamic**		**Static**	
	Wall Friction			
	With	**Without**	**With**	**Without**
theta = ratio relating Kh and Kv	0.29	0.29	0.00	0.00
Kae, Ka = active earth pressure coefficient in earthquakes	0.53	0.53	0.31	0.31
Kpe, Kp = passive earth pressure coefficient in earthquakes	2.66	2.66	3.25	3.25
Ko = at rest coefficient	0.47	0.47	0.47	0.47
Pa (equivalent active unit weight) pcf	64	64	37	37
Pp=(equivalent passive unit weight) pcf	319	319	391	391

Inremental active seismic force coefficient (lbs per unit width) 13.4
(for static active pressure DYA uses co-efficient without wall friction)
Metric Unit

Pa (equivalent active unit weight) kN/m^3	10.0	10.0	5.8	5.8
Pp=(equivalent passive unit weight) kN/m^3	50.1	50.1	61.3	61.3

Inremental active seismic force coefficient (kN per unit width) 2.1

Job No.: 296-05
Job Name: Western Ave UC
Date: 9-Jun-02 BY: VRT

STATIC AND DYNAMIC, ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENTS

Based on Seed and Whitman, "Design of Retaing Earth Structures for Dynamic Loads"
ASCE, 1970 Specialty Conference, Lateral Stresses in the Ground and the Design of Earth Retaining Structures. Library reference: S-36, pages 113 - 118

This Page created by SM based on VRN's spread sheet

INPUT		Radians
phi = soil friction angle (degrees)	32	0.5585054
beta = wall angle w.r.t. vertical (degrees)	0	0
i = slope angle of the backfill w.r.t. horizontal (degrees)	0	0
delta = wall friction - (degrees)	0	0
gamma = bulk soil density (pcf)	120	
H = height of wall	0	
Kh = horizontal component of the earthquake acceleration = 0 for static case (usually 0.75 PGA)	0.45	
Kv = vertical component of the earthquake acceleration = 0 for static case (usually 0)	0	

OUTPUT	Dynamic		Static	
	Wall Friction			
	With	Without	With	Without
theta = ratio relating Kh and Kv	0.42	0.42	0.00	0.00
Kae, Ka = active earth pressure coefficient in earthquakes	0.72	0.72	0.31	0.31
Kpe, Kp = passive earth pressure coefficient in earthquakes	2.28	2.28	3.25	3.25
Ko = at rest coefficient	0.47	0.47	0.47	0.47
Po (equivalent at-rest unit weight) pcf	56	56	56	56
Pp=(equivalent passive unit weight) pcf	274	274	391	391

Inremental active seismic force coefficient (lbs per unit width) 24.8

Coefficient without wall friction used for static active pressures.

Metric Unit				
Po (equivalent at-rest unit weight) kN/m^3	8.9	8.9	8.9	8.9
Pp=(equivalent passive unit weight) kN/m^3	43.0	43.0	61.3	61.3

Inremental active seismic force coefficient (kN per unit width) 3.9

APPENDIX F
RESPONSE TO CALTRANS REVIEW COMMENTS

DIAZ • YOURMAN
& ASSOCIATES
Geotechnical Services

February 7, 2003

Project No. 296-05

Mr. Ray Miller
Dokken Engineering
1171 Sun Center Drive, Suite 435
Rancho Cordova, CA 95670

Subject: Response to Caltrans Review Comments Dated December 20, 2002
Geotechnical Investigation Report
Western Avenue Undercrossing (53-1079) Kilometer Post 44.2/45.2
Glendale, California
Caltrans District 7
EA 07-1786A1

Dear Mr. Miller:

This letter provides DYA's response to Caltrans review comments dated December 20, 2002. DYA's responses are provided in Table 1 and are in the same order as the Caltrans Review Comments (see attached). The revision to the comments was incorporated in the resubmitted report dated February 7, 2003.

We trust this provides the information you require. Please call if you have any questions.

Very truly yours,

Diaz•Yourman & Associates

Allen M. Yourman, Jr.

Allen M. Yourman, Jr., P.E., G.E.
Vice President

Attachment: Caltrans Review Comment Dated December 20, 2002

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Table 1 - RESPONSE TO REVIEW COMMENTS

Caltrans Review Comment	DYA's Response
1. Page 7 Why is the design groundwater evaluation (131 m) assumed to be the same as measured? Groundwater level may vary. The foundation report states that the historical average groundwater elevation is approximately 133.5 m or lower. What is the historical high groundwater level at this site?	Based on the well monitoring data at the State well No. 1N14W13R01 between January 1957 and October 2001, the historical high groundwater was estimated to be elevation 135.3 m MSL. Therefore the design groundwater level was assumed at elevation 135.3 m MSL. The analyses using the design groundwater level were revised accordingly.
2. Page 7-8, Table 3-2 The generalized soil profile shown here is not consistent with that shown in Appendix C. Also, LPILE input parameters are missing from this table and Appendix D.	The axial pile capacity attached in Appendix C was reevaluated using the revised generalized soil profile shown in Table 3-2. The revised report will include the input parameters for lateral pile analyses in Appendix D.
3. Page 13, Table 4-3 The contractor may choose Class 625 Alt. W unless this type of pile is specifically excluded by the contract specifications and special provisions. Will this provision be included?	Class 625 Alt. W is specifically excluded by the revised report, as well as the contract specifications and special provisions.
4. Pile Data Table a) Revise the Pile Data Table to conform with Caltrans' Memo to Designer 3-1. Nominal Resistance and Design Loading values as shown are not acceptable. b) Verify that no tension requirements exist. If there is a tension demand, the Design Tip Evaluation for Tension shall be included in the Pile Data Table. c) It appears that a single design soil profile was used at Abutment 1, Bent 2, and Abutment 3. Abutments 1 and 3 have the same loading and practically the same bottom footing elevations. Why are the pile lengths different?	a) The revised Pile Data Table conformed with the Caltrans standard. b) No tension demands were required. c) The same tip elevation was specified for the Abutments 1 and 3 in the revised Pile Data Table.
5. Log of Test Borings Revise the "Note" in the Legend Block (left side) to state "Visual classification of earth materials is based on field inspection and is confirmed or revised with laboratory test results as necessary."	LOTB has been revised.
6. Include the LOTB in the Plans.	Dokken to address.
7. Caltrans' Memo to Designers 9 requires that existing bridges, including their foundations, be evaluated before they are widened. Who performed this evaluation?	Dokken to address.

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VINCE JACOB, Chief
Office of Structure Contract Management

DATE: December 20, 2002

Attention: Mr. Imad Abu-Markhieh

FILE: 07------LA------5------KP 44.2/45.2
District County Route PM

FDN REPORT BY: Diaz Yourman & Assoc. DTD: 9/26/02

Western Ave UC (widen)
Structure Name

GENERAL PLAN DTD: 95% FDN PLAN DTD: 95%

07-178601 — EA Number
53-1079S — Bridge Number

Submittal (Check One): ☒ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ Other ______

The following comments are based on the report "Geotechnical Investigation: Western Avenue Undercrossing" dated July 12, 2002, prepared by Diaz Yourman & Associates.

1. Page 7
Why is the design groundwater elevation (131 m) assumed to be the same as measured? Groundwater level may vary. The foundation report states that the historical average groundwater elevation is approximately 133.5 m or lower. What is the historical high groundwater level at this site?

2. Pages 7-8, Table 3-2
The generalized soil profile shown here is not consistent with that shown in Appendix C. Also, LPILE input parameters are missing from this table and Appendix D.

3. Page 13, Table 4-3
The contractor may choose Class 625 Alt. W unless this type of pile is specifically excluded by the contract specifications and special provisions. Will this provision be included?

4. Pile Data Table
(a) Revise the Pile Data Table to conform with Caltrans' Memo to Designers 3-1. Nominal Resistance and Design Loading values as shown are not acceptable.

(b) Verify that no tension requirements exist. If there is a tension demand, the Design Tip Elevation for Tension shall be included in the Pile Data Table.

(c) It appears that a single design soil profile was used at Abutment 1, Bent 2, and Abutment 3. Abutments 1 and 3 have the same loading and practically the same bottom of footing elevations. Why are the pile lengths different?

Approval: (C3) Not approved (resubmittal to GS required)

Della Leong

Office of Structure Contract Management (OSCM)

Della Leong
Office of Geotechnical Design – West

Revised 09/01

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VINCE JACOB, Chief
Office of Structure Contract Management

Attention: Mr. Imad Abu-Markhieh

DATE: December 20, 2002

FILE: 07-------LA-------5-------KP 44.2/45.2
District County Route PM

Western Ave UC (widen)
Structure Name

07-178601 — EA Number
53-1079S — Bridge Number

5. Log of Test Borings
Revise the "Note" in the Legend Block (left side) to state "Visual classification of earth materials is based on field inspection and is confirmed or revised with laboratory test results as necessary."

6. Include the LOTB in the Plans.

7. Caltrans' Memo to Designers 9 requires that existing bridges, including their foundations, be evaluated before they are widened. Who performed this evaluation?

Please contact Della Leong at (916) 227-7099 or Qiang Huang at (916) 227-7179 for further clarification of these or other issues.

DIAZ•YOURMAN
& ASSOCIATES
Geotechnical Services

May 8, 2003

Project No. 296-05

Mr. Matthew W. Salveson
Dokken Engineering
11171 Sun Center Drive, Suite 250
Rancho Cordova, CA 95670

Subject: Response to Caltrans Review Comments Dated March 25, 2003
Geotechnical Investigation Report
Western Avenue Undercrossing (53-1079S) Kilometer Post 44.2/45.2
Glendale, California
Caltrans District 7, Los Angeles County
EA 07-1786A1

Dear Mr. Salveson:

This letter provides DYA's response to Caltrans review comments dated March 25, 2003. DYA's responses are provided in Table 1 and are in the same order as the Caltrans Review Comments (see attached). As noted in Table 1, a revised report is being prepared which incorporates these comments.

We trust this provides the information you require. Please call if you have any questions.

Sincerely,

Diaz•Yourman & Associates

Christopher M. Diaz, P.E.
Associate Engineer

Allen M. Yourman, Jr., P.E., G.E.
Vice President

Attachment: Caltrans Review Comment Dated March 25, 2003

K:\dataflsPROJECTS\200\296-05\08t RESPONSE TO Caltrans REVIEW COMMENTS.doc

Table 1 - RESPONSE TO REVIEW COMMENTS

Caltrans Review Comment	DYA's Response
1. Cover Page The project County (Los Angeles) and Route (Highway 5) are missing from the cover of the Foundation Report. Also, the Caltrans Bridge Number is 53-1079S, not 53-1079	Corrected in revised report.
2. Page 13, Pile Data Table For the Pile Data Table, per *Caltrans Memo to Designers 3-1*, Design loading shall be rounded up to nearest 25 kN and Nominal Resistance shall be rounded up to the nearest 50 kN. Therefore, the Pile Data Table on the Project Plans and in the Foundation Report should indicate Design Loading = 425 kN (rounded up from 405 kN) and Nominal Resistance = 850 kN (rounded up from 850 kN) for Abutments 1 and 3, and should indicate Design Loading = 600 kN rounded up from 587 kN) and Nominal Resistance = 1200 kN (rounded up from 1174 kN) for Bent 2.	Corrected in revised report.
3. Pages 10 & 13, Settlement The foundation report indicates that "seismic induced settlement would be approximately 12 mm for the design level earthquake" (page 10) and that "post earthquake settlement of the subsurface soils due to the approach embankment was calculated to be approximately 25 mm" (page 13). The settlement calculations in Appendix E indicate an average calculated settlement of 0.5 inches or 12.7 mm. Please clarify what are the estimated amounts of immediate settlement, static settlement and settlement period, and seismically induced settlement.	Page 13, Section 4.5.1 addresses immediate settlement, static settlement and settlement period has been revised to read "The static settlement of the subsurface soils due to the approach embankment was calculated to be approximately 25 mm. Most of the static settlement is expected to occur within 30 days of completion of earthwork operations." Page 10, Section 4.1.4 addresses seismically induced settlement.
4. Page 17, Figure 4-3 The low expansive soils in Bridge Embankment figure (page 17) should include: (a) maximum 1V;1H slope of Low Expansion Material behind the Abutment (b) minimum 0.3 meter width of Low Expansion Material behind the Abutment (c) a note that Low Expansive Material shall have either an Expansion Index (EI) less than 50 (EI to be determined by ASTM D4827) or a Sand Equivalent (SE) greater than 20 (SE to be determined in accordance with California Test 217).	Corrected in revised report.
5. Appendix B Remove the laboratory test data from Appendix B that do not pertain to this bridge or project. Plates B5 through B21 are labeled "Oceanside CRT" and the boring numbers, sample numbers and soil descriptions do not match those shown in the Log of Test Borings for this bridge. Table B1 "Laboratory Testing Summary" should be revised accordingly.	Corrected in revised report.
6. Appendix B Include all the laboratory test date for this bridge in Appendix B. Direct shear, R-value, compaction and	Corrected in revised report.

Caltrans Review Comment	DYA's Response
chemical analyses data are missing from the appendix.	
7. Appendix C The axial pile capacity calculations (Appendix C) indicate that an overburden pressure of 110 kPa was assumed in the calculations. The embankment prism shall not be construed as unlimited. Provide a discussion of pressure distribution.	Conservatively, the overburden pressure of the fill embankment was neglected. As noted in Appendix C, the axial pile capacity calculation was based on methods presented in Naval Facilities Engineering Command (NAVFAC), Foundation and Earth Structure Design Manual 7.02 (DM 7). NAVFAC DM 7 states in Figure 1, Note 1 that "Therefore, if D is greater than 20B, limit Po at the pile tip to that value corresponding to D = 20B". In this case, B = 0.305 m, and 20B = 6.1m. As shown in the calculations, the critical depth limiting the overburden pressure for analysis was 6m, which corresponds to Po = 110 kPa.
8. Appendix D The soil profile used for the LPILE input parameters (Appendix D) is not consistent with the soil profile used for axial pile capacity calculations, nor is it consistent with the Log of Test Borings. For example, the Log of Test Borings shows an upper clay layer (approximate Elev. 141.5 to 143 m) underlain by approximately eight to nine meters of silts and sands, underlain by a fat clay layer. The lateral pile calculations use a soil profile where the upper clay layer is underlain by approximately 4.6 meters of silts and sands, underlain by a stiff clay layer. Provide an explanation for these discrepancies.	As noted in Table D1, the LPILE input parameters were conservatively based on Boring B-2. The upper clay layer in Table D1 matches Boring B-2.
9. Appendix D The soil modulus parameter, k, presented in Table D1 for the two clay layers appear to be based on cyclic loading. However, static loading results were provided in addition to cyclic loading results. What values of k were used for static loading results?	A revised Table D1 is presented in Appendix D. As shown on revised Table D-1, static values of k were used during the static analysis, and cyclic values were during cyclic loading analysis.
10. Appendix D The value of the soil strain parameter, ε_{50}, for the upper clay layer is unconservative. The equivalent SPT values shown on the Log of Test Borings for this layer are 8 and 12, indicating stiff clay, therefore an ε_{50} = 0.007 (not 0.005) is recommended.	A revised Table D1 is presented in Appendix D. As shown on revised Table D-1, a revised soil strain parameter, □Õ = 0.007 was used for the clays. Re-performing the calculations with this parameter change indicated very little change (less than 3% percent, static loading; less than 20% cyclic loading) from the published results and the results as published on Plates D1 through D6 are a conservative version of the calculation. Final values in the range of 3% to 20% are, in our opinion, within the accuracy of the state of the practice.
11. Appendix D The unit weight of 21kN/m3 for the API Sand layer at depths between 6.4 and 11.0 meters is not supported by the equivalent SPT values and dry density test data. Also, why is the unit weight for lateral analysis different than the unit weight (18 kN/m^3) used for axial pile capacity calculations?	As noted in Table D1, the LPILE input parameters were conservatively based on Boring B-2. In this layer, Boring B-2 had dry unit weights and moisture contents of 18.3 kN/m3 and 18.6 kN/m3 and 15% and 11%, respectively, resulting in total unit weights of 21.0 kN/m3 and 20.6 kN/m3. The axial pile calculations were based on the idealized soil parameters noted in Table 3-2. As noted in comment 7, the critical depth limiting the overburden pressure for analysis was 6m, a change in the unit weight below that depth will not influence the results of the axial pile capacity calculations.

Caltrans Review Comment	DYA's Response
12. Appendix D The design groundwater table is at elevation 135.3m, which is above the lower clay layer. In the axial pile capacity calculations, the unit weight for the lower clay layer is 9.2 kN/m3. However, in the lateral analyses, the total unit weight of 19 kN/m3 is used, Please explain this discrepancy.	Table D1 contained a typographical error and is revised to read "stiff clay without freewater" at layer depths of 10.6m to 12.2m. As noted in Table D1, the assumed ground surface elevation was 148.4 m and the design groundwater level was 135.3m, therefore, groundwater begins at layers below depths of 13.1m.
13. Appendix D The value of the soil strain parameter, ε_{50}, for the lower clay layer in unconservative. The equivalent SPT values shown on the Log of Test Borings for this layer are 12 and 16, indicating stiff clay, therefore an ε_{50} = 0.007 (not 0.005) is recommended.	See response to comment 10.
14. Appendix D The API Sand layers below the lower clay are below the design groundwater table. In the axial pile capacity calculations, the unit weight for the sand layers below the lower clay layer is 10.2 kN/m3. However, in the lateral analyses, a total unit weight of 20kN/m3 is used for one of the sand layers, Please explain this discrepancy.	As noted in Table D1, the assumed ground surface elevation was 148.4 m and the design groundwater table was 135.3, therefore, groundwater begins at layers below depths of 13.1m.
15. Appendix D The API Sand layers below the lower clay layer are below the design groundwater table, therefore the values for soil modulus parameter k should be for submerged sand, not sand above the water table. Provide a discussion on how the values for k were chosen for these layers.	As noted in Table D1, the assumed ground surface elevation was 148.4 m and the design groundwater table was 135.3, therefore, groundwater begins at layers below depths of 13.1m.
16. Log of Test Borings (LOTB) The Penetration Index shown on the LOTB should be the value recorded from field measurements, not the equivalent SPT value. For example, the Penetration Index at approximately Elev. 145.5 to 146.0 meters at Boring B-1 should be shown as 20 (-8 + 12), not 10.	Corrected in revised report.
17. Log of Test Borings (LOTB) The name of the field investigator; identified as "SN" in the foundation report, is missing form the LOTB sheet.	Corrected in revised report.
18. Log of Test Borings (LOTB) Both boring stations for Borings B-1 and B-2 are identified as 5+24.2, but the stations are not referenced to a control line. Identify the control line on the LOTB.	Corrected in revised report.
19. Log of Test Borings (LOTB) The symbol for the drilling method (e.g., auger boring; dry) in the Profile View shall match the symbol in the Legend.	Corrected in revised report.
20. Log of Test Borings (LOTB) The approximate current ground surface line shall be shown in the Profile View.	Corrected in revised report.
21. Appendix B The test data for "COMP," "RV," "CHEM," and "DS" are missing from the Foundation Report. See also Comments 5 and 6.	Corrected in revised report.

Caltrans Review Comment	DYA's Response
22. Log of Test Borings (LOTB) The symbols "COMP" and CHEM" appear on the Profile View, but there is no explanation of these abbreviations in the Legend Block.	Corrected in revised report.
23. Appendix F Responses to previous review (dated December 20, 2002) comments 1, 2, 3, 4b, 4c, 5, and 6 are adequate and acceptable.	No action required.
24. Appendix F With regard to the Response to previous review (dated December 20, 2002) comment 4a: The revised Pile Data Table as shown in the Foundation Report dated February 7, 2003 and the 100% Submittal Plans are not in conformance with Caltrans standards. See Comment 2.	Corrected in revised report.
25. Appendix F With regard to the Response to previous review (dated December 20, 2002) comment 7: Include documentation that Dokken has addressed the adequacy of the existing bridge foundation, as required per *Caltrans Memo to Designers 9*.	The structural designer (Dokken Engineering) analyzed the widened bridge structure, including the existing foundations. Dokken Engineering determined that no retrofit of the existing structure was required. The Caltrans contact regarding structural design issues on this project is Mr. Imad Abu-Markeih (916-227-1190). The Dokken Engineering contact person is Mr. Matt Salveson (916-858-0642).

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VONG TOAN, Chief
Office of Structure Contract Management

DATE: March 25, 2003

Attention: Mr. Imad Abu-Markhieh

FILE: 07------LA-------5-------KP 44.2/45.2
District County Route PM

FDN REPORT BY: Diaz Yourman & Assoc. DTD: 02/27/03

Western Ave UC (widen)
Structure Name

GENERAL PLAN DTD: 100% FDN PLAN DTD: 100%

07-178601 — EA Number
53-1079S — Bridge Number

Submittal (*Check One*): ☐ 1st ☒ 2nd ☐ 3rd ☐ 4th ☐ Other______

The following comments are based on the report "Geotechnical Investigation: Western Avenue Undercrossing" revised February 7, 2003, prepared by Diaz Yourman & Associates.

1. The project County (Los Angeles) and Route (Highway 5) are missing from the cover of the Foundation Report. Also, the Caltrans Bridge Number is 53-1079S, not 53-1079.

2. For the Pile Data Table, per Caltrans *Memo to Designers 3-1*, Design Loading shall be rounded up to the nearest 25 kN and Nominal Resistance shall be rounded up to the nearest 50 kN. Therefore, the Pile Data Table on the Project Plans and in the Foundation Report should indicate Design Loading = 425 kN (rounded up from 405 kN) and Nominal Resistance = 850 kN (rounded up from 810 kN) for Abutments 1 and 3, and should indicate Design Loading = 600 kN (rounded up from 587 kN) and Nominal Resistance = 1200 kN (rounded up from 1174 kN) for Bent 2.

3. The Foundation Report indicates that "seismic induced settlement would be approximately 12 mm for the design level earthquake" (page 10) and that "post earthquake settlement of the subsurface soils due to the approach embankment was calculated to be approximately 25 mm" (page 13). The settlement calculations in Appendix E indicate an average calculated settlement of 0.5 inch or 12.7 mm. Please clarify what are the estimated amounts of immediate settlement, static settlement and settlement period, and seismically induced settlement.

4. The Low Expansive Soils in Bridge Embankment figure (page 17) should include:
(a) maximum 1V:1H slope of Low Expansion Material behind the Abutment,
(b) minimum 0.3 meter width of Low Expansion Material behind the Abutment, and
(c) a note that Low Expansive Material shall have either an Expansion Index (EI) less than 50 (EI to be determined by *ASTM D4827*) or a Sand Equivalent (SE) greater than 20 (SE to be determined in accordance with *California Test 217*).

Approval: (C3) Not approved (resubmittal to GS required)

Della Leong
Office of Geotechnical Design – West

____
Office of Structure Contract Management

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VONG TOAN, Chief
Office of Structure Contract Management

Attention: Mr. Imad Abu-Markhieh

DATE: March 25, 2003

FILE: 07------LA------5------KP 44.2/45.2
District County Route PM

Western Ave UC (widen)
Structure Name

07-178601 — EA Number
53-1079S — Bridge Number

5. Remove the laboratory test data from Appendix B that do not pertain to this bridge or project. Plates B5 through B21 are labeled "Oceanside CRT" and the boring numbers, sample numbers and soil descriptions do not match those shown in the Log of Test Borings for this bridge. Table B1 "Laboratory Testing Summary" should be revised accordingly.

6. Include all the laboratory test data for this bridge in Appendix B. Direct shear, R-value, compaction and chemical analyses data are missing from the appendix.

7. The axial pile capacity calculations (Appendix C) indicate that an overburden pressure of 110 kPa was assumed in the calculations. The embankment prism shall not be construed as unlimited. Provide a discussion of pressure distribution.

8. The soil profile used for the LPILE input parameters (Appendix D) is not consistent with the soil profile used for axial pile capacity calculations, nor is it consistent with the Log of Test Borings. For example, the Log of Test Borings shows an upper clay layer (approximate Elev. 141.5 to 143 m) underlain by approximately eight to nine meters of silts and sands, underlain by a fat clay layer. The lateral pile calculations use a soil profile where the upper clay layer is underlain by approximately 4.6 meters of silts and sands, underlain by a stiff clay layer. Provide an explanation for these discrepancies.

9. The soil modulus parameter, k, presented in Table D1 for the two clay layers appear to be based on cyclic loading. However, static loading results were provided in addition to cyclic loading results. What values of k were used for static loading results?

10. The value of the soil strain parameter, e50, for the upper clay layer is unconservative. The equivalent SPT values shown on the Log of Test Borings for this layer are 8 and 12, indicating stiff clay, therefore an e50 = 0.007 (not 0.005) is recommended.

11. The unit weight of 21 kN/m3 for the API Sand layer at depths between 6.4 and 11.0 meters is not supported by the equivalent SPT values and dry density test data. Also, why is the unit weight for lateral analyses different than the unit weight (18 kN/m3) used for axial pile capacity calculations?

12. The design groundwater table is at elevation 135.3m, which is above the lower clay layer. In the axial pile capacity calculations, the unit weight for the lower clay layer is 9.2 kN/m3. However, in the lateral analyses, the total unit weight of 19 kN/m3 is used. Please explain this discrepancy.

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VONG TOAN, Chief
Office of Structure Contract Management

Attention: Mr. Imad Abu-Markhieh

DATE: March 25, 2003

FILE: 07-------LA------5------KP 44.2/45.2
District County Route PM

Western Ave UC (widen)
Structure Name

07-178601 — EA Number
53-1079S — Bridge Number

13. The value of the soil strain parameter, e50, for the lower clay layer is unconservative. The equivalent SPT values shown on the Log of Test Borings for this layer are 12 and 16, indicating stiff clay, therefore an e50 = 0.007 (not 0.005) is recommended.

14. The API Sand layers below the lower clay layer are below the design groundwater table. In the axial pile capacity calculations, the unit weight for the sand layers below the lower clay layer is 10.2 kN/m3. However, in the lateral analyses, a total unit weight of 20 kN/m3 is used for one of the sand layers. Please explain this discrepancy.

15. The API Sand layers below the lower clay layer are below the design groundwater table, therefore the values for soil modulus parameter k should be for submerged sand, not sand above the water table. Provide a discussion on how the values for k were chosen for these layers.

Log of Test Borings (LOTB)

16. The Penetration Index shown on the LOTB should be the value recorded from field measurements, not the equivalent SPT value. For example, the Penetration Index at approximately Elev. 145.5 to 146.0 meters at Boring B-1 should be shown as 20 (= 8 + 12), not 10.

17. The name of the field investigator, identified as "SN" in the foundation report, is missing from the LOTB sheet.

18. Both boring stations for Borings B-1 and B-2 are identified as 5+24.2, but the stations are not referenced to a control line. Identify the control line on the LOTB.

19. The symbol for the drilling method (e.g., auger boring: dry) in the Profile View shall match the symbol in the Legend.

20. The approximate current ground surface line shall be shown in the Profile View.

21. The test data for "COMP," "RV," "CHEM," and "DS" are missing from the Foundation Report. See also Comments 5 and 6.

22. The symbols "COMP" and "CHEM" appear on the Profile View, but there is no explanation of these abbreviations in the Legend Block.

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VONG TOAN, Chief
Office of Structure Contract Management

Attention: Mr. Imad Abu-Markhieh

DATE: March 25, 2003

FILE: 07------LA------5------KP 44.2/46.2
District County Route PM

Western Ave UC (widen)
Structure Name

07-178601 53-1079S
EA Number Bridge Number

23. Responses to previous review (dated December 20, 2002) comments 1, 2, 3, 4b, 4c, 5, and 6 are adequate and acceptable.

24. With regard to the Response to previous review (dated December 20, 2002) comment 4a: The revised Pile Data Table as shown in the Foundation Report dated February 7, 2003 and the 100% Submittal Plans are not in conformance with Caltrans standards. See Comment 2.

25. With regard to the Response to previous review (dated December 20, 2002) comment 7: Include documentation that Dokken has addressed the adequacy of the existing bridge foundation, as required per Caltrans *Memo to Designers 9*.

Please contact Della Leong at (916) 227-7099 or Qiang Huang at (916) 227-7179 for further clarification of these or other issues.

DISTRIBUTION

4 copies: Mr. Ray Miller
Dokken Engineering
11171 Sun Center Drive, Suite 435
Rancho Cordova, California 95670-6113

QUALITY CONTROL REVIEWER

Gerald M. Diaz, P.E., G.E.
President

AMY/NS:djb

DIAZ • YOURMAN
& ASSOCIATES
Geotechnical Services

June 30, 2003

Project No. 296-05

Mr. Matthew W. Salveson
Dokken Engineering
11171 Sun Center Drive, Suite 250
Rancho Cordova, CA 95670

Subject: Response to Caltrans Review Comments Dated June 13, 2003
Geotechnical Investigation Report
Western Avenue Undercrossing (53-1079S) Kilometer Post 44.2/45.2
Glendale, California
Caltrans District 7, Los Angeles County
EA 07-1786A1

Dear Mr. Salveson:

This letter provides DYA's response to Caltrans review comments dated June 13, 2003 (attached). DYA's responses are provided in Table 1 and are in the same order as the Caltrans Review Comments (see attached). As noted in Table 1, one revised page (Page D1) and one revised Log of Test Borings (LOTB) that incorporate these comments are included herein.

We trust this provides the information you require. Please call if you have any questions.

Sincerely,

Diaz•Yourman & Associates

Allen M. Yourman, Jr.

Allen M. Yourman, Jr., P.E., G.E.
Vice President

Attachment:
1. Revised Page D1.
2. Revised LOTB.
3. Revised L Pile Analysis outputs.
4. Caltrans Review Comment Dated June 13, 2003.

K:\datafls\PROJECTS\200\296-05\10a RESPONSE TO Caltrans REVIEW COMMENTS on June 13.doc

Table 1 - RESPONSE TO REVIEW COMMENTS

Caltrans Review Comment	DYA's Response
3. Log of Test Borings (LOTB) The LOTB dated 2/19/03 and included with the General Plan plotted 05/23/2003 is not acceptable. The LOTB shall show the Penetration Index (i.e. SPT) values as recorded from the filed measurements, not the calculated equivalent SPT values. The LOTB included in the Foundation Report shows the correct Penetration Index values and, as such, those values shuld be used in the LOTB for the Project Plans. Additionally, the following corrections to the LOTB (in the Foundation Report and for the Project Plans) should be made: (a) The control line (s) for Borings B-1 and B-2 shall be identified. (Comment 18) (b) The approximate current ground surface line shall be shown in the Profile View. (Comment 20) (c) The symbol "CHEM" shown at Elev. 139.5m on Boring B-2 should be revised to "CHM." (Comment 22)	(a) Dokken to add control line to LOTB. (b) Ground Surface profile added. (c) CHEM changed to CA. Revised LOTB is allowed.
4. Analyses for Axial and Lateral Pile Capacities In the Foundation Report, there are discrepancies between the subsurface profiles used to calculate pile axial capacity and pile lateral capacity. The generalized soil profile shown in Table 3-2, used for axial pile capacity calculations shown in Appendix C, is not consistent with the LPILB input parameters shown in Table D1. The explanation provided for this discrepancy is that Table D1 is based on Boring B-2 for conservation. However, there was no explanation why different and possibly less conservative geotechnical parameters were used for axial capacity. Caltrans practice is to consistently use the same soil profile and parameters for pile design, whether designing the pile for axial capacity or lateral capacity, settlement, etc. (Comments 8, 12, 14, 15)	Attached the revised Table D1 based on the generalized soil profile shown in Table 3-2. Lateral pile analyses were re-performed at both bent and abutment using the revised parameters per Caltrans practice. It is our opinion that the previously published analyses were slightly more conservative and, therefore, judged to be still adequate. See attached plots of the re-performed analyses for details.

APPENDIX D - LATERAL PILE ANALYSIS

Lateral pile analyses were performed using the computer program LPILE Plus Version 4 (Ensoft, 2000). The program computes deflection, shear, and bending moments of laterally loaded piles. The program uses nonlinear p-y (lateral load-deflection) curves to model the soil behavior. These p-y curves can be either input or generated by the program. For sloping ground surfaces, a reduction factor is applied to the resisting soil force (p) based on the ratio of the difference between the passive and active earth pressures for a sloping ground surface to the difference between the passive and active earth pressure for a level surface.

Input parameters for the program include applied moments and lateral forces, pile geometry, head condition (free or fixed), and stiffness, and soil geometry and strength parameters. The soil parameters include shear strength, density (both total and relative density for sands), and stress-strain information for clays. The input parameters used in the analyses are summarized in Table D1.

Table D1 - LPILE INPUT PARAMETERS

LPILE SOIL TYPE	DEPTH TO TOP OF LAYER (m)	DEPTH TO BOTTOM OF LAYER (m)	UNIT WEIGT (kN/m^3)	k (kN/m^3)[a]	Friction Angle (degrees)	C_u (kPa)[b]	ε_{50}[c]
API Sand	-0.6	1.2	18	6790	32	--	--
API Sand	1.2	4.8	18	24430	32	--	--
Stiff Clay without freewater	4.8	6.6	20	54300/136000[d]	--	53	0.007
API Sand	6.6	13.1	18	24430	32	--	--
API Sand	13.1	15.1	10	33900	36	--	--
Stiff Clay with freewater	15.1	17.1	9	54300/136000[d]	--	95	0.005

Notes:

- Assuming ground surface at elevation 148.7 m.
- Depth = Depth below pile top; pile top at 0.6 m below ground surface

a. k = variation of soil modulus with depth.
b. C_u = undrained shear strength.
c. ε_{50} = soil strain mobilized at 50% of maximum shear strength.
d. Soils modulus parameter of stiff clay used for static analyses.

Plots of deflection, moment, and shear versus pile depth for the bridge bent are presented on Plates D1 through D3 for the fixed- and free-head conditions, respectively. Plots of deflection, moment, and shear versus pile depth for the bridge abutment are presented on Plates D4 through D6 for the fixed- and free-head conditions, respectively.

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VONG TOAN, Chief
Office of Structure Contract Management

DATE: June 13, 2003

Attention: Mr. Imad Abu-Markhieh

FILE: 07-------LA-------5-------KP 44.2/45.2
District County Route PM

FDN REPORT BY: Diaz Yourman & Assoc. DTD: 05/08/03

Western Ave UC (widen)
Structure Name

GENERAL PLAN DTD: 100% FDN PLAN DTD: 100%

07-178601 — EA Number
53-1079S — Bridge Number

Submittal (Check One): ☐ 1st ☐ 2nd ☒ 3rd ☐ 4th ☐ Other ________

The following comments are based on the report "Geotechnical Investigation: Western Avenue Undercrossing" revised May 8, 2003, prepared by Diaz Yourman & Associates.

1. Responses to Comments 1, 3-7, 9-11, 13, 16-17, 19, 20-21, and 23-24 in Appendix F are adequate and acceptable.

2. Pile Data Table (PDT)
The PDT shown on the Project Plans dated 2/19/03 and plotted 05/23/2003 is not in conformance with Caltrans *Memo to Designers 3-1* and is therefore not acceptable. The PDT as shown in the Foundation Report as Table 4-3 is acceptable. (Comment 2)

3. Log of Test Borings (LOTB)
The LOTB dated 2/19/03 and included with the General Plan plotted 05/23/2003 is not acceptable. The LOTB shall show the Penetration Index (i.e., SPT) values as recorded from field measurements, not the calculated equivalent SPT values. The LOTB included in the Foundation Report shows the correct Penetration Index values and, as such, those values should be used in the LOTB for the Project Plans. Additionally, the following corrections to the LOTB (in the Foundation Report and for the Project Plans) should be made:
(a) The control line(s) for Borings B-1 and B-2 shall be identified. (Comment 18)
(b) The approximate current ground surface line shall be shown in the Profile View. (Comment 20)
(c) The symbol "CHEM" shown at Elev. 139.5 m on Boring B-2 should be revised to "CHM". (Comment 22)

Approval: (C2) Approved subject to OSCM verification

____
Office of Structure Contract Management

Della Leong
Office of Geotechnical Design -- West

Revised 09/01

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. VONG TOAN, Chief
Office of Structure Contract Management

Attention: Mr. Imad Abu-Markhieh

DATE: June 13, 2003

FILE: 07------LA------5------KP 44.2/45.2
District County Route PM

Western Ave UC (widen)
Structure Name

07-178601 — EA Number
53-1079S — Bridge Number

4. Analyses for Axial and Lateral Pile Capacities
In the Foundation Report, there are discrepancies between the subsurface profiles used to calculate pile axial capacity and pile lateral capacity. The generalized soil profile shown in Table 3-2, used for axial capacity calculations shown in Appendix C, is not consistent with the LPILE input parameters shown in Table D1. The explanation provided for this discrepancy is that Table D1 is based on Boring B-2 for conservatism. However, there was no explanation why different and possibly less conservative geotechnical parameters were used for axial capacity. Caltrans practice is to consistently use the same soil profile and parameters for pile design, whether designing the pile for axial capacity or lateral capacity, settlement, etc. (Comments 8, 12, 14, 15)

Please contact Della Leong at (916) 227-7099 or Qiang Huang at (916) 227-7179 for further clarification of these or other issues.

GEOTECHNICAL PROFESSIONAL | APPROVAL DATE

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

GRANULAR		COHESIVE	
Penetration Index	Consistency	Penetration Index	Consistency
0–4	Very Loose	<2	Very Soft
5–10	Loose	2–4	Soft
11–30	Medium Dense	5–8	Firm
31–50	Dense	9–15	Stiff
>50	Very Dense	16–30	Very Stiff
		>30	Hard

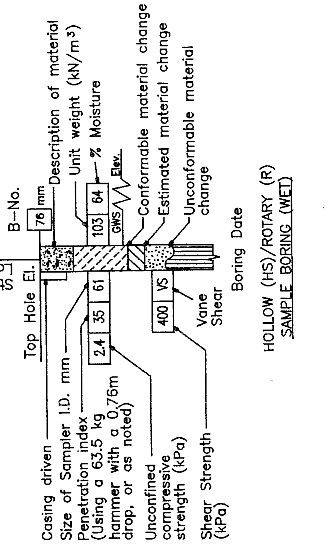
NOTE: Classification of earth material as shown on this sheet is based upon visual inspection and/or mechanical analysis where indicated.

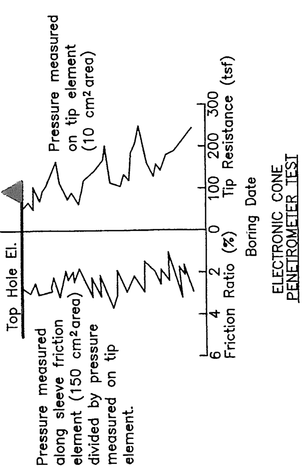
LEGEND OF EARTH MATERIALS

ACCORDING TO ASTM D–2487

SYMBOLS			
GRAPH	LETTER	GRAPH	LETTER
	GW		ML
	GP		CL
	GM		OL
	GC		MH
	SW		CH
	SP		OH
	SM		PT
	SC		

LEGEND OF BORING OPERATIONS





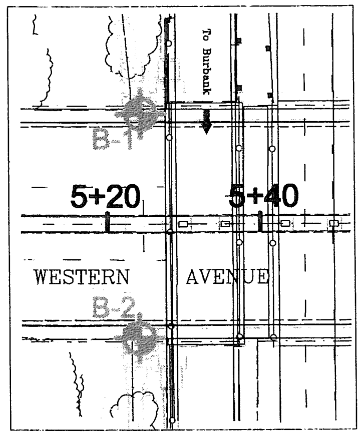
Cone Penetrometer dimensions and testing procedures are in accordance with ASTM standard D–3441–79 or as noted.

SOIL TESTS

(AL) ATTERBERG LIMITS
(CA) CORRSION ANALYSIS
(CM) COMPACTION
(C) CONSOLIDATION
(DS) DIRECT SHEAR
(EIT) EXPANSION INDEX TEST
(HYD) HYDROMETER ANALYSIS
(PP) POCKET PENETROMETER
(RV) R–VALUE
(WA) WASH #200
(SA) SIEVE ANALYSIS
(SE) SAND EQUIVALENT
(UU) TRIAXIAL
(CHM) CHEMICAL ANALYSIS

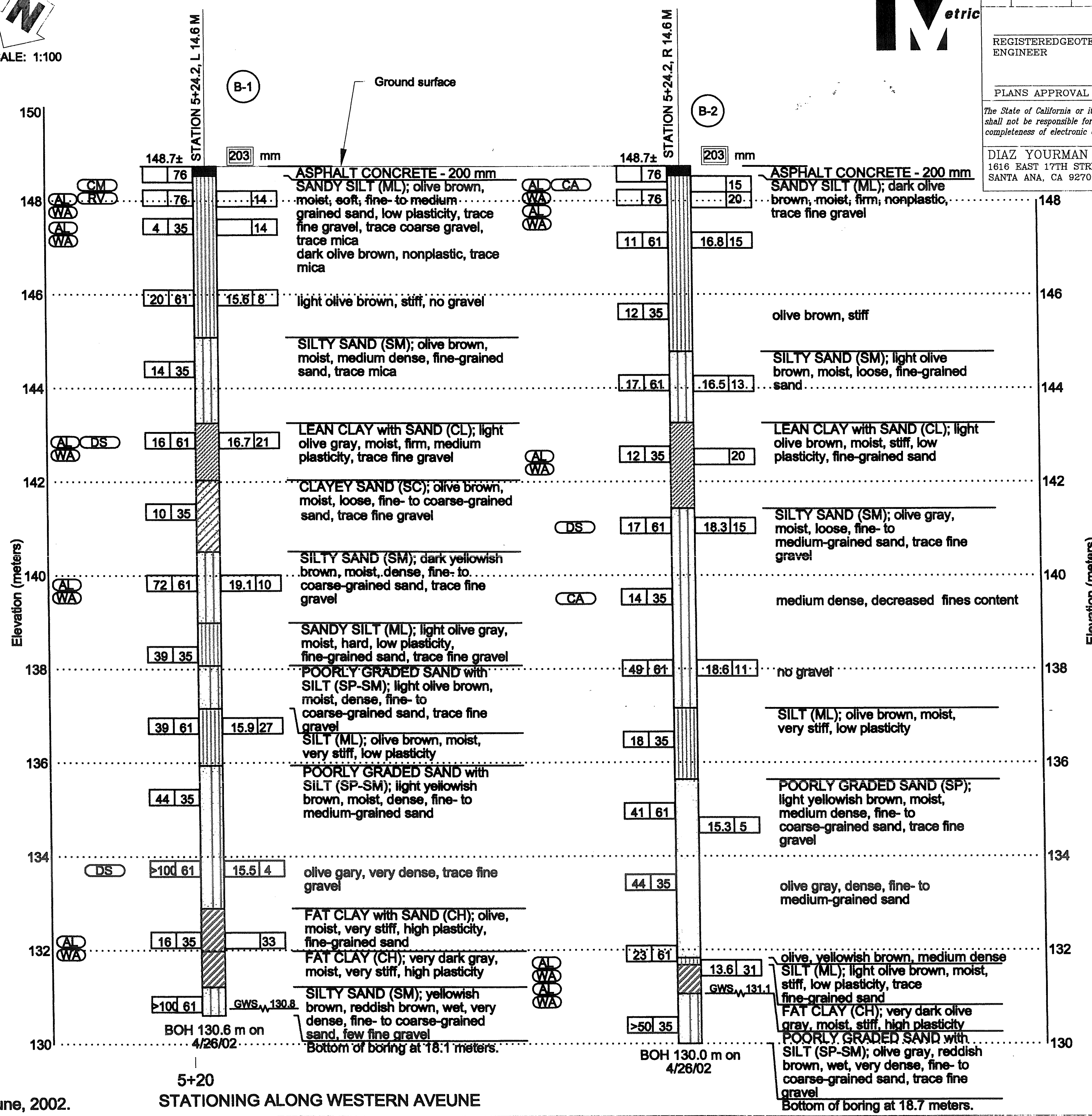
57 mm CONE PENETROMETER
SAMPLE BORING (DRY)
ROTARY SAMPLE BOIRNG (WET)
AUGER BORING (DRY)
TEST PIT
DIAMOND CORE BORING
JET BORING
ELECTRONIC CONE PENTROMETER

BENCH MARK
GPS Point #0326: 2 1/4 " Bronze
CA DT Disc w/ 1" I.P. stamped
"LA 5-28.0 1993", in A.C., flush.



EXPLANATION
DYA BORING LOCATION

SCALE: 1:100



Reference: Base map provided by Dokken Engineering June, 2002.

5+20
STATIONING ALONG WESTERN AVEUNE

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL
07	LA	5	44.2/45.2	1	1

Caltrans Metric

REGISTEREDGEOTECHNICAL ENGINEER
PLANS APPROVAL DATE

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

REGISTERED PROFESSIONAL ENGINEER — ALLEN M. YOURMAN, JR — No 925 — Exp. 12-31-04 — GEOTECHNICAL — STATE OF CALIFORNIA

DIAZ YOURMAN ASSOCIATES
1616 EAST 17TH STREET
SANTA ANA, CA 92705-8509

SCALE: AS NOTED | VERT.DATUM NAVD 88 | HORZ.DATUM NAD 83
PHOTOGRAMMETRY AS OF: | ALIGNMENT TIES
SURVEYED BY | DRAFTED BY
FIELD CHECKED BY | CHECKED BY
DESIGN OVERSIGHT
SIGN OFF DATE
DESIGN BY R. Miller | CHECKED H. Hamzawi
DETAILS BY K. Dang | CHECKED H. Hamzawi
QUANTITIES BY R. Neves | CHECKED C. Tornaci

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Raymond Miller
PROJECT ENGINEER
Field Investigation by: S. Niranganan

BRIDGE NO. 53-1079S
KILOMETER POST 44.2/45 2

WESTERN AVE UC (WIDEN)

LOG OF TEST BORINGS B-1 AND B-2

FOUNDATION PLAN SHEET (METRIC) (REV 3/1/99) 296-05\CAD\LOTB DWG 06-09-02

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 07266
EA 07-178601

DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 1 OF 1

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

DIAZ·YOURMAN
Geotechnical Services

SHEET 1 OF 1
PROJECT NO. 2896-05
DATE 06/30/2003
COMPUTED BY NS
CHECKED BY

PROJECT Western Avenue
SUBJECT Review Commt Dated on 06/13/2003

Attn: Response to Review Commt #4 to the subject comment

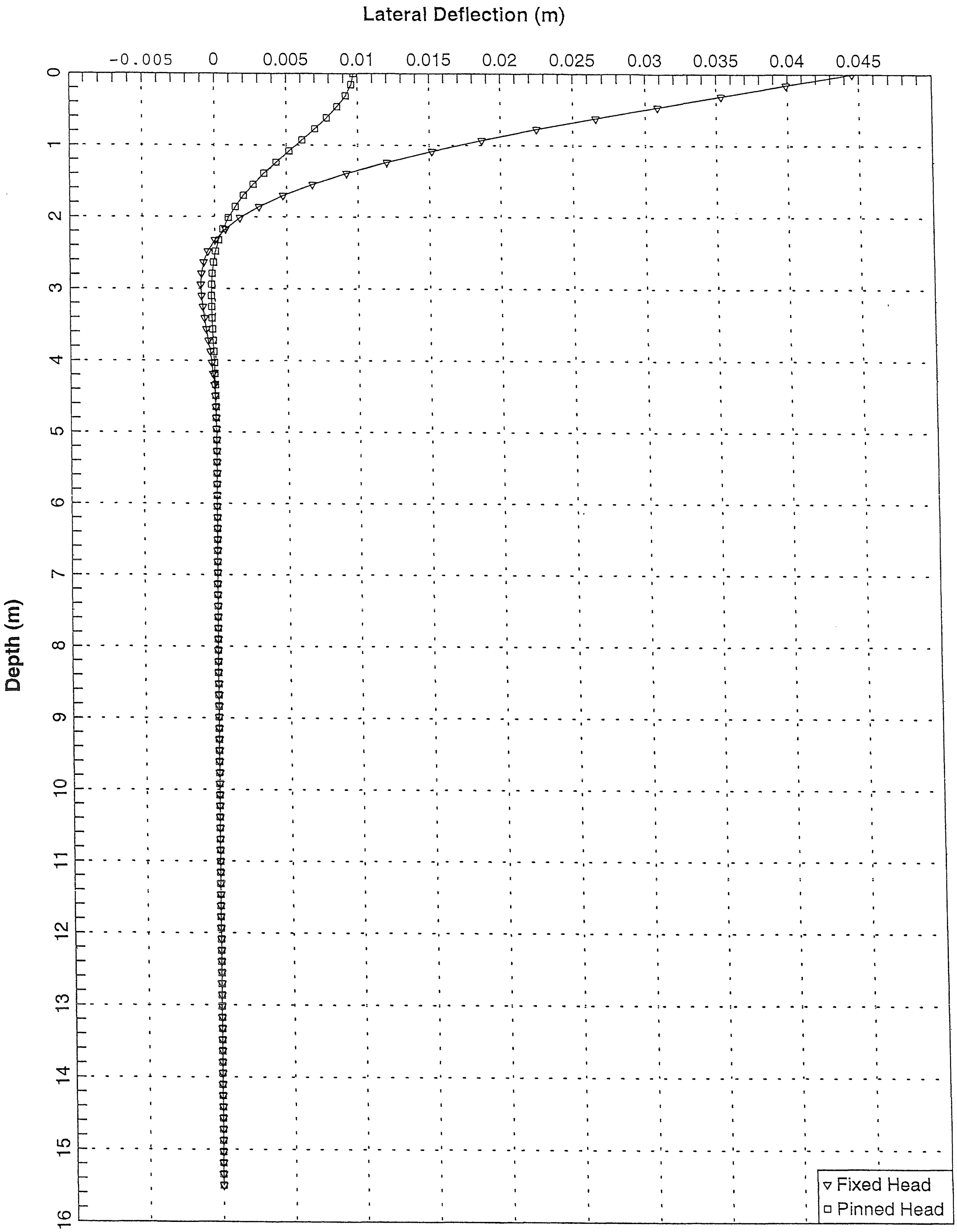
Sol:

1. Idealize Profile.

Elev (m)	Idealized Profile	Axial Pile Capacity Depth (m)	Axial Pile Capacity	Lateral Pile Capacity Depth (m)	Lateral Pile Capacity	Lateral Pile use Idealized Profile Depth (m)	Lateral Pile use Idealized Profile	Elevation (m)
150		0		−0.6		−0.6		148.7
145	ML/SM		ML/SM		Sand		Sand	
		5.1		4.6		4.8		143.3
	CL		CL		Clay		Clay	
		6.9		6.4		6.6		141.5
140	ML/SM		ML/SM		Sand		Sand	
				10.6				
					Clay			
				12.2				
					Sand			
135		13.4		13.1		13.1		135
	SM~SP		SM/SP		Sand		Sand	
		15.4				15.1		133
	CH		CH				Clay	
		17.4				17.1		131
130	SM~SP		SM/SP					

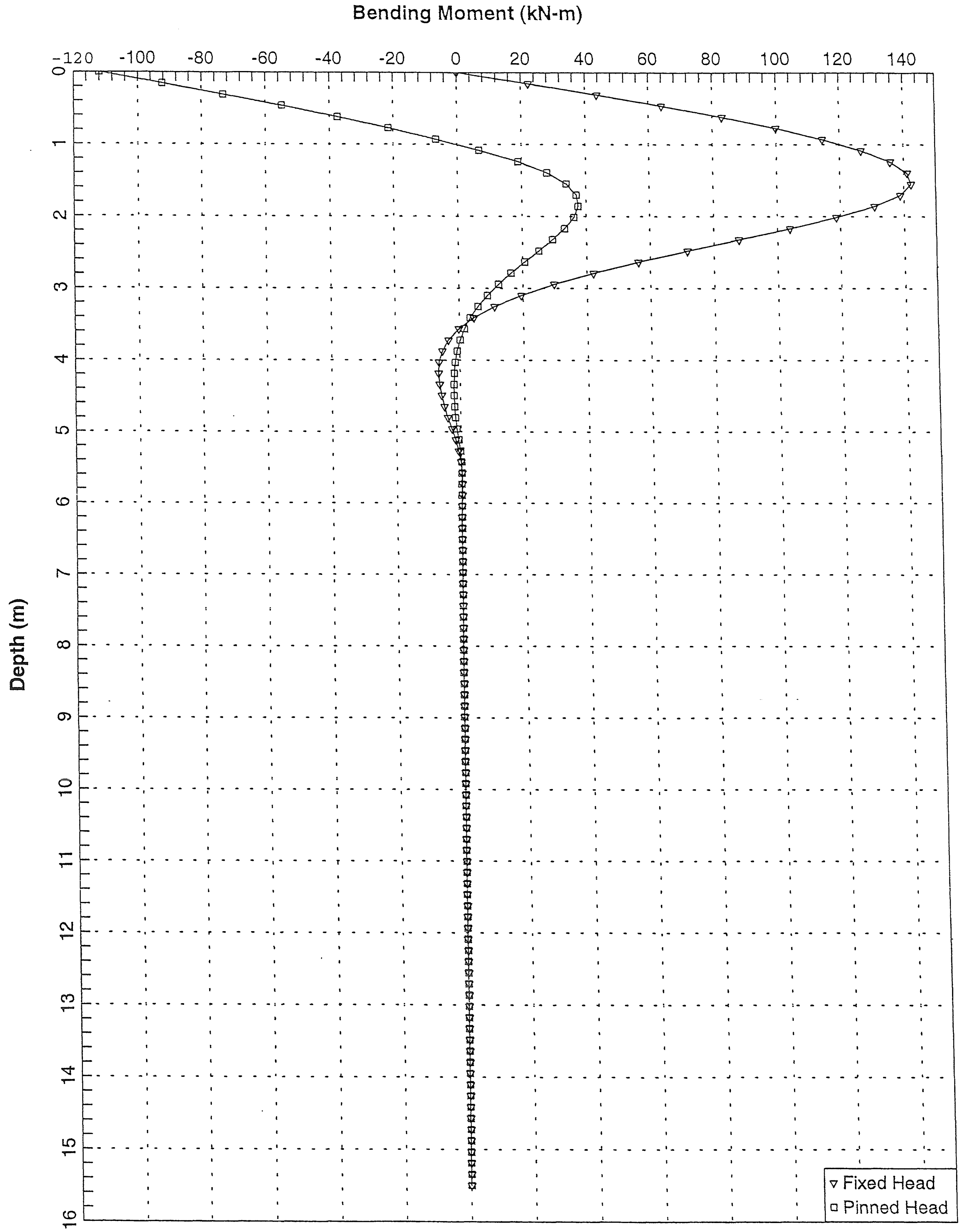
2. Rerun LPile Analyses using idealized profile shown on revised Table D4.

3. Based on the new analyses, the published result in the foundation report was judged to be slight more conservative. See attached new analysis output.
We concluded the previously published result is adequate.



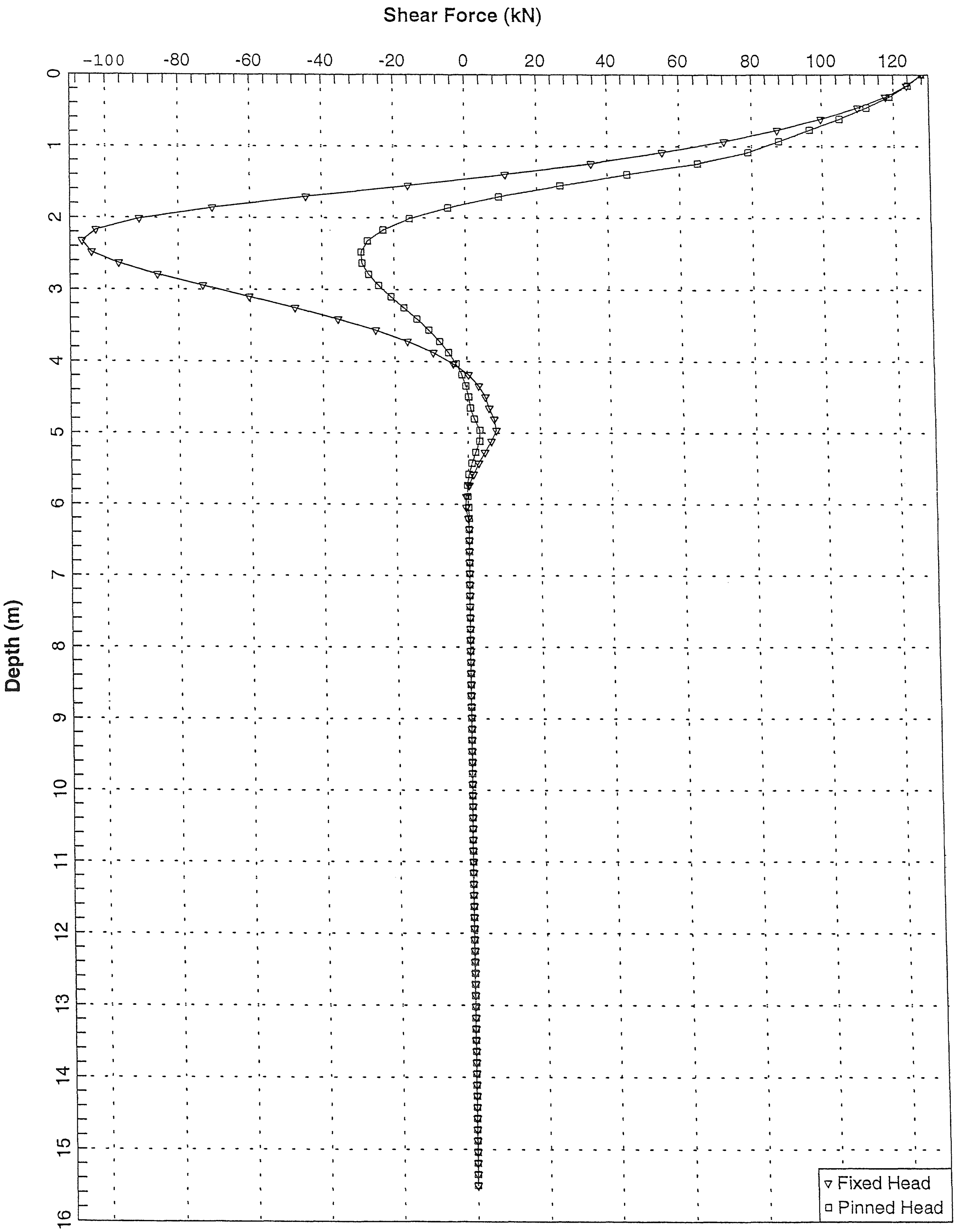
Caltrans Class 625 Pile, Crack Moment of Inertia, Cyclic Loading (15 cycles), Lateral Load = 128 kN, Vertical Load = 587 kN

Bents



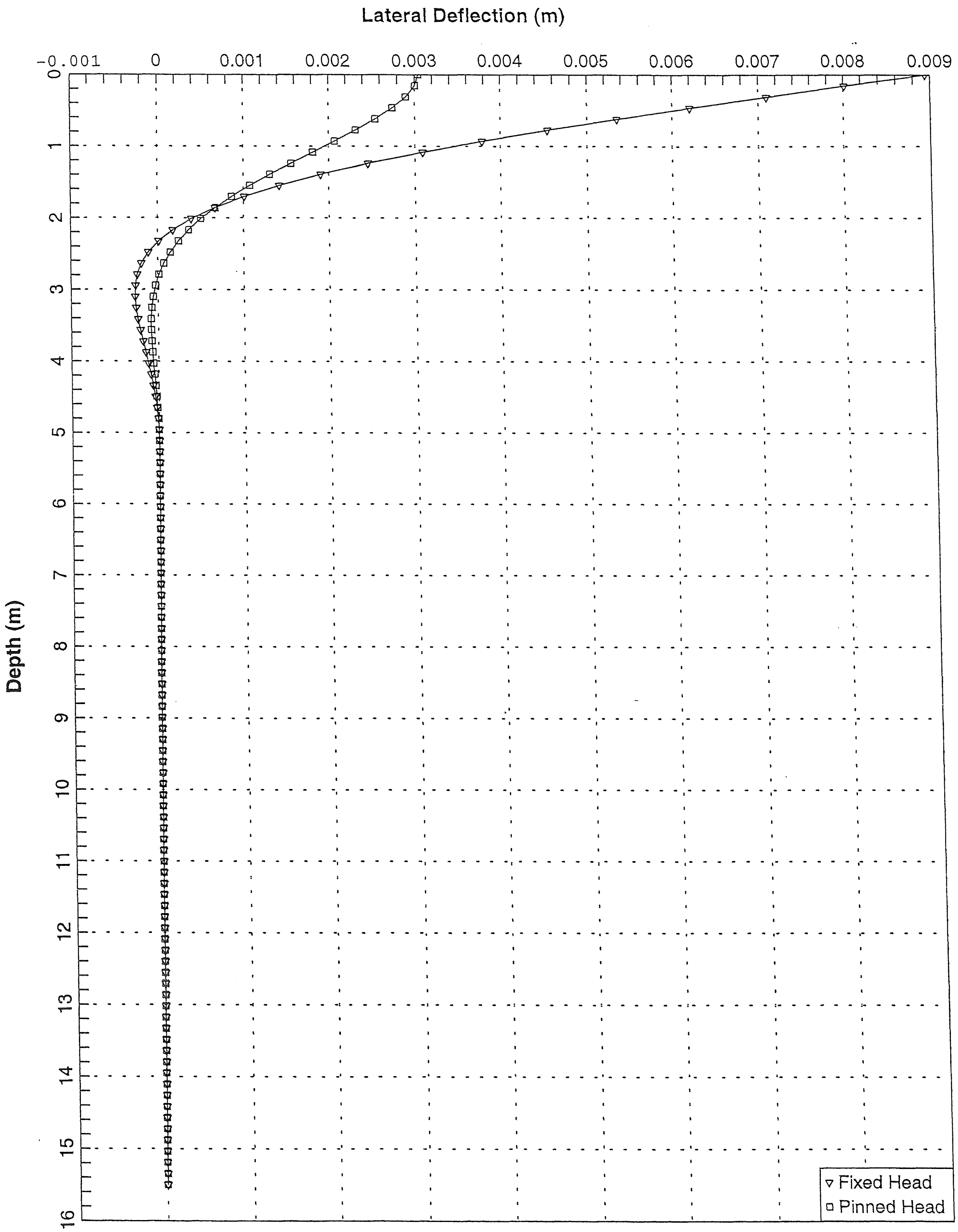
Caltrans Class 625 Pile, Crack Moment of Inertia, Cyclic Loading (15 cycles), Lateral Load = 128 kN, Vertical Load = 587 kN

Bents



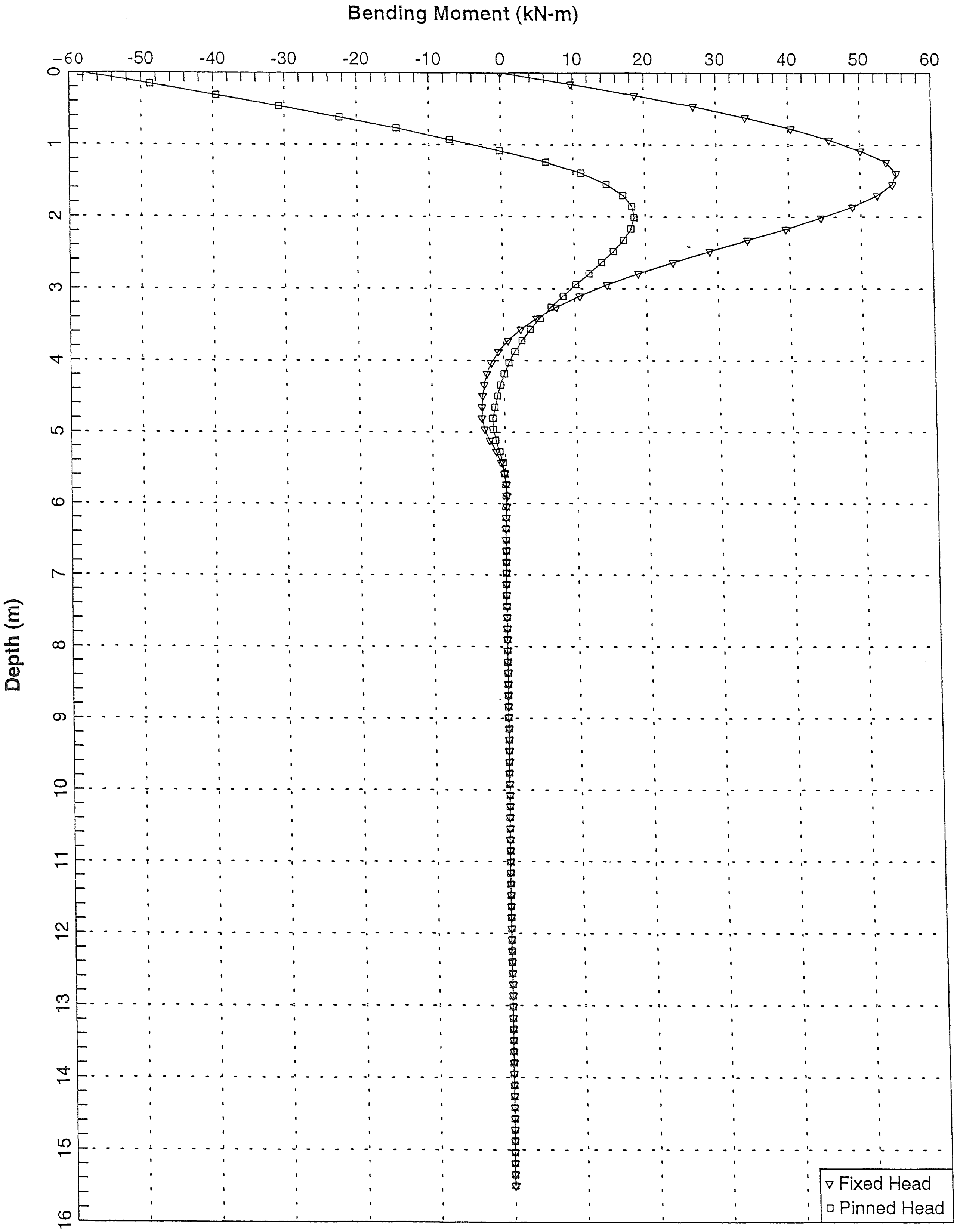
Caltrans Class 625 Pile, Crack Moment of Inertia, Cyclic Loading (15 cycles), Lateral Load = 128 kN, Vertical Load = 587 kN

Bents



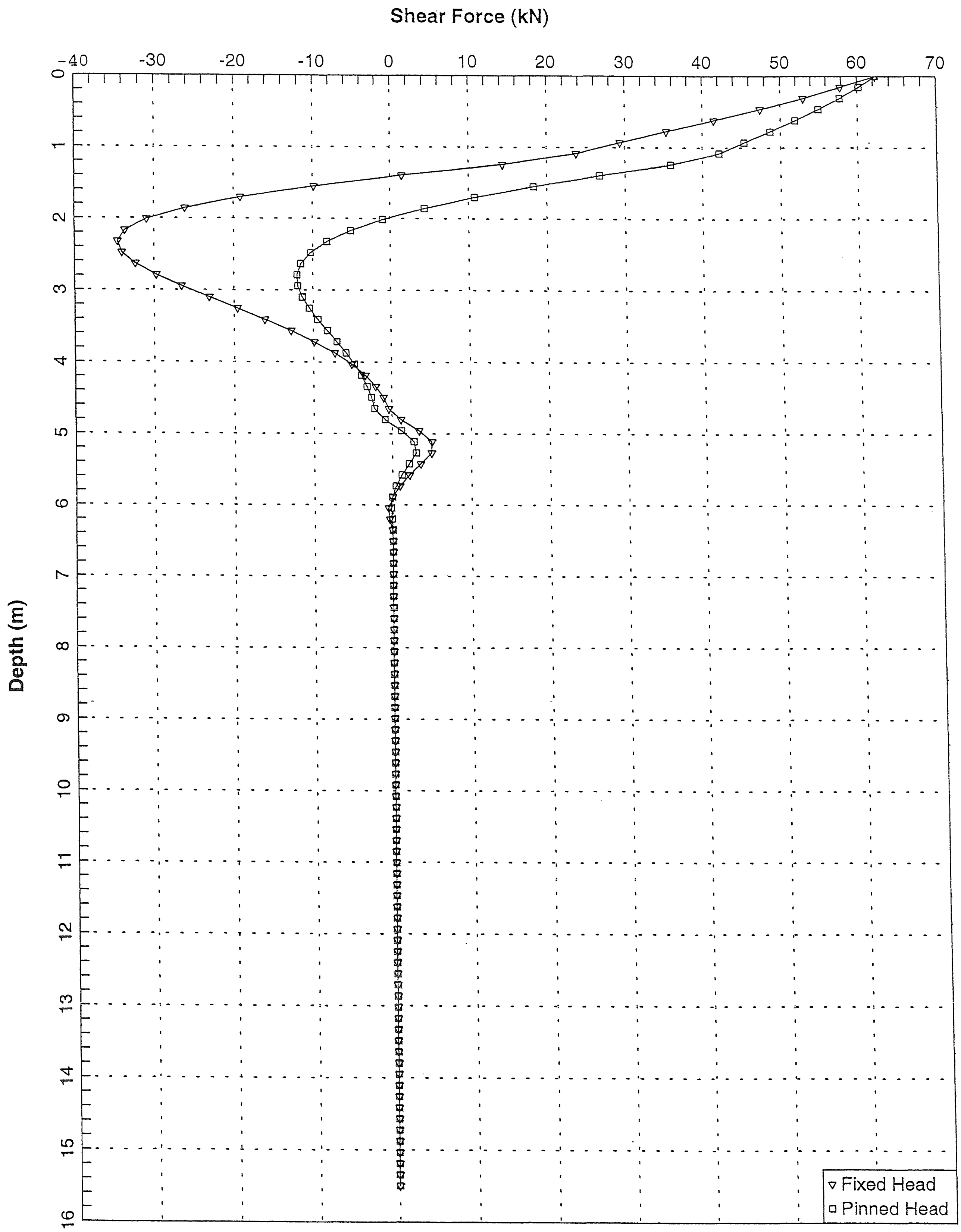
Caltrans Class 625 Pile, Gross Moment of Inertia, Static Loading, Lateral Load = 62 kN, Vertical Load = 405 kN

Abutments



Caltrans Class 625 Pile, Gross Moment of Inertia, Static Loading, Lateral Load = 62 kN, Vertical Load = 405 kN

Abutments



Caltrans Class 625 Pile, Gross Moment of Inertia, Static Loading, Lateral Load = 62 kN, Vertical Load = 405 kN

Abutments

DOKKEN ENGINEERING
Transportation Solutions from Concept to Construction

March 25, 2009

Mr. Imad Abu-Markhieh, P.E.
Contract Manager
Office of Structure Contract Management
California Department of Transportation
PO Box 942874
Sacramento, CA 94274-0001

RE: Updates to the Western Avenue Undercrossing (53-1079S) Geotechnical Investigation Kilometer Post 44.2/45.2
EA 07-1786A1

Dear Mr. Abu-Markhieh:

Please find attached geotechnical report updated sections.

If you have any questions or comments, please call me at (916) 858-0642.

Sincerely,

DOKKEN ENGINEERING

Robert Lawrence, P.E. G.E.
Senior Geotechnical Engineer

attachments

1277-52/RL/rl/mm

4.9.1 Pile Installation

Criteria for pile driving should be established after the contractor's pile-hammer-cushion system is known and dynamic pile wave equation (WEAP) analyses are performed. With the exception of piles to be load tested, all driven piles shall be driven to a value of not less than the nominal resistance demand presented in Table 4-3. This nominal resistance shall be determined during driving using the Gates Equation.

Based upon the soils encountered in the boring logs, the piles should be capable of being driven to the specified tip elevations. However, the contractor should have all necessary equipment and necessary drilling equipment pursuant to Section 49-105 of the Standard Specifications. Jetting will not be an acceptable method of pile installation.

If the piles do not have the penetration value (blows per foot) which corresponds to the design static capacity near the specified tip elevation, the pile shall be driven to between 1- to 2-feet above the specified tip elevation and the driving stopped. A re-strike (second driving of a pile) shall be performed to drive the last 1- to 2-feet of pile to determine the re-strike penetration value. Provided this penetration value is equal to or greater than the penetration value required to achieve the design static capacity, the pile will be accepted. The minimum time between initial driving and the re-strike shall be 24-hours, but the longer the time the pile is allowed to set-up, the greater the chance of the re-strike achieving the required penetration value.

Table 4-3 SUMMARY OF PILE DATA

LOCATION	PILE TYPE	DESIGN LOADING (kN)	NOMINAL RESISTANCE		PILE CUT-OFF ELEVATION (m)	DESIGN TIP ELEVATIONS (m)	SPECIFIED TIP ELEVATIONS (m)
			Compression (kN)	Tension (kN)			
Abutment 1	Class 625	425	850	0	Varies	134 (1); 137 (3)	134
Bent 2	Class 625	600	1200	0	148.4	133 (1); 139 (3)	133
Abutment 3	Class 625	425	850	0	Varies	134 (1); 137 (3)	134

Notes:
1. Alternatives V, X, Y only; Alternative W is excluded in type selection.
2. Design tip elevation is controlled by the following demands: (1) Compression, (2) Tension, (3) Lateral.

FOR CONTRACT NO.: 07-1786A4

INFORMATION HANDOUT

MATERIALS INFORMATION

BATTERY BACKUP SYSTEM CONNECTION DIAGRAMS

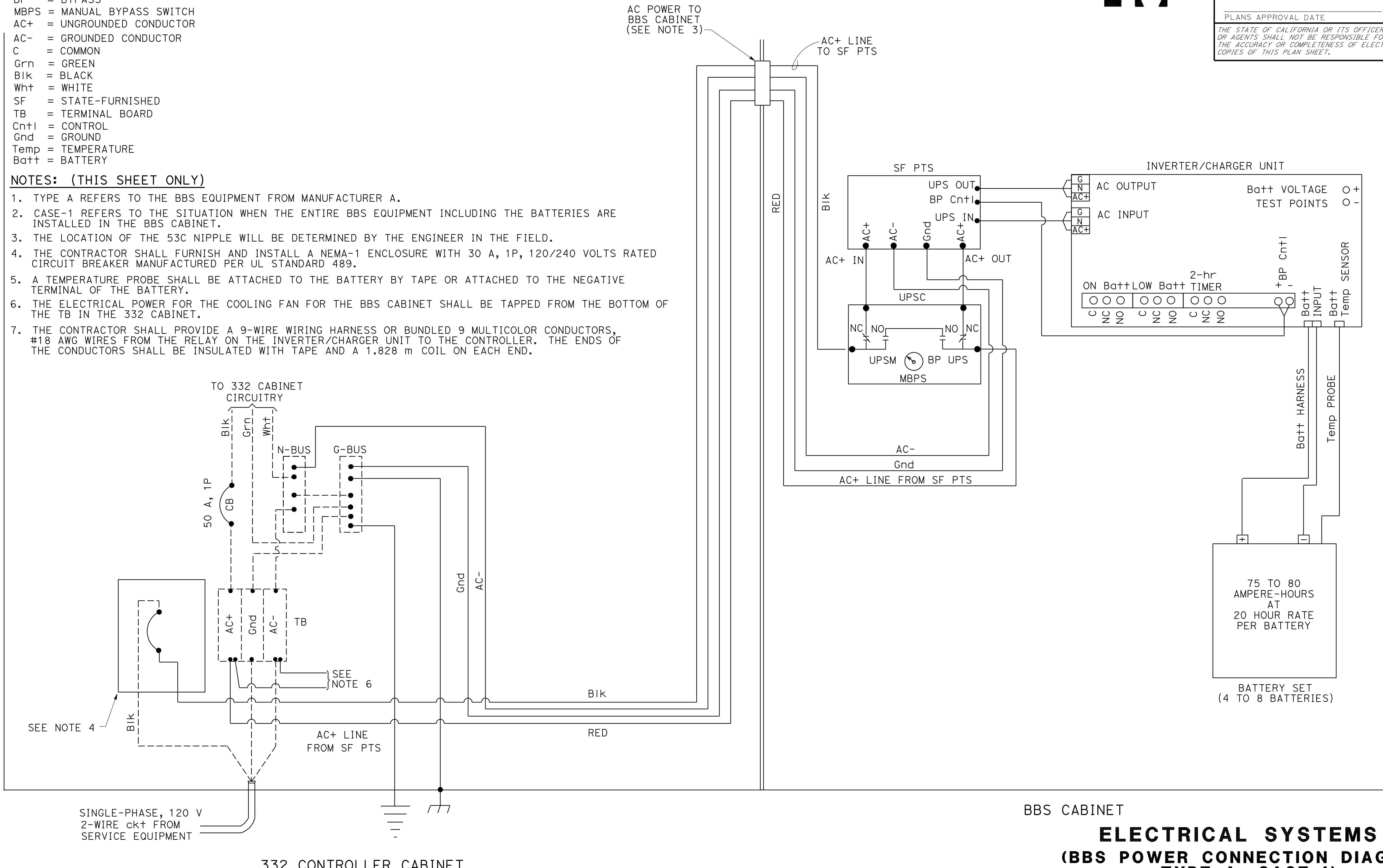
ROUTE: 07-LA-5, KP 44.2/45.2

LEGEND: (THIS SHEET ONLY)

- PTS = POWER TRANSFER SWITCH
- UPS = UNINTERRUPTIBLE POWER SUPPLY
- UPSC = UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
- UPSM = UPS MODE
- BP = BYPASS
- MBPS = MANUAL BYPASS SWITCH
- AC+ = UNGROUNDED CONDUCTOR
- AC- = GROUNDED CONDUCTOR
- C = COMMON
- Grn = GREEN
- Blk = BLACK
- Wht = WHITE
- SF = STATE-FURNISHED
- TB = TERMINAL BOARD
- Cntl = CONTROL
- Gnd = GROUND
- Temp = TEMPERATURE
- Batt = BATTERY

NOTES: (THIS SHEET ONLY)

1. TYPE A REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER A.
2. CASE-1 REFERS TO THE SITUATION WHEN THE ENTIRE BBS EQUIPMENT INCLUDING THE BATTERIES ARE INSTALLED IN THE BBS CABINET.
3. THE LOCATION OF THE 53C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OF THE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A 1.828 m COIL ON EACH END.



Thresa Gabriel 12-20-07
REGISTERED ELECT ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Theresa A. Gabriel — No. E15129 — Exp. 6-30-10 — ELECT — STATE OF CALIFORNIA

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-1)

NO SCALE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CALCULATED-DESIGNED BY | CHECKED BY | FUNCTIONAL SUPERVISOR | REVISED BY | DATE REVISED

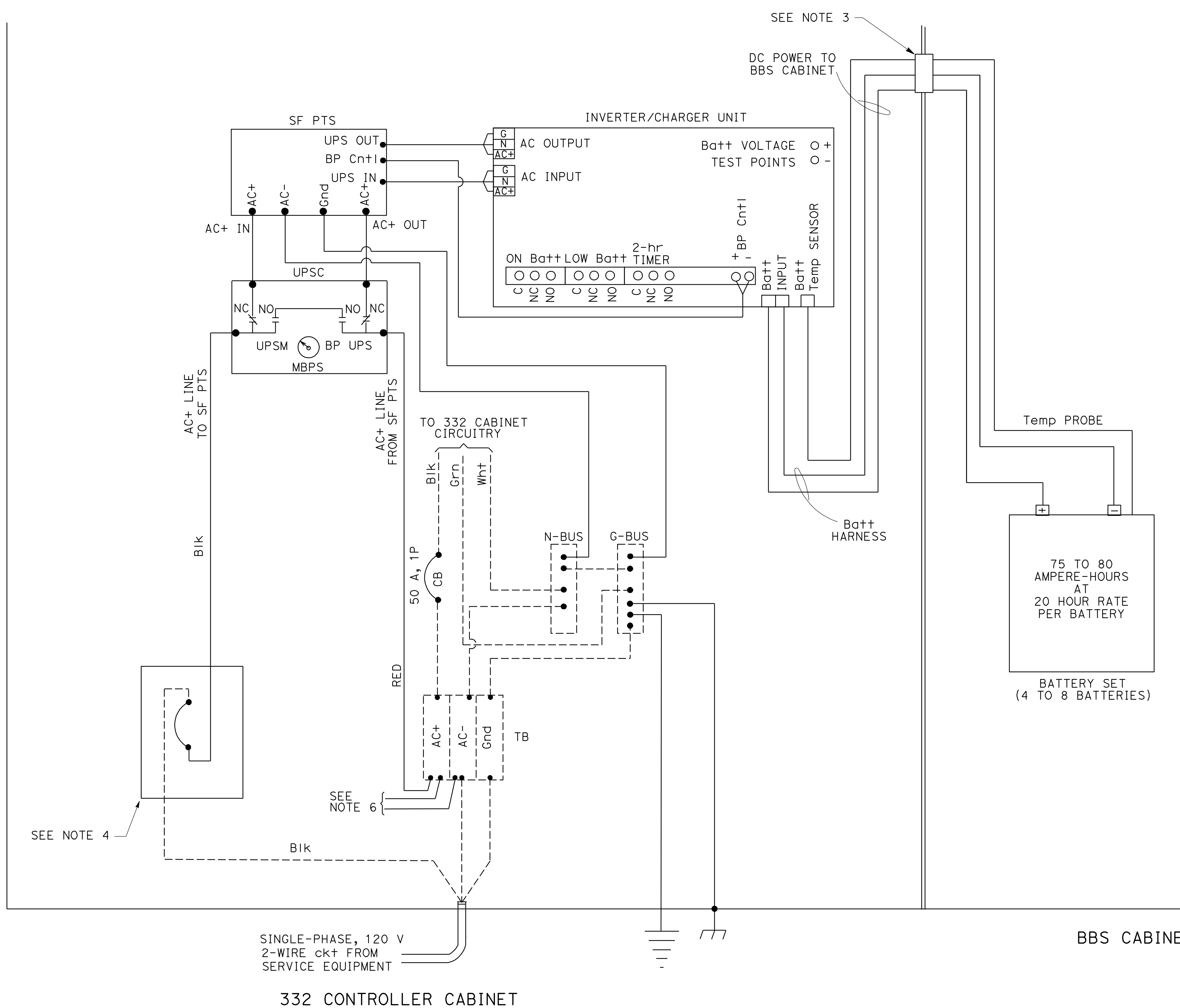
LAST REVISION 2-2-09 | DATE PLOTTED => 13-MAR-2009 | TIME PLOTTED => 09:05

Caltrans Metric

Theresa Gabriel 12-20-07
REGISTERED ELECT ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Theresa A. Gabriel
No. E15129
Exp. 6-30-10
ELECT
STATE OF CALIFORNIA



LEGEND: (THIS SHEET ONLY)

PTS = POWER TRANSFER SWITCH
UPS = UNINTERRUPTIBLE POWER SUPPLY
UPSC = UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
UPSM = UPS MODE
BP = BYPASS
MBPS = MANUAL BYPASS SWITCH
AC+ = UNGROUNDED CONDUCTOR
AC- = GROUNDED CONDUCTOR
C = COMMON
Grn = GREEN
Blk = BLACK
Wht = WHITE
SF = STATE-FURNISHED
Batt = BATTERY
Temp = TEMPERATURE
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND

NOTES: (THIS SHEET ONLY)

1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-2 REFERS TO THE SITUATION WHEN ONLY THE BATTERIES ARE INSTALLED IN THE BBS CABINET. THE REMAINING EQUIPMENT IS PLACED IN THE 332 CONTROLLER CABINET.
3. THE LOCATION OF THE 53C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OFTHE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A 1.828 m COIL ON EACH END.

ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-2)

NO SCALE

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:06
LAST REVISION 2-2-09

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NOTES: (THIS SHEET ONLY)

1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-1 REFERS TO THE SITUATION WHEN THE ENTIRE BBS EQUIPMENT INCLUDING THE BATTERIES ARE INSTALLED IN THE BBS CABINET.
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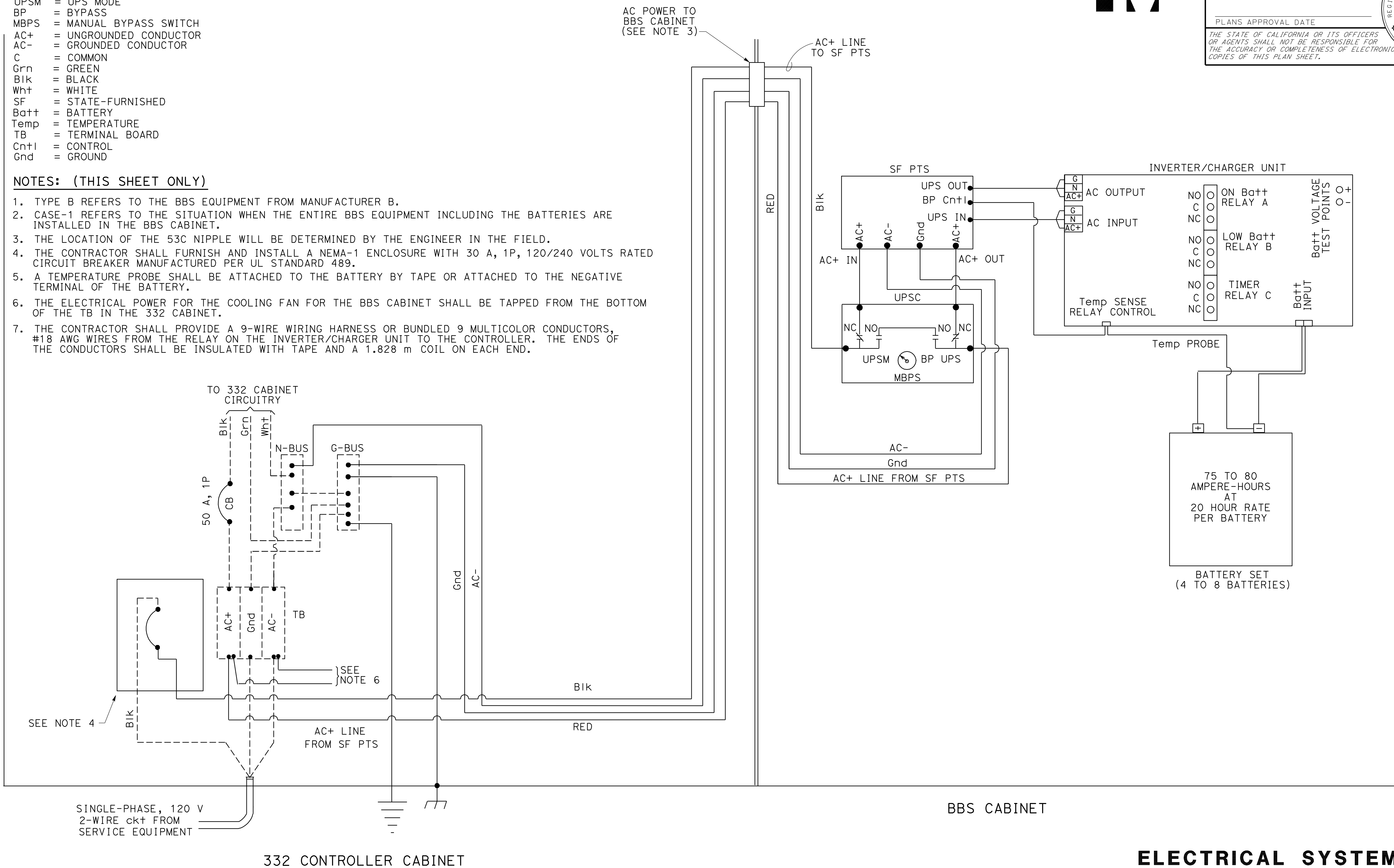

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED ELECT ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Theresa A. Gabriel — No. E15129 — Exp. 6-30-10 — ELECT — STATE OF CALIFORNIA

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ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE B, CASE-1)

NO SCALE

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LAST REVISION 2-2-09 | DATE PLOTTED => 13-MAR-2009 | TIME PLOTTED => 09:07

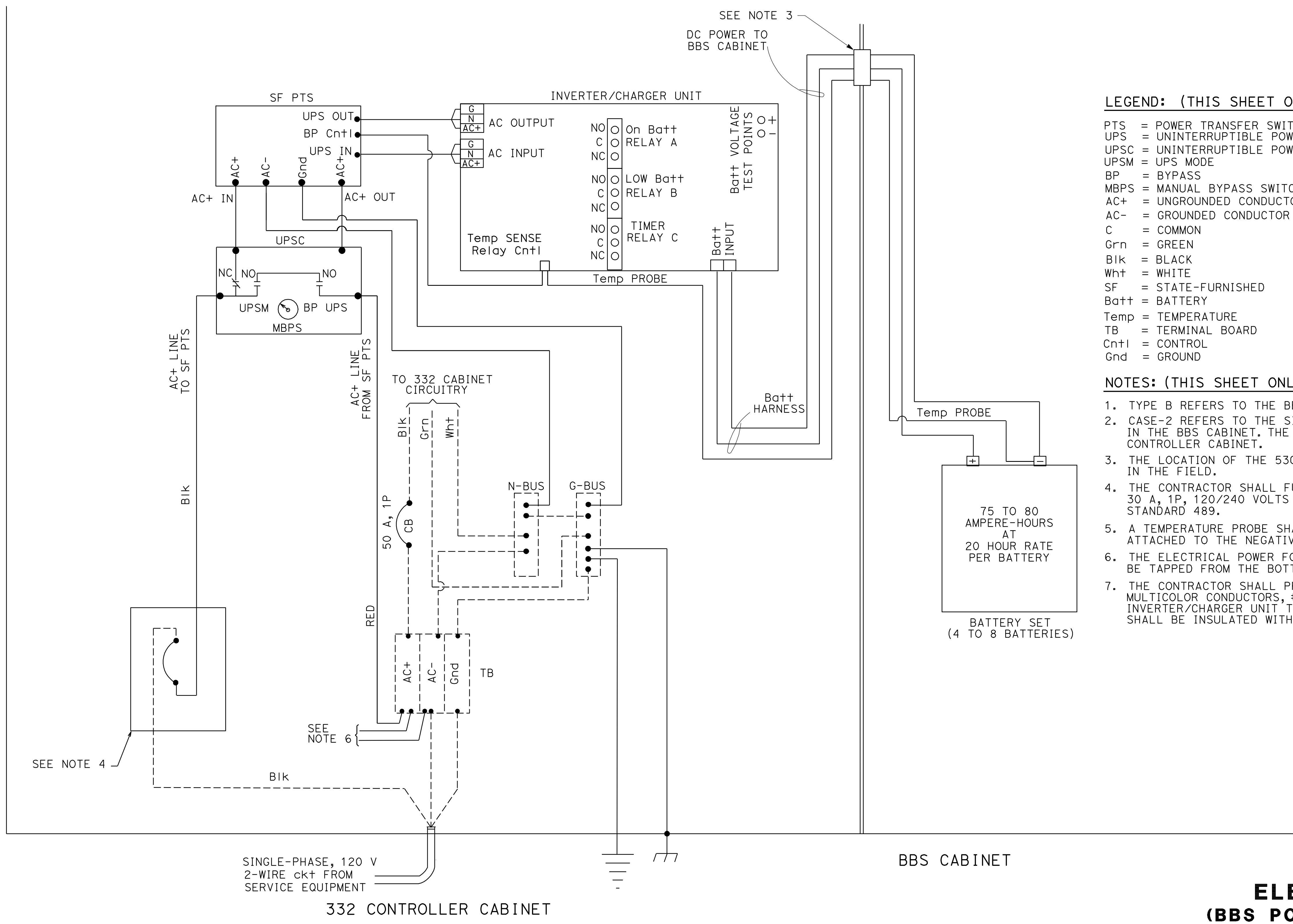
Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED ELECT ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Theresa A. Gabriel No. E15129 Exp. 6-30-10 ELECT STATE OF CALIFORNIA

Caltrans Metric



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ELECTRICAL SYSTEMS
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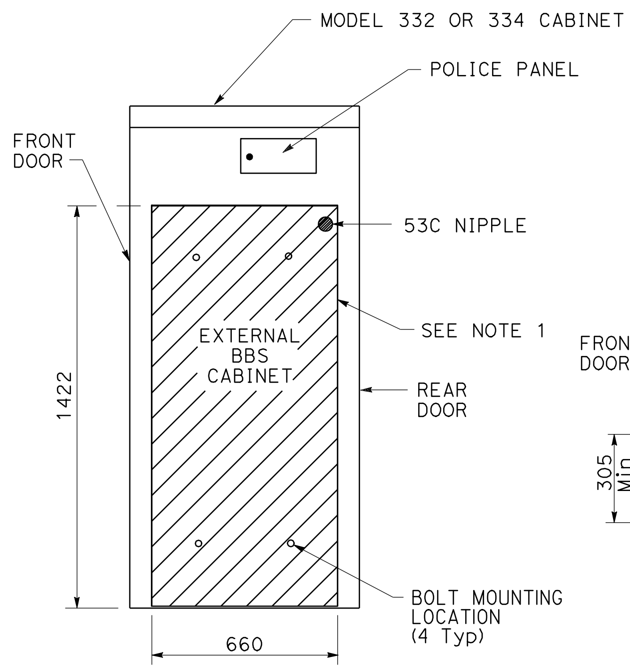
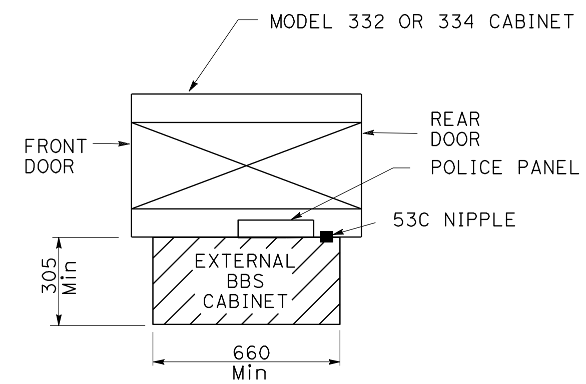


SIDE VIEW

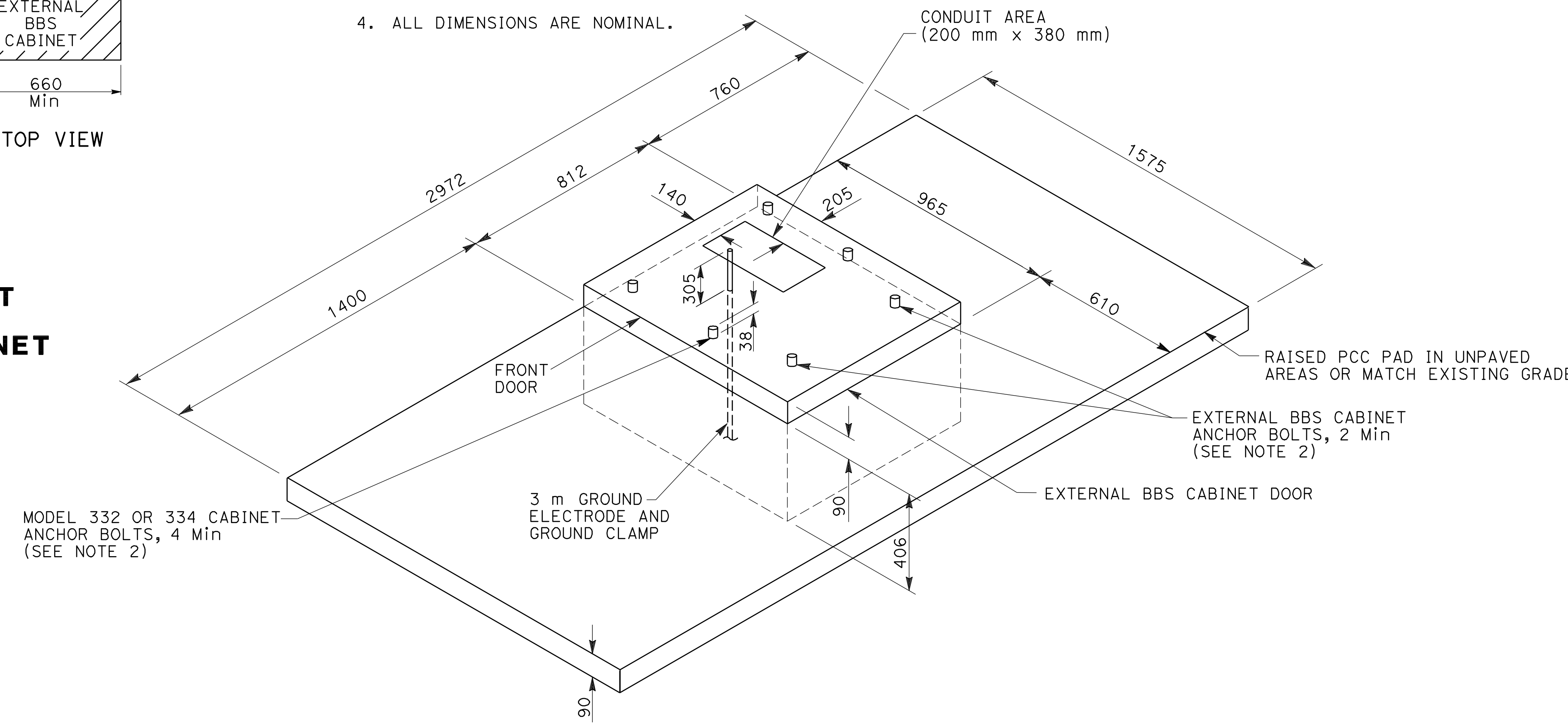


TOP VIEW

EXTERNAL BBS CABINET MOUNTED TO THE MODEL 332 OR 334 CABINET

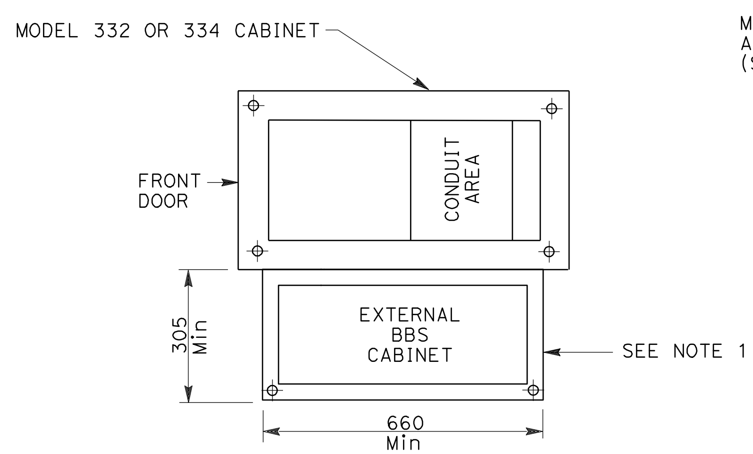
NOTE: (THIS SHEET ONLY)

1. THE EXTERNAL BBS CABINET SHALL BE MOUNTED TO THE MODEL 332 OR 334 CABINET WITH FOUR 18-8 STAINLESS STEEL HEX HEAD, FULLY-THREADED, 9.5 mm-16 X 25.4 mm BOLTS; TWO WASHERS PER BOLT, DESIGNED FOR 9.5 mm BOLTS AND ARE 18-8 STAINLESS STEEL, 25.4 mm OUTSIDE DIAMETER, ROUND, AND FLAT; AND ONE K-LOCK NUT PER BOLT, THAT IS 18-8 STAINLESS STEEL AND A HEX-NUT. THE ENGINEER WILL HAVE TO APPROVE THE BOLT MOUNTING LOCATION PRIOR TO INSTALLATION.
2. THE ANCHOR BOLTS SHALL BE 19 mm Dia X 380 mm WITH A 50 mm-90° BEND. THE CABINET MANUFACTURER'S SPECIFICATION SHALL DETERMINE THE LOCATION OF THE ANCHOR BOLTS IN THE FOUNDATION. THE ENGINEER WILL HAVE TO APPROVE ANCHOR BOLTS AND ITS LOCATION IN THE FOUNDATION PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL VERIFY THE DIMENSIONS OF THE BBS CABINET PRIOR TO CONSTRUCTING THE FOUNDATION OF THE MODIFIED PORTION OF THE Std MODEL 332 AND 334 CABINET FOUNDATION. THE ENGINEER WILL HAVE TO APPROVE ANY NECESSARY DEVIATIONS PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS ARE NOMINAL.



MODIFIED MODEL 332 AND 334 CABINET FOUNDATION DETAIL FOR BATTERY BACKUP SYSTEM (BBS)

(FOR DIMENSIONS AND DETAILS NOT SHOWN AND ADDITIONAL NOTES, SEE SHEET ES-3C OF THE STANDARDS PLANS FOR MODEL 332 AND 334 CABINETS)



BASE PLAN FOR BBS MOUNTED TO THE MODEL 332 OR 334 CABINET

(FOR DIMENSIONS AND DETAILS NOT SHOWN, SEE SHEET A6-1 TO A6-4, CABINET HOUSING DETAILS OF THE TRANSPORTATION ELECTRICAL EQUIPMENT SPECIFICATION (TEES))

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ELECTRICAL SYSTEMS
(BBS FOUNDATION DETAILS)

NO SCALE

THIS PLAN IS ACCURATE FOR ELECTRICAL WORK ONLY.

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